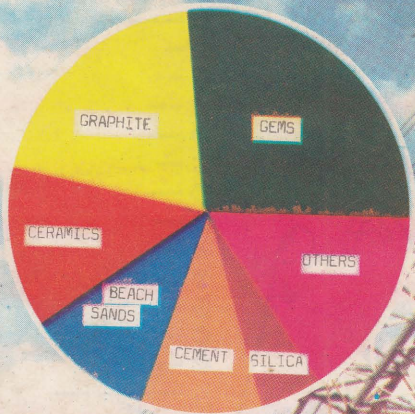


ECONOMIC REVIEW

April
1984



**SRI LANKA'S
MINERAL
RESOURCES**



MINERAL RESOURCES MAP SRI LANKA

REFERENCE

- Miocene Limestone
- Graphite Working Mine
- Main Graphite Areas
- Graphite Experimental Mine
- Gem Bearing Areas
- Beach Mineral Sands
- Crystalline Limestone, Detritic
- Iron Ore (Magnetite)
- Pearl Banks
- Iron Ore (Limonite)
- Peat
- Clay (Brick, Tile, Ceramics)
- Corals
- Cement Raw Material
- Silica Sands
- Kaolin
- Quartzite
- Mica
- Vein Quartz
- Feldspar
- Fluorapatite
- Serpentine
- Magnetite
- Apatite
- Copper Magnetite
- Thorium
- Green Marble
- Black Carbonaceous Shale
- Miocene Limestone boundary (Interpreted)
- Hot Springs
- Latent resources developed

Dike

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 Department of Mines and Energy, Sri Lanka
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 Published 1982
 Open File Report 82-1

SCALE: 8 MILES TO ONE INCH
 500,000
 MILES 0 5 10 15 20 25 30
 KILOMETERS 0 5 10 15 20 25 30
 TEMPERATURE INDICATION PROJECTION
 REFERENCE
 SYMBOLS AND MEANINGS
 THIS MAP IS A SUMMARY OF THE MINERAL RESOURCES OF SRI LANKA AS OF 1982. IT IS NOT A FIELD MAP AND SHOULD NOT BE USED FOR FIELD WORK. THE MAP IS A SUMMARY OF THE MINERAL RESOURCES OF SRI LANKA AS OF 1982. IT IS NOT A FIELD MAP AND SHOULD NOT BE USED FOR FIELD WORK.

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"Book Review"	32	International commodity control - A contemporary history and appraisal Fiona Gordon - Ashworth, (London: Croom Helm, 1984 £ 19.95) Leelananda de Silva

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- * A buffer stock of gold for producer exporters
- * Market conditions for Sri Lanka's non-traditional exports
- * The concept of intermodal tariff rate structure for sea borne exports

COVER DESIGNED BY

Palitha Kannangara

THE ECONOMIC REVIEW is intended to promote knowledge of and interest in the economy and economic development process by a many sided presentation of views & reportage, facts and debate.

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DIARY OF EVENTS

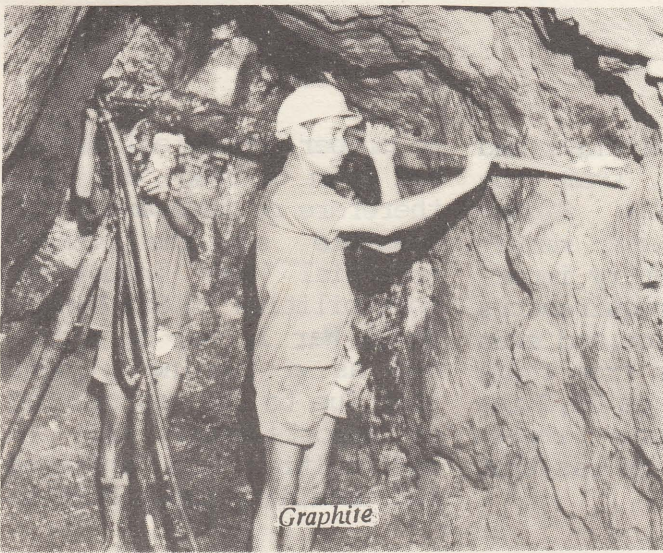
March

- 26 The Ceylon Petroleum Corporation entered into an agreement with Petro-Canada International Assistance Corporation for financial and technical assistance to carry out geophysical surveys to explore for oil off the coast of Sri Lanka. The survey is estimated to cost around Canadian dollars 1.68 million.
- 30 An agreement for a grant of £ 5.3 million (approximately Rs.190.5 million) for the Colombo Airport Development Project was finalised in an exchange of letters between the governments of the United Kingdom and Sri Lanka. This grant will meet part of the cost of equipment and related services for the new run-way and terminal building programme.
- 31 At the end of March 1984 the Cost of Living Index figures (Colombo Consumer's Price Index No.) computed by the Department of Census and Statistics had reached 542.1 as against 450.0 at the end of March 1983 and 407.5 at the end of March 1982.

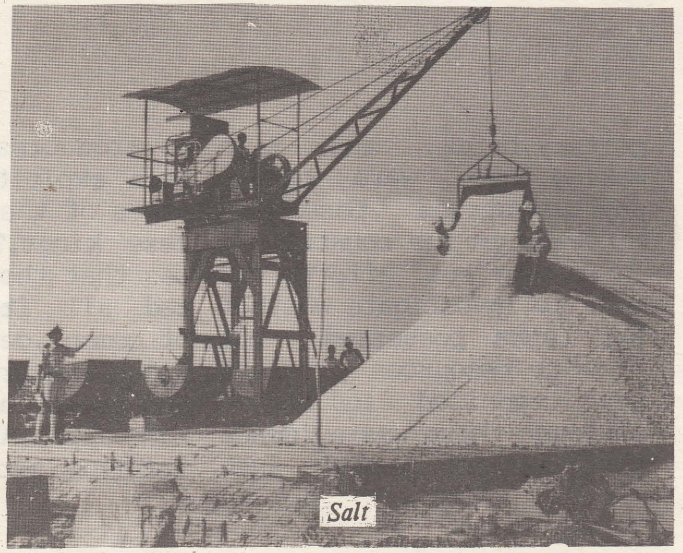
April

- 1 The Government announced a downward revision of import duties on selected energy conserving items. Import duties on electrical goods such as generators and motors, and electrical apparatus and parts such as starters for fluorescent lamps were reduced from 7½ percent to 5 percent and lamp holders for fluorescent lamps from 60 percent to 5 percent; while duty on fluorescent lamps was reduced from 15 percent to 5 percent.
- The Government decided to increase the cost of living allowance by Rs.102 per month on a family basis, effective from March 1, 1984. Accordingly, unmarried employees and married employees whose spouses are employed in the public or private sector where cost of living allowance is payable would be entitled to receive 50 percent of this increase. Other government employees and pensioners would be entitled to the entire allowance. Previously an equal amount of cost of living allowance was granted to all employees irrespective of their civil status.
- 2 The 33rd annual PATA (Pacific Area Travel Authority) conference was formally declared open in Colombo by President J.R. Jayawardena.
- Female workers in the tea, rubber and coconut plantations are to have their salaries increased to the level of their male counterparts with effect from April 2, 1984. This will cost government a further Rs.429 million annually. The decision to raise plantation workers' salaries, and equalise male and female earnings was a historic one, a communique from the Ministries of State Plantations and Janatha Estates Development said.
- 3 The Ceylon Petroleum Corporation concluded a Rs.750 million contract with Petronas, Malaysia's national oil corporation; for the purchase of 240,000 metric tons of crude oil during the 12 month period beginning April 1, the Chairman of the CPC announced.

- A further reduction in the turnover tax rate from 10 percent to 5 percent on hotels and guest houses approved by the Ceylon Tourist Board, and rest houses, came into effect. The previous reduction in the rate from 15 percent to 10 percent was announced in October 1983. This revision is aimed at providing relief to the hotel industry which was adversely affected by the reduced number of tourist arrivals consequent to the July '83 disturbances.
- 7 The Victoria reservoir which is one of the main projects under the Accelerated Mahaweli Programme was impounded. The maximum height and length of the dam amount to 122 meters (400 ft.) and 507 meters (1,663 ft.) respectively. The gross capacity of the reservoir is 728 million cubic meters (508,800 acre feet).
- 10 An agreement was signed by Sri Lanka with the Asian Development Bank (ADB) providing for a loan of SDR 3,264 million (approximately Rs.87 million) to finance the Trincomalee Thermal Power Project. The proceeds of the loan will be utilized to obtain goods and services required for the project.
- 12 The Ceylon Petroleum Corporation entered into a joint venture agreement with a three nation consortium, viz. Oil Tanking of West Germany, Tradinaft S.A.] (a Swiss-based company) and Oroleum (pte) Limited of Singapore to rehabilitate the Trincomalee Tank Farm and up-grade it to an international oil storage complex. The tank farm comprises 99 oil tanks with a total capacity of one million metric tons of oil. The Ceylon Petroleum Corporation will hold 15 percent of shares in this venture and the capital cost of the project would be between sixteen to twenty million US dollars.
- 20 The Foreign Investment Advisory Committee has turned down applications made by three hotels for additional foreign financing of their expansion programmes, a Ministry of State spokesman announced. He said that the Ceylon Tourist Board was now taking "a close look at tourist projects suspected of operating outside the terms of FIAC approval".
- 21 The Minipe Trans-basin Canal which is an important structure under the Accelerated Mahaweli Programme was declared open. This is the largest canal to be built in Sri Lanka in recent times and its entire length of 19 miles is concrete-lined. This will divert the Mahaweli waters; released from Victoria and Randenigala reservoirs to Ulhitiya Oya for irrigation of 200,000 acres of new land in systems 'B' and 'C' of the Mahaweli Development Programme.
- 30 Agreements were signed by Sri Lanka with the Government of the United State of America providing additional funds for a malaria control project (US\$ 4.1 million-approximately Rs. 104 million) and the Mahaweli Basin Development (US\$ 2.8 million-approximately Rs.69 million).
- At the end of April 1984 the Cost of Living Index figures (Colombo Consumers Price Index No.) computed by the Department of Census and Statistics had reached 548.9 as against 460.0 at the end of April 1983 and 412.6 at the end of April 1982.



Graphite



Salt



Limestone



Gems



Clay

MINERAL RESOURCES AND DEVELOPMENT

Despite its comparatively small size Sri Lanka possesses fair quantities of mineral resources 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, Baddleyite, Garnet, Gems, Thorianite, Coral, Shell, Clay
CENOZOIC	(QUARERNARY) PLEISTOCENE	Laterites (may extend from recent to Tertiary Periods) Gravels. Red earths	Laterites, Limonitic 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 dolerites.	Limestone, Dolomite Magnesite, Quartz, Allahite, 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.

ECONOMIC REVIEW, April - 1984

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 possible 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 Wajja, 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 1950'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 alluvial 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

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

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

an internationally known brand name, 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

targets appear reasonable:

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 can 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 O₅ 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 alternative 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-Kolungaha 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.

	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

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

export targets should be realised.

SALT AND SALT BASED 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 hydrochloric 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

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

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

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.



Limestone Quarrying Causes Environmental Destruction

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 hostile 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.

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 extracts 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.

ECONOMIC MINERALS AND RELATED INDUSTRIES IN SRI LANKA

Basil Marasinghe Dept. of Mining & Mineral Engineering
University of Moratuwa

"A substantial effort must be made in the area of non-traditional exports. The pattern of export led growth in Sri Lanka would have to focus on the full exploitation of local resources, the promotion and growth of activities enjoying locational advantages due to the geographical position of the country and the optimum utilization of the country's educated and adaptive manpower. Since our land, mineral and marine resources are still not fully exploited, there is considerable growth potential in these areas. Several high quality minerals such as graphite, ilmenite, apatite, clay and silica sands have still not been exploited satisfactorily. There is also much scope in a number of manufacturers."

*- Minister of Finance, Mr. Ronnie de Mel
in his 1984 Budget Speech*

Sri Lanka possesses a fair amount of mineral deposits in spite of its small size. Based on some of these deposits, a good number of industries have been set up in the country. If Sri Lanka is to achieve greater economic independence and move towards prosperity while earning much needed foreign exchange and arresting unemployment, it is essential that these industries are expanded on a scientific basis. It is heartening to note that some of the major mineral industries are taking steps to do just that.

Industries based on mineral sands, graphite, salt and phosphate are in various stages of attracting foreign collaboration in order to expand production. As the present government has created a very favourable climate for foreign investment, one would expect that the other industries will follow suit. As far as Sri Lanka's industrial minerals are concerned their full potential is yet to be realised. This paper presents a short account of the important mineral deposits in Sri Lanka, a brief description of related industries, and prospects for further development.

APATITE.

In 1971 the Department of Geological Survey located a very large deposit of phosphate bearing mineral, apatite, at Eppawala. It has been estimated that

about 60 million tonnes of reserves are available. Initial studies have indicated that the deposit occupies an area of 3 square miles. Drilling reveals that the deposit extends to 400 feet or more from the surface.

The general formula of apatite can be represented as $\text{Ca}_5(\text{PO}_4)_3(\text{F}, \text{Cl}, \text{O}_4)$. The chlorine, fluorine and hydroxyl ions can replace each other to give pure end members known as chlor, fluor and hydroxy apatite respectively. Chemical analyses have shown that Eppawala apatite is richer in chlorine than fluorine and hence may consist mostly of chlor apatite (CaO 53.8%, P₂O₅ 41% Cl 6.8%). Phosphorus is one of the three major plant food elements. It aids in nutrition and hastens maturity and ripening of fruits, particularly of grains. Phosphorus also promotes the development of the root system and other underground organs.

As the solubility of raw apatite is rather low, its direct use as a fertilizer is limited. Therefore rock phosphate should be converted into more soluble phosphate, thus increasing the amount of phosphorus available to plants. Industrially, finely ground rock phosphate is converted to superphosphate, which is fairly soluble, by the treatment of mineral acids such as sulphuric, hydrochloric, nitric or orthophosphoric. In

spite of the fact that hydrochloric acid is produced locally, sulphuric acid is preferable as in the case of the former, calcium chloride which is undesirable owing to its highly hygroscopic nature, is formed as a by product. In 1978, the development of the resource was undertaken by the State Mining and Mineral Development Corporation. The Corporation has chosen the Agrico Chemical Company of the USA as a collaborator. The project cost was initially estimated at about \$ 400m. It has been agreed to establish a plant capable of producing 530,000 tons per annum (tpa) of diammonium phosphate for export and 50,000 tpa of triple superphosphate for domestic use. This project still awaits final approval of the government. Meanwhile, the State Mining and Mineral Development Corporation has produced increasing quantities of apatite since 1978. Its annual production of apatite has been as follows:

Year	Quantity (Mt. Tons)
1978	3,660
1979	8,671
1980	14,076
1981	15,294
1982	13,993
1983	15,727

CLAY

There are four types of industrial clays in Sri Lanka. They are china clay, ball clay, fire clay and earthenware clay. China clay or kaolinite (sometimes incorrectly termed as kaolin) is the chief raw material used in the manufacture of porcelain and ceramic ware. Kaolinite ($\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$) deposits are found as a sedimentary formation at varying depths in Boralessgamuwa and Meetouagpda area. These deposits are associated with quartz, mica, feldspar and heavy minerals such as ilmenite and monazite. The mining and processing of kaolinite are being carried out by the Ceylon Ceramics Corporation, at its clay refineries in Boralessgamuwa and Meetiyagods. Kaolinite is also used as a filler and coating in the paper industry and also in the manufacture of numerous products such as paints and tooth pastes.

It is also used in the rubber industry and in the manufacture of fiberglass. Chemically ball clay is very much similar to china clay. The difference lies in particle size and in the amount of impurities. The ball clay owes its name to the fact that it was originally dug out of the ground in blocks or balls. Ball clay is noted for its toughness, plasticity, better binding power and low refractoriness. It is used along with china clay as a raw material in the ceramic industry. Deposits of ball clay are found in Bolgoda and Dediawala areas. Fire clay possesses a remarkable resistance to heat and is termed refractory clay. It is used to manufacture refractory parts for kilns and furnaces. Earthenware clay in raw state is red, brown or grey as a result of the presence of iron oxide. When fired, the colour may vary from pink to red brown. It is mainly used for manufacture of pottery.

The two china clay refineries of the Ceylon Ceramics Corporation produce 700 tpa. The Corporation's main factories are situated at Negombo and Piliyandala. It also has nearly 10 factories producing tiles and another 10 factories producing wall tiles. A total of 7,000 tpa of ceramic ware - which includes domestic crockery, wall tiles, sanitary ware, mosaic tiles, electro-ceramics, ornamental and fancy ware - are produced by the Corporation. Lanka Porcelain Ltd. at its factory at Rattota manufactures porcelain mainly for export. Products of Lanka Wall Tiles Ltd., in Balangoda too are meant for export.

In March last year, the Dankotuwa Porcelain (Pvt) Ltd. a subsidiary of the Ceylon Ceramics Corporation was commissioned. This factory, one of the largest in Asia for porcelain manufacture, is export-oriented. According to the Corporation, export orders have been received from several countries including the USA and Canada.

DOLOMITE

Dolomite is a double carbonate of calcium and magnesium. These deposits are found mainly in the hill country in areas such as Kandy and Matale; and also in the Badulla and Ratnapura

TABLE I
Production and Sales of Ceramic Ware 1979-1983
(Ceylon Ceramics Corporation)

Production (Tonnes)	1979	1980	1981	1982	1983
Crockery 3,572	3,281	2,967	3,461	3,769	
Sanitary Ware	804	1,075	1,045	1,030	1,126
Ball Clay - Raw	1,196	9,821	8,095	8,554	10,725
-Refined		1,636	1,139	737	1,255
Kaolin	5,870	6,614	7,315	8,206	7,976
Insulators	280	361	287	267	291
Mosaic Tiles	1,734	1,879	1,733	901	67
Tiles and Bricks ('000)	25,316	25,793	24,903	19,715	19,289
Quartz (upto Aug'83)					512
Feldspar (upto Aug'83)					1,547
Hydrated Lime (upto Aug'83)					1,012
Value of Production (Rs.000)	132,718	190,517	199,079	200,776	
Value of Sales (Rs.000)	142,816	207,106	219,085	375,312	
Foreign Exchange Savings (Rs.000)	139,979	212,170	59,393	94,055	
Foreign Exchange Earnings (Rs.000)	11,087	14,630	9,394	2,732	

Source: Ceylon Ceramics Corporation

areas. Although this mineral has a value as a fertilizer, its use is rather limited because of its low solubility. However, dolomite can be used for several other purposes such as manufacture of scouring powder, floor polish and water colours, foundry bricks, manufacture of magnesia, and as fillers in the rubber industry. It is also used in mechanised glass factories and the ceramics, enamel and porcelain industries. About 15,000 tpa of dolomite is extracted from deposits in the Central Province. However, its use has been limited due to the preference for imported Kieserite and commercial Epsom salt. The mode of production of dolomite in this country needs further development. The Industrial Development Board has come up with suggestions to establish small scale plants to manufacture about 2,500 tpa of 250 mesh dolomite with comparatively low investment and reasonably low running costs.

FELDSPAR

Feldspar is generally an anhydrous silicate of aluminium usually found in combination with potassium, sodium,

calcium or barium. In the ceramic industry, feldspar is used as a bonding or coating material. The glass industry is another important consumer of this mineral. Feldspar is also used in the enamel, abrasive and scouring soap industries. Mining of feldspar is carried out in the Matale area. The largest deposits are located at Kaikawala and these are exploited by the Ceylon Ceramics Corporation. Reserves at Kaikawala which persist to a depth of 600 feet are estimated at 3 million tonnes. The Corporation has also mined large deposits in the Talagoda and Rattota areas. There is potential for export of feldspar in crushed and fine ground form.

GEMS

Sri Lanka has earned a high reputation for its gems. Although there are four other gem bearing areas in the world in South Africa, South America, Burma and Thailand no other country, with the possible exception of Brazil, produces such a variety of gemstones as Sri Lanka does. The country's economy has been greatly boosted by the gem industry. In recent years the ex-

port of gems has brought in about Rs 500 million annually in foreign exchange to the country. In 1982 the figure reached Rs.695 million and in 1983 Rs.940 million. This figure does not include the earnings through sales to tourists. The actual values could have been much higher if not for the illicit trade in gems.

All types of gemstones with the exception of diamond, opal and turquoise are found here. Most common Sri Lankan gems are sapphire, ruby, aquamarine, topaz, tourmaline, garnet, spinel and zircon. Among the gemstones unique to this country are sinhalite, a magnesium aluminium borate, taaffeite, a magnesium beryllium aluminate and ekanite, a complex silicate of uranium, thorium, calcium iron and lead. The best known gem-bearing area is in the Sabaragamuwa Province. Nearly 80 percent of the chief gem mines are found in this area. It covers an area of about 1,800 square miles between Avissawella, Kamburupitiya and Moneragala. Among the villages famous for gems are Balangoda, Ehiliyagoda, Pelmadulla, Rakwana and Ratnapura. Other locations in the Okkampitiya - Elahera areas as well as in Nuwara Eliya, Horton-Plains, Maskeliya and Kandy also yield some gemstones. Approximately 7,000 gem pits are scattered throughout the country.

Gems can be broadly classified as precious and semi-precious. Aquamarines, garnet, tourmaline, zircon, topaz, quartz, amethyst and moonstones fall into the category of semi-precious stones.

Blue, pink, yellow and star sapphires, rubies, star rubies and alexandrite are precious stones. Catseyes are technically classified as semi-precious, though their rarity makes them very expensive, specially when the quality is good. Gemstones are found embedded in layers of gravel and sand in river beds, swamps and buried in river valleys. Moonstones, tourmaline, garnet, and amethyst are exceptions as they are generally mined from weathered parent rocks. The extent of the gem gravels generally varies but usually has been between a few metres in

breadth and about 30 metres in depth. When the depth is not more than 15 metres, exploiting the deposits is a relatively simple affair. When the gem-bearing gravels are located deeper, mining becomes difficult owing to the unconsolidated nature of the surrounding gravels which require support. The only form of mechanization is the use of water pumps to empty the water that collects at the bottom of the pit. A simple washing process is used to separate heavier gems from the lighter gravels. Although mechanically operated cutting and polishing machines are available, the lapidary work of the bulk of the Sri Lankan gemstones is done using hand machines of primitive construction.

The value of exports of gems from Sri Lanka, on an official basis, has kept fluctuating over the years, despite the very generous concessions granted to gem exporters. The value of gems exported officially had dropped from Rs. 531 million in 1978 to Rs. 302 million in 1981. This fall in earnings was attributed partly to the fact that some of the gem-bearing areas had been exhausted as a result of intensive mining.

TABLE 2
Value of Exports of Gems
from Sri Lanka

Year	Value (Rs.mn.)
1971	3.9
1972	12.5
1973	140.8
1974	408.7
1975	180.2
1976	261.4
1977	297.9
1978	531.0
1979	490.1
1980	458.1
1981	301.6
1982	684.9
1983	940.4

Source: Sri Lanka Customs

However, it appears that some gem traders were exporting their gems through illegitimate channels. This aspect was highlighted by the Minister of Finance during his 1984 Budget Speech.

Although there has been a significant improvement in the gem industry owing to the presence of the State Gem Corporation, there are some areas which need further improvement. The local gem business is still in the hands of few traders with miners getting only a fraction of the profits. Illicit gemming is still going on and according to the Customs, gem smuggling has not stopped either. Modernisation of gem mining and processing as well as cutting and polishing could also help the industry.

GRAPHITE

Graphite is crystalline carbon identical in composition with charcoal and diamond. It has been one of the main minerals mined and exported by Sri Lanka over the last 160 years. There are three principal types of graphite: they are vein-graphite, flake and amorphous. Sri Lankan graphite falls into the vein - graphite category which can be further sub-classified into crystalline and amorphous forms. Both these types occur in this country. Sri Lanka's graphite has a high percentage of carbon, the balance consisting of ash, grit and volatile matter.

During the late 19th century and the early part of the 20th century graphite was a major item of export, being almost as important as tea, and rubber. In 1899 for instance the earnings from graphite exports were Rs 22 million, which amounted to 20 percent of the total export earnings in that year. In 1983 this mineral ranked sixth among the Sri Lanka's items of export. For nearly 100 years, the production of graphite was in the hands of the private sector. In 1971 the graphite mining industry was handed over to the then State Graphite Corporation, not the State Mining and Mineral Development Corporation. The production today is centred on two underground operations at Bogala and Kahatagaha-Kolongaha. There are two experimental mines at Rangala. The State Mining and Mineral Development Corporation has also opened-up two more abandoned mines at Siyambalapatiya and Pussehena.

TABLE 3
Production and Sales of Graphite

	1978	1979	1980	1981	1982	1983
Production (Metric tons)	10,579	9,491	7,124	7,453	8,257	5528
Sales - quantity (Metric tons)	11,427	10,933	6,759	4,670	3,197	
Sales - value (Rs.Mn.)	67.7	89.5	94.0	114.8	73.8	
Exports - value (Rs.Mn.)	59.3	74.6	85.2	100.9	59.1	

Source: State Mining and Mineral Development Corporation

The importance of graphite in other industries is related to its refractory quality, lubricant characteristics and electrical properties. Graphite is very useful as a refractory ramming material in metallurgical industries, especially in the production of iron and steel. Crucibles made from graphite are used in foundry smelting of steel and non ferrous metals including precious metals. A mixture of clay and graphite is used to make pencils. Graphite is mixed with manganese oxide to manufacture dry cell batteries. Graphite is also widely used as a lubricant in mechanical parts and to make carbon brushes. Brake linings which are made of friction materials are generally impregnated with graphite to ease the transfer of heat generated by braking friction. In the nuclear industry graphite is used in the manufacture of moderators and reflector blocks.

Sri Lankan graphite is under severe competition from several graphite producing countries. The main competitors are Korea, Austria, Germany, USSR, China and Mexico. The greatest threat is from Malagasy where graphite can be obtained from easily worked graphite deposits. The recession in the industrial world too had a considerable effect on the graphite market. During the period 1973-1981, the output of graphite has been around 10,000 tonnes. In 1980, it went as low as 7,300 tonnes as the world economic recession worsened.

Consequently, graphite production in Sri Lanka is dependent on overseas markets. In 1983 the Graphite Corporation had to slow down on its production due mainly to marketing

constraints and both production and sales were comparatively low.

By the end of 1982 the Sri Lanka government decided to mount a project to develop the country's graphite industry. The cost of the project has been assessed at Rs.660 million. The Asian Development Bank has agreed to fund part of the project. This project will commence once the government makes a final decision taking the local component of the expenses (Rs.260 - 280 million) into consideration. Meanwhile, the State Mining and Mineral Development Corporation (SMMDC) is considering the establishment of a graphite based industry in Sri Lanka with foreign collaboration. The Ceylon Ceramics Corporation has established a

factory for the production of graphite crucibles for the domestic market. The SMMDC is also planning to set up a high quality graphite crucibles unit with a foreign collaborator entirely for the export market.

IRON ORE

Sri Lankan iron ore deposits can be broadly put into two categories. One of them is hydrated iron oxides (limonite and goethite) and the other is magnetite. The limonite variety has been located mainly in the Ratnapura district and to a lesser extent in the Galle and Matara districts.

Production at the Steel Corporation during the years 1982 and 1983 has been below the budgeted amounts in respect of all items. When compared with the previous years performance production reached its peak in 1980 but since then there has been a gradual decrease. This is due to adverse market conditions. There has been a decrease in sales mainly due to increased competition from imports and the Corporation has been compelled to cut back on their production plans, as seen in the following table

Most of these deposits are found at or near the surface. The limonite re-

TABLE 4
LOCAL PRODUCTION OF BASIC STEEL ITEMS

Products	1978	1979	1980	1981	1982	1983 up to August
Rolled Sections (m.t.)	33,111	45,355	52,704	38,991	22,797	15,504
Steel Foundry (m.t.)	633	800	673	406	477	262
Fabricated Steel (mt.)	251	338	457	257	203	152
Welding Electrodes (Kgs.)	-	-	-	-	-	17,682
Billets Local (m.t.)	-	-	-	-	-	7,188
Tor Steel Unit (m.t.)	-	-	-	-	-	13,183
Wire Mill (m.t.)	-	-	-	-	-	1,382
Value of Production (Rs.m.n.)	268.1	-	507.8	478.6	310.2	209.8

Source: Ceylon Steel Corporation

erves have been estimated at 2.2 million tonnes. The magnetite deposits have been discovered at Panirendawa and Seruwila. The deposit at Panirendawa is expected to contain about 5.6 million tonnes of magnetite of high grade. The most promising iron ore deposit is found at Seruwila. It is also a magnetite deposit. In terms of quality as well as quantity this deposit is assumed to be superior to any other iron ore deposits.

In 1961, the Ceylon Steel Corporation was established. The Corporation's factory consists a rolling mill, a wire mill, foundry section and a ribbed steel production unit. This factory relies on imported billets as starting material. Annually about 35,000 tonnes of steel billets are imported for this purpose. Stage II of the project commenced operation in July 1982, with the installation of an electric arc smelting furnace of a capacity of 25 tonnes. This stage II relied completely on local available steel scrap. The furnace was capable of producing 60,000 tonnes of finished products annually. The furnace and its accessories have been valued at Rs.183 million. This stage of the project was capable of saving a vast amount of foreign exchange as it did not need imported material but scrap obtained from the CGR and some local industries.

Although State II was metallurgically successful, it had to be closed down in 1983 when its products could not compete with imported materials. In spite of difficulties the Corporation decided to re-start the operation in early 1984

LIMESTONE

Lime stone is a valuable raw material as it is used in many major industries such as cement, fertilizer, ceramics, sugar and bleaching powder. As the acti-

Lime stone is a valuable raw material as it is used in many major industries such as cement, fertilizer, ceramics,

TABLE 5
PRODUCTION OF CEMENT IN SRI LANKA (Metric Tons)

YEAR	PORTLAND CEMENT	MASONARY CEMENT
1977	362,860	
1978	575,061	
1979	591,797	68,800
1980	551,076	71,723
1981	630,944	74,731
1982	468,840	68,789
1983	446,469	33,099

Source : Ceylon Cement Corporation

sugar and bleaching powder. As the activities in agriculture and construction have been greatly encouraged by the present government, there has been a sharp increase in the demand for limestone. It has been estimated that at least 15,000 tonnes of lime will be needed annually for government housing development alone. Limestone deposits are found in the central hills and in the northern region. The sources of limestone are available in abundance.

However, they are hard to mine and also contain impurities; as a result there is a higher demand for coral lime which is easy to mine and comparatively purer. The range of coral mining and processing is generally confined to a 50 mile stretch from Ambalangoda to Dondra head. Coral mining activities while providing a good income to the people involved has also created many problems. A unique and valuable coral reef ecosystem has been threatened with near extinction. More alarming is the fact that the coral mining leads to coastal erosion, with the removal of the natural barriers of the sea beach which curb a direct attack by waves on the beaches.

CEMENT

Massive development programmes started in recent years have led to a boom in cement production. The Ceylon Cement Corporation finds it hard to meet the demand. The Corporation's major cement works are located at Kankesanthurai and at Puttlam. The Corporation also has a grinding plant in Galle which uses limestone derived from Kankesanthurai. The Ceylon

Cement Corporation produces about 2.5 million tonnes annually. In 1983 a public company called Lanka Cement Ltd., was commissioned. It is expected that the company will be initially producing 0.6 million tonnes of cement annually.

Also in 1983, a local private firm went into collaboration with Japanese firm to set up a Rs 400 million cement complex in China Bay, where the clinker will be imported for this project, which has a production capacity of 200,000 tons of cement per annum. From September 1984 it hopes to produce 17,000 to 20,000 tons of cement per month. When the new plant at K K S is also at capacity production about 225,000 tons is expected to be available for export. In view of this situation there are possibilities that the country will be self-sufficient in cement and even have a surplus in the near future. This surplus would have to be exported to bring in foreign exchange.

MICA

Mica is a complex silicate of aluminium with potassium, magnesium, iron sodium and traces of many other elements. Two of the most common varieties are muscovite and phlogopite. Large thin flakes measuring several inches in diameter are common. Particles as small as 0.5 micron have been found in association with clay minerals. Mica is very useful in making con-

densers. It can also be used as an insulating material. Mica in ground form is used as a decoration on wall paper. Mica deposits are found in the Badulla and Haputale districts. Although the quality of mica mined from shallow surface pits is rather low, it is believed that good quality sheet is available at depth. The State Mining and Mineral Development Corporation has been examining the potential for mica. In 1982 about 300 tonnes of mica

The Corporation was engaged in manufacturing vermiculite mica as there was a greater demand for this variety. In 1982 almost 300 tonnes of mica was exported to Japan. Production, exports and total income from mica over the last six years was as follows:

Year	Production (Mt tons)	Exports (Mt. tons)	Total Earnings (Rs.Mn)
1978	240	140	.4
1979	308	275	1.0
1980	145	88	.4
1981	182	168	1.0
1982	291	292	1.8
1983	171	111	.7

Source: State Mining and Mineral Development Corporation

MINERAL SANDS

Ilmenite, rutile, monazite and zircon are collectively termed mineral sands. Ilmenite (FeOTiO_2) contains between 50 - 60 per cent of titanium oxide. Its dark colour is due to the presence of iron oxide. Rutile (TiO_2) is at least 95 percent titanium oxide. Metallic titanium when produced commercially possesses unusual properties for many applications, particularly in the manufacture of aircrafts, spacecrafts, missiles and supersonic jets. The titanium paints consist of pure titanium oxide as a mineral base. Ferro-carbon titanium is alloyed with steel to make high speed steels. Rutile is also used in the ceramic industry. Zircon (ZrSiO_4) is used as foundry sand and in the manufacture of refractories. It can also be used a raw material for the manufacture of crucibles. Monazite is utilised mainly to produce tho-

rium and rare earth elements. The practical importance of thorium is connected with utilisation of nuclear energy.

Sri Lanka has earned an international reputation for its mineral sands. The country's beach placer deposit at Pulmuddai extends for about 4.5 miles along the coast and reaches about 250 yards in width and about ten feet below the low water mark. The other important concentrations of mineral sands deposits are at Kaikawela and Polkotuwa to the south of Colombo, and at Kudremala point to the south of Mannar. The Pulmuddai deposit is estimated to contain about 4 million tonnes of raw materials, whose composition is 70 - 72 percent ilmenite, 8-10 percent zircon, 8 percent rutile, 0.3

percent monazite and 1 percent silimanite.

The Ceylon Mineral Sands Corporation is responsible for the exploitation of mineral sands in Sri Lanka. Its Pulmuddai plant is capable of processing 140,000 tpa of raw dry sand. Ilmenite is recovered using magnetic separators. In 1978 and expanded rutile and zircon recovery plant commenced operations. The current rate of production of ilmenite is of the order of 40,000 tonnes per year. With the commissioning of the new plant 1978 the production of rutile increased to 11,300 tonnes per annum tpa. The Corporation is capable of recovering 10,000 tpa of zircon. In 1983 production of ilmenite and zircon showed significant increases over that of 1982. At present all of the Corporation's ilmenite and rutile is exported to Japan. Zircon is sold to Europe and

Japan. The value of ilmenite exports has moved up steadily in recent years while the value of rutile exports have gone up even faster. See Table 5.

Mining of these mineral sands is concentrated on deposits on the north-east coast from Mullativu to Nilaveli. Exploration by the Geological Survey Department (GSD) has revealed additional deposits. The total reserves of heavy minerals is now estimated at around 13 million tons.

A deposit of cupriferous magnetite has also been discovered at Seruwila. The GSD in collaboration with Bureau de Recherches Geologiques et Minières has identified some 3.5 million tons of ore containing 1 to 1.5 percent Cu and 40 percent Fe.

An on-shore survey conducted by SIMCO Ltd., in a joint collaboration project between the State Mining and Mineral Development Corporation and the Intersite B.V. of Netherlands, completed in 1981 has indicated prospects of large deposits of heavy minerals. The Corporation was seeking assistance to do a further detailed survey to establish the exact quantities. Also, a contract was signed with M/s. Voest Alpine AG. of Austria in April 1982 for the erection of a Wet Gravity Upgrading Plant and a Wet Magnetic Separation Plant and these were expected to be commissioned late in 1984.

SILICA SAND

Quartz and silica sand are two abrasive materials that are abundant in Sri Lanka. Silica (SiO_2) is also used to manufacture glass. Most important deposits of silica are found at Marawila and in the Ampanavallipurum area near Point Pedro. In Nattandiya, the deposits spread over an area of 1,500 acres with an average thickness of about 4 ft. It has been estimated that in Nattandiya alone there is about 6 million tonnes of silica which contains 98 percent silica, less

TABLE 6
PRODUCTION AND EXPORTS OF ILMENITE, RUTILE AND ZIRCON

	1978	1979	1980	1981	1982	1983
Ilmenite						
Production '000						
Mt. tons		34.5	55.4	34.0	80.0	68.3
Exports (Quantity)						80.5
'000 mt. tons		37.1	30.5	36.7	41.5	47.0
Exports (Value)Rs. mn.		9.0	7.8	9.9	13.9	15.3
Rutile						
Production '000						
mt. tons		11.3	14.7	12.8	13.3	7.2
Exports (Quantity)						8.1
'000 mt. tons		9.4	14.6	12.2	2.1	15.4
Exports (Value)Rs. mn.		26.3	49.3	55.7	13.5	74.7
Zircon						
Production '000						
mt. tons		3.1	1.4	3.0	3.3	5.8
Exports (Quantity)						5.7
'000 mt. tons			3.2	2.0	4.6	
Exports (Value)Rs. mn.			1.9	1.3	4.8	

Source: Mineral Sands Corporation

than 1 per cent iron oxide (Fe₂O₃) and titanium dioxide (TiO₂). This is an ideal raw material for glass manufacture. Rayo Glass Ltd. produces 2,500 tpa of glass melt from which white and amber bottles are made. The company has plans to produce 30,000 bottles per day. The abrasive properties of quartz and silica make them useful in the manufacture of sand papers and other abrasive products. Sri Lanka also has high quality natural abrasive materials such as corundum and garnet. Garnet sand is available on the southern coast of the island.

MINERALS FROM THE SEA

Sea water contains an average of 3.5 per cent of various elements in solution. Thus, each cubic mile of sea water holds about 166 million tonnes of solids. As a source of minerals, the sea has been little exploited in relation to its potential. Of the 60 or so elements known to be dissolved in sea water only a few have been commercially extracted. Minerals that can be successfully extracted from the sea include salt, gypsum, epsom, bromine and iodine. Although sea water contains traces of precious metals such as gold, the economic recovery of such

metals has not been successful. For further details see table 7.

SALT

The National Salt Corporation which is the sole organisation engaged in the production of salt has 17 solar

evaporation units which have a total combined production capacity of 250,000 tons per annum (tpa). However, the production is kept at a lower level as the local demand does not exceed 120,000 tpa. (See table 8) The export of the product is hampered owing to the high cost of freight. There are many chemicals that can be manufactured starting from salt. They are caustic soda, washing soda, bleaching powder, hydrochloric acid and gaseous chlorine. Only 2 per cent of Sri Lanka's total production is used for the manufacture of chemicals. Production of these chemicals is presently done by the Paranthan Chemicals Corporation which operates the caustic soda plant. The government is considering the setting up of a second caustic soda/chlorine plant. There is a great demand for caustic soda which is an important raw material in the paper industry. The National Salt Corporation is collaborating on a Rs 100 million project with the Paranthan Chemicals Corporation and the National Paper Corporation to establish a plant to manufacture 700 tpa caustic soda/Chlorine at Embilipitiya. Unlike the traditional method which uses the diaphrag - cell technique, this project is to be based on the latest membrane cell production technology.

TABLE 7
Minerals Available in Sea Water

Minerals	Quantity	
	Basis: 1 cubic mile	
Sodium Chloride	128	million tonnes
Magnesium Chloride	18	" "
Magnesium Sulphate	8	" "
Calcium Sulphate	6	" "
Potassium Sulphate	4	" "
Calcium Carbonate	578	thousand tonnes
Magnesium Bromide	350	" "
Bromine	300	" "
Strontium	60	" "
Boron	21	" "
Fluorine	6	" "
Barium	900	tonnes
Iodine	700	" "
Arsenic	250	" "
Rubidium	200	" "
Silver	40	" "
Copper, Lead and Zinc	30	" "
Gold	25	" "
Uranium	7	" "

A chemicals industry is a fundamental requirement for the speedy industrialisation of a country and with this as one of its objectives the Paranthan Chemicals Corporation commenced commercial production of

will have to play a dominant role. As the Minister of Finance pointed out in his 1984 budget speech, it is imperative that our mineral resources are exploited to the full. Involvement in the industry by the private sector is being

done graphite mines with technical advice from the SMMDC. The private sector should also consider setting up of graphite-based industries. Among such possible industries are the manufacture of cinema arc carbon, carbon arc electrodes, midjet electrodes for dry cells, carbon brushes, colloidal graphite lubricants, greases, paints and crucibles. Small scale indigenous industries based on local minerals such as clay, glass-sand and limestone are comparatively easier to realize.

Table 8
Production and Sales of Common Salt
by the National Salt Corporation

Year	Production	Sales
1977	46,360 (tons)	120,586 (tons)
1978	149,268 (")	113,059 (")
1979	121,443 (")	110,615 (")
1980	127,161 (")	120,924 (")
1981	104,344 (mt.tons)	116,094 (mt. tons)
1982	169,232 (" ")	106,329 (" ")
1983 Upto August	84,603 (" ")	69,820 (" ")

Source: *National Salt Corporation*

chlorine, caustic soda and sulphuric acid at the beginning of the 1960s. Although the Corporation is mainly concerned with the production and disposal of caustic soda and liquid chlorine, limited quantities of table salt are also produced for sale locally. Hydrochloric acid, Ferric chloride, Zinc chloride are other items being produced, as seen in table 9.

Conclusion

In order to transform an underdeveloped Sri Lankan economy into a developed one, the industrial sector

encouraged by the present government which favours an open economy.

The Government has recently authorized private sector participation in the refractories project of the Ceylon Ceramics Corporation and projects initiated by several other state corporations including the State Mining and Mineral Development Corporation, the Hardware Corporation and the Ceylon Mineral Sands Corporation. Entrepreneurs should explore the possibilities of getting involved in similar mineral-based industries. For example, it may be possible for private miners to open some of the old aban-

Kaolin which is a valuable raw material for ceramics, the paper and paint industries, can also be used as a refining agent in the sugar industry and also to make dielectric parts for electronic equipment. Garnet sands may be used to make sand papers. At present mica is exported in the raw state. Mica may be processed to produce sheets to be used in insulating materials for electrical appliances.

The mineral sands industry is heavily dependent on exports for its survival. There are possibilities of establishing domestic manufacturing industries based on these resources. In this way value-added mineral products could be available for the more diverse industrial markets.

Once the Eppawala phosphate project is completed, Sri Lanka would be a major producer of phosphate fertilizer, capable of producing 530,000 tpa of diammonium phosphate and 50,000 tpa of triple super phosphate.

Table 9
Production of Salt-related products by
the Paranthan Chemicals Corporation

Year	Caustic Soda	Liquid Chlorine	Table Salt	Hydrochloric Acid	Ferric Chloride	Zinc Chloride
1977	1,515	662	559	550	108	110
1978	1,865	1,156	486	668	110	121
1979	1,723	1,274	519	1,041	78	63
1980	1,827	1,456	521	982	123	74
1981	1,729	1,339	498	979	108	59
1982	1,407	845	365	627	117	45
1983	1,420	903	520	563	90	32

Source: *Paranthan Chemicals Corporation*

As a source of minerals, the potential of the sea is enormous. Apart from salt, chemicals that can be extracted from sea water include magnesium sulphate, magnesium chloride, calcium sulphate, bromine and iodine. Sri Lanka's maritime boundaries cover an area of 4 times its size and therefore the amount of marine minerals available to the country is almost limitless. Extraction of marine minerals

and production of chemicals from them can no doubt be a profitable business. Demand for caustic soda, for instance, is growing annually by about 12 percent. This growth in demand is mainly due to the increased demand for pulp and paper. This year the Ceylon Petroleum Corporation has planned to commence off-shore oil exploration in collaboration with a Canadian firm. If, successful, this venture could make a tremendous impact on the nation's economy.

At present most of Sri Lanka's valuable minerals are exported almost in raw state. Processing of minerals increases their value by a great margin. In some cases, the increase may be twenty fold or more. It is time that this country considers the processing of minerals before exporting them.

There are several reasons why the 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 a hostile international climate may have been some of them. Political and social pressures too may have inhibited effective policy adaptation. The international market for some of the mineral commodities too has gone through a difficult period in recent years because of a slowing down in the rate of economic growth in some of the industrialised countries. The need for foreign investment to supplement local capital resources, technology and access to export markets has now been recognised. The recent tendency of international mining companies to strengthen their investment and exploration efforts in industrialised countries at the expense of their activities in developing countries has nothing to do with the natural potential for mineral resources in developing countries. It is largely based on political, fiscal and economic considerations. To counteract this tendency it is necessary to strengthen mutual trust and stability and to create conditions which attract foreign investment and investors who will bring in the technical expertise and technology.

Some of the Sri Lankan industries are faced with marketing difficulties because of the competition

from imported products. A classic example of this situation is the closure of stage II of the Ceylon Steel Corporation project where an electric arc furnace worth over Rs.180 million was left idling.

Stage II which was commissioned in mid 1982 had to be shut down in 1983 being unable to compete with imported products. Since early 1984 Stage II has been back in operation, however, and its future remains bleak unless remedial action is taken. Considering the advantages flowing from such enterprises through the use of indigenous raw materials, generating of employment and savings of foreign exchange, a re-examination of the present tariff structure so as to ascertain the degree of protection that needs to be afforded to the local industry merits some consideration.

Another state venture that had to face similar competition is the Paranthan Chemicals Corporation which manufactures and sells caustic soda and chlorine, Hydrochloric acid, Zinc oxide, Ferric chloride and table salt. Its production and sales were affected in 1982 as a result of the lower prices of imported finished products and substitute products. Imported caustic soda and chlorine were cheaper than the locally manufactured products and Hydrochloric acid sales were affected as several customers switched to the use of imported Sulphuric acid.

Local manufacturers generally prefer to use imported raw materials of superior quality unless the quality of the locally available raw material is acceptable to them. For example, although china clay is available in Sri Lanka, the quality of the mineral is not quite acceptable for industries such as paper and paint, owing to its low brightness. It may be possible to improve the brightness of local china clay by chemical or electrolytic treatment. There are a number of similar cases. The domestic market may not be adequate for profitable running of some industries. The alternative is to look to the international market. The quality of the finished products must be improved to be able to compete with products of other countries. Therefore, it is of utmost importance to encourage research and develop-

ment work on local mineral resources. Appropriate research projects may be carried out at the universities and research institutes where scientific personnel and laboratory facilities are available. State Corporations and prospective manufacturers who would be the ultimate beneficiaries of such work could provide funds for research projects. Similar action by the business community can ensure not only economic progress but also an eventual return on investment.

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FEATURES

A SURVEY OF CURRENT AND POTENTIAL USE OF PERSONAL COMPUTERS IN SRI LANKA

Gamini Gunawardene

Personal computers have made much progress in the Sri Lankan market within a few years but more efforts are definitely needed to raise the awareness of the general public on this subject according to this study carried out by Gamini Gunawardene, Associate Professor in the Department of Management School of Business Administration and Economics at California State University Fullerton. We publish his findings compiled from a larger study he undertook in Sri Lanka recently. The data has not been verified by the Economic Review and it may be possible that certain dealers or others in the field of computers may not agree with some of the findings or have contrary views. The Economic Review is prepared to carry any reasonable viewpoints submitted for publication on this subject.

Introduction

Personal computers have been in the Sri Lanka market on a commercial scale for about two years. Currently over ten leading distributors market various models and over 3000 computers, including 2500 Sinclair models placed in schools, have been sold. In addition, there are several consulting, software and training organizations that have come up to fill gaps in these areas. Have the personal computers come to Sri Lanka to stay? What are their current and potential uses here? How would recent advances in the personal computers field in other countries like USA affect and influence the Sri Lanka market? What are some of the constraints limiting the growth of personal computers in Sri Lanka? This paper is the result of an investigation of these issues. In this paper, the terms 'microcomputer' and 'personal computer' are used synonymously.

Methodology

The author and a research assistant conducted this survey in Colombo during June 1984. Leading dealers were visited and information was gathered by interviewing management.

Similar interviews were conducted with some of the leading users of personal computers and computer professionals (eg. President, Computer Society of Sri Lanka). The author also met the Council of the Institute of Chartered Accountants and an audience of present and potential personal computer users for a lecture and discussion. Current information on advances in the U.S. personal computer market was derived from publications listed in the references and the author's experience as a Director of a group of personal computer manufacturing and sales companies.

Sri Lanka - The Current Picture

The following information obtained directly from dealers describes the position of current personal computer use in Sri Lanka.

Major models, units in use and their uses

Table 1 below shows the major brand of personal computers in Sri Lanka numbers sold to date and their uses.

The market share distribution differs significantly from the pattern in the USA where, since its arrival

in the market place in 1981, IBM has been the dominant force. IBM is expected to hold 30 percent of the market by 1985, and the IBM compatibles (other brands on which most IBM software can be used) about 40 percent. The absence of IBM in the Sri Lanka market is probably because of its continuing inability to meet the demand and its high price. However, the absence of the compatibles is surprising. These machines (eg. COMPAQ, CORONA, EAGLE) perform very well and their prices are certainly competitive (converted dollar value plus duty) with prices of PC's available in Sri Lanka today. It would not be surprising to see some of these compatibles in our market within the next few years.

Prices

It was difficult to make a proper price comparison between units because of differing RAM capacities and peripheral hardware offered. The average price, however, was found to be between Rs.100,000 and Rs.200,000 for a computer with sufficient memory for business use. For example, Apple 11 sells at Rs.145,000; Cannon models sell between Rs.120,000 and Rs.300,000; and Wang sells at Rs.200,000. In the U.S. market a good 64 model, together with two disk drives, monitor, printer and necessary controller cards can be bought for \$3,000 - \$4,000. Additional memory, for example, enhancing tal

TABLE 1 MAJOR COMPUTER BRANDS, NUMBERS SOLD AND MAJOR USERS/USES

Brand	Number sold to date	Major Users/Uses
BBC	220	Universities
TRS (Radio Shack)	155	Business (B), Scientific (S), Educational (E), Home (H)
LOTUS	5	B
WANG	40	B
SHARP	15	B
CANNON	85(5)	B (H)
APPLE	210	B
SINCLAIR	2500	E, B, H

Includes 10 16 bit systems machines.

256K would cost approximately another \$300 - \$ 500. Converting these prices directly, and considering duty and diseconomies of scale, prices in Sri Lanka seem reasonable. The business and professional sector feel that they are affordable too. Smaller models for home uses sell at much lower prices, for example, SINCLAIR 1K at Rs.2,450; 16K at Rs.5,250. These prices are also comparable to the world market prices. Dealers who were interviewed predicted that hardware prices would come down as competition increases.

Uses

Dealers and users were asked what applications their computers are most commonly used for. Two patterns of use were revealed. Some organizations use their personal computers as intelligent terminals for data communication with their main frame computer. Others use them as stand alone modules for business applications. Most commonly quoted applications were: travel trade reservations and information (data base) management, simple banking transactions such as foreign currency exchanging, stock control and accounting. The universities and schools, of course, use their computers mainly for teaching computer basics and some programming for students. It was somewhat surprising to find the low usage in Word Processing. Word processing is one of the major uses of personal computers in USA. Traditional secretarial techniques of shorthand, typing and filing still seem to prevail in our business world. Once again, as the economy grows further, Word Processing is bound to become a more frequent application area.

In general, the survey revealed that users and potential users were not very familiar with applications possible with personal computers. Many consider a personal computer for a particular application, for example, stock control. Beyond this, they seem to be slow in using the machine for other applications. This is not surprising at this early stage when users are less familiar with available software. As shown in the next section, there is no shortage of application software. However, the

capabilities of this software is not marketed well, and are not known to users. The knowledge among potential users is dangerously low. In a group of 49 users and non-users attending the lecture in computers, only a handful knew what Electronic Spread Sheets were. Much has to be done by dealers and educators to educate the market on capabilities of software.

Software

This appears to be the crucial area in Sri Lanka. Canned (ready made) software are offered for sale by dealers. Some well known software packages in USA for example, LOGO, EASY AMIL (and others in the EASY series), MULTIPLAN, VISI-CALC, WORLDSTAR, DBASE II, APPLEWRITER II and a variety of accounting and recreational software, are offered in the market. The prices are comparable with US prices. At this early stage, the market is only a little knowledgeable about the availability and capabilities of these packages. They are also doubtful how a particular software would fit their need and how flexible the software would be. Another notable factor was the gap between user needs and available software packages. The users, at least at this early stage, focus on specific needs and look for software exactly matching the need. The solution in these cases is the writing of original software. This service is now provided by consultants and in house programmers. This pattern will prevail for sometime as the justification for buying a personal computer in Sri Lanka still remains to be the computerization of a major aspect of the business/ organization. Thereafter, flexible software, that is, software that can be adopted for Sri Lanka by appropriate field changes for example, (spreadsheets where columns and rows are free of headings) would be used more frequently. It would be a long time, perhaps another 2-3 years, before consumers would be knowledgeable and aggressive enough to buy canned software at a larger scale. The catalyst for this would be provided by local software houses eventually producing original (canned)

software packages for Sri Lankan business use. It was heartening to observe several firms exploring this strategy.

Training

There are several types of training programmes in personal computers available today in Sri Lanka. First, schools and universities are now providing some courses. The most effective among these are the various courses and hands-on experience provided to students in some Universities. For example, (the University of Colombo, equipped with a TRS 80 - 16 and 20 BBC machines is providing a wide array of opportunities to its students. These include programming and application training. This University also holds short courses for the business community and has, at times, held workshops on very advanced issues such as systems programming. The University training, however, is still focussed mainly towards Science students.

Other types of training include courses provided by institutions such as the National Institute of Business Management, consulting firms and computer dealers. These courses provide instruction in computer basics, programming and sometimes, systems management.

In USA, the current trend in the Universities is to incorporate micro computers into almost every course. In Sri Lanka, we do not have enough funds for machines, and more importantly, enough trained personnel to reach such a level. But the coming years should see the inclusion of micro computers in at least the Engineering, Science and Business/ Commerce courses. A co-ordinated programme to train lecturers in these subjects (on personal computer basics) is needed. This is done frequently in the United States. Lecturers in these fields should explore opportunities to learn more about application software in their fields, original or canned. The central University micro computer labs should provide assistance at the hands-on use level. It was heartening to note that the University of Colombo was taking steps in these directions.

Conclusion

Within a few years personal computers have made much progress in the Sri Lanka market. The problems of user unfamiliarity seen in Sri Lanka today is little different from the situation seen in USA in the early seventies. User education necessary for faster growth in personal computer use must come, (just as it did in USA) in five ways: lower hardware prices; user-friendly and flexible software packages at affordable prices; drives towards top and middle management appreciation; concentrated educational and lab experience programmes at school and University level; and of course, a general national awareness of the benefits of personal computers at all levels. In a mixed economy such as ours, these will come from joint efforts of the government, dealers, computer professionals, top and middle management of organizations, educators and mass communicators. It is heartening to notice the current interest of all these groups. However, more efforts in raising the awareness of the general public through mass media programmes is definitely needed.

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PRIVILEGED EXPORT ZONES

N.N. Sachitanand

India's first Export Processing Zone, confined to production of electronics goods was established ten years ago. But, its performance has not been upto expectations either in promoting exports or foreign investors. N. N. Sachitanand writing in the Madras "Hindu" assesses its performance over the past decade and maintains that the experience of Bombay's SEEPZ provides several important indicators that could ensure better results in the new Export Processing Zone contemplated in India. During India's six year plan period four more such zones are to be established at Falta near Calcutta, Meenambikkan near Madras, NOIDA near Delhi and in Cochin. Since there appears to be no retraction on this policy, at least the Government can learn from the SEEPZ experience and take steps for better performance in the new zones, he states.

When the Santa Cruz Electronics Export Processing zone (SEEPZ) was established in Bombay in 1974, the Union Government had hoped to achieve the following objectives through it:

(1) promote a rapid expansion of electronics goods export from the country;

(2) expose Indian professionals to the latest product design and production technology (brought in by top-notch foreign companies investing in the Zone). This exposure would ultimately result in the enhancing of technology in the rest of the country by horizontal transfer from these professionals working within the Zone.

(3) raise the technological level of electronics ancillary industries in the country, especially those catering to the units in the Zone;

(4) earn substantial foreign exchange.

INCENTIVES

To enable the achievement of these objectives and attract foreign investors to the Zone, the Government offered a basketful of incentives and facilities which not only did away with all the irritants and impediments faced by an enterprise elsewhere in India but also placed the Zone company in a highly competitive position with respect to

manufacturers anywhere in the world. Licensing for import of capital goods and other production materials was waived, imported capital goods, toolings, spares, raw materials and packaging materials were allowed in free of customs duty, products made in the Zone were exempted from central excise duties and other levies, relaxations were made in local levies, foreign equity upto 100 per cent was permitted, foreign capital invested in the Zone was allowed to be repatriated at any time, foreign investors were allowed to remit freely to their countries profits and dividends earned after payment of taxes, a subsidy on wages was offered during the first six months of training, the Zone units were statutorily exempted from power cuts, all the Zone enterprises were given public utility status under the Industrial Disputes Act, telecommunication facilities were given on top priority basis, ready-built space in standard design factories was offered at low rents for those entrepreneurs who did not want plots for constructing their own factories and so on.

Obtaining all clearances for putting up the enterprise, which in India is usually a nightmarish experience involving considerable running around and agonising delay, was arranged at a single point - the SEEPZ Board - within a maximum of 45 days only. Customs clearance was provided within the Zone itself and procedures simplified to ensure

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almost immediate clearance of consignments, both incoming and outgoing.

ENCOURAGING EXPORT CURVE

Despite these "heavenly" conditions (so it would seem to entrepreneurs outside the Zone), SEEPZ failed to attract the jostling queue of foreign investors which was expected. After comparing the carrots dangled by similar zones in South Korea, Taiwan, Singapore and Sri Lanka, from April, 1981, SEEPZ units were exempted from tax on their profits for an initial period of five years. This has resulted in an increase of enquiries from some big foreign firms.

The question now arises has SEEPZ performed upto expectations? The export curve shows an encouraging trend with a low growth rate in the initial years but a rapid acceleration in the last two years. Between 1976/77 and 80, exports rose slowly from Rs. 3 crores to Rs. 11 crores. Thereafter, the growth rate has been around 70 per cent to 80 per cent per annum (80/81 - Rs. 19 crores; 81/81 30 crores; 82/83 - Rs. 54 crores and 83/84 - Rs. 70 crores expected.)

RETURN NOT ADEQUATE

However, a discouraging factor is that in the last nine years of its existence SEEPZ has contributed only Rs. 40 crores as net foreign exchange earnings for the country with total exports being Rs. 175 crores and total imports (including Rs. 14 crores in capital goods) amounting to Rs. 135 crores. When one considers that the total exports is around Rs. 8,000 crores per annum now, the contribution by SEEPZ with all the concessions and facilities given to its units, is piddling. Certainly it is not an adequate return for the nearly Rs. 10 crores already spent by the Government on development and maintainance of the Zone.

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The high level of imports into SEEPZ points to another disturbing factor - the minimal use of local supplies. This is because, contrary to expectations of high technology manufacturers in SEEPZ the Zone is being used by foreign investors mainly for assembly operations in order to take advantage of the low wage cost in India. Thus SEEPZ is far from meeting the desired objective of enhancing the technological level of hinterland electronics ancillary industries. There is ofcourse, no scope for Indian professionals working in the SEEPZ units picking up design know-how. The assembly production line techniques employed in the SEEPZ units are for scales of production usually too large for replicating in the hinterland given the low demand levels of the Indian market.

UNEVEN PERFORMANCE

The performance of the units located in SEEPZ has been uneven. Of the 75 units sanctioned only 45 are now operating. Roughly, 50 percent of the operating units have kept upto the projections given in their original project reports about quantum of exports and value added. There are 18 units exporting more than Rs. 50 lakhs per annum each, seven units exporting between Rs. 25 lakhs and Rs. 50 lakhs and nine units exporting less than Rs. 25 lakhs a year and 11 non-exporting units. Among the non-exporters, four units are sub-contracting to other enterprises in the Zone and seven are non-active.

Among the 75 units originally sanctioned, 12 have downed shutters. Their products included cassette tape recorders, ceramic capacitors, black and white, TV sets, X-ray units, wire-wrapping boards, aluminium foil capacitors and digital watches. A recent review of the reasons for the poor performance of SEEPZ units identified poor marketing know-how, product becoming obsolete and international prices dropping too low as the primary causes.

As a result of this review and the representations made by the Zone units the Union Government permitted as of April 1983, the zone enterprises to export 25 per cent of their production to the hinterland. Of the 12 units which applied for such export, 10 have already received their sanctions. Their products include rectifiers, semi-conductors integrated circuits, capacitors, printers, carbon and metal film resistors. It is hoped that this inland outlet will provide a cushion for the units in distress due to a slump in international demand or prices.

However, how far the Indian buyer will opt for SEEPZ products remains to be seen since the only advantage he gets is ready availability of the product. In all other respects obtaining the product from SEEPZ is as good as importing from abroad since an import licence is needed and excise duty as well as import duty (in the form of additional excise duty) are levied on the SEEPZ product to the same extent as if it is procured from abroad.

FOR BETTER PERFORMANCE

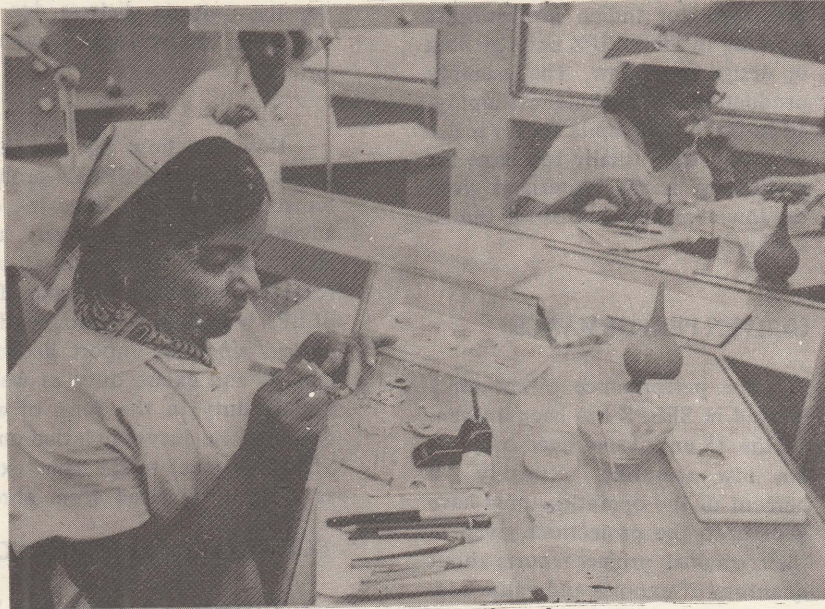
Although the experience with SEEPZ has not been all that encouraging, the Union Government is obviously sold on the idea of privileged export processing zones. During the Sixth Plan period, four more such zones are to be established at Falta near Calcutta, Meenambakkam near Madras, MOIDA near Delhi and Cochin. Since there appears to be no retraction on this policy at least the Government can learn from the SEEPZ experience and take the following steps for better performance in the new zones;

(1) Select the entrepreneurs with greater care, especially with respect to their international strength and marketing arrangements.

(2) Insist on a technology flow for each enterprise so that the Zones do not become a mere haven for exploiting the cheapness of lo-

cal labour. If Singapore can do it, there is no reason why India with a much higher inherent technical strength should not.

(3) Meet the social infrastructure needs of expatriates working in the Zones. A residential enclave around each Zone, with facilities such as an international school and supermarket, for the foreign personnel, is a must. The housing units can be leased out to the Zone, units according to the period of their requirement.



Women working in a watch making factory.

(4) Telex and telephone connections are provided within two months to every Zone enterprise in its office premises inside the Zone. But no such priority is extended to the residence of the chief executive. This is a serious drawback because the difference in time zones between India and the foreign principals of the Zone enterprises quite often necessitates the chief executive ringing up the foreign headquarters late in the night (when it is day there). This cannot be done if the only telephone connection is in the office within the zone.

(5) To promote the development of local ancillaries in the hinterland, the value added criterion should be so fixed that the operation of a Zone enterprise does not become a mere assembly of imported parts.

(6) A problem faced by the

SEEPZ units is the disposal of imported equipment which has outlived its utility. Till now such equipment was allowed to be sold inland on an ad-hoc basis after payment of customs duties charged on the depreciated value but at rates prevalent at the time of import.

Now the Customs and Excise Department has been asked to modify the Customs Exemption Notification permitting taking out of old or surplus equipment from the Zone by paying customs duty

at current rates on the depreciated value of the equipment which is based on a prescribed lifetime for the equipment. This policy modification needs to be executed before the other zones are set up.

(7) There is tremendous competition among the newly industrialised countries in Asia to attract foreign investors to their export zones. While the Indian Government has provided a number of incentives, there is need to match what the others offer. For example, the five-year tax holiday, which SEEPZ offered rather late in the day, to match similar benefits given by Sri Lanka, Taiwan, South Korea and Singapore, has certainly attracted some big fish who would not nibble previously. In the same manner, the Government needs to have another look at the taxes on dividends, royalties and know-how fees and salaries of foreign person-

nel and either reduce them or eliminate them altogether to keep the lure of our Zones on par with those of competing countries.

PASSING CRAZE

(8) In the eagerness to fill up a zone, the authorities may let in fly-by-night operators who are only temporarily interested in making use of the facilities and concessions in order to cash in on a passing craze. This can lead to sickness and a high morality rate in the zone. For example, SEEPZ is saddled eight videotape recording units whose total capacity is 37.5 lakh cassettes a year and which are now underworked since they have run out of availability of new movies to record. Such types of enterprises, which have strictly no technological function, should be avoided.

(9) The zones that are coming up now will be offering both vacant plots for selfconstruction of factories and also built-up space on lease. It has been the experience of SEEPZ that entrepreneurs prefer built-up space since they can immediately start production. Of the 54 plots offered by SEEPZ in its area, only seven enterprises have constructed factories and started production.

On the other hand the demand for built-up space has been so high that the SEEPZ authorities have had to treble the originally sanctioned covered floor area and are planning further substantial expansion. This is a point to be kept in mind by the authorities of the new zones when they do their project planning.

In the ultimate analysis, small countries like South Korea, and Sri Lanka or city States like Hong Kong and Singapore can reasonably hope to achieve export led growth through their free trade zones. But for a large country like India with its immense internal market, the correct strategy should be growth-led exports. And for this short-cuts like free trade zones will be of marginal utility. The real spurt in exports will come only if the trade and industrial policies are so liberalised that enterprises can grow in strength and become internationally competitive without props.

Courtesy: *THE HINDU*

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COMMUNITY - BASED REHABILITATION AS A RELEVANT APPROACH FOR DEVELOPING COUNTRIES

Padmani Mendis

The need for community based rehabilitation, particularly for the disabled, is today an essential requirement in the Primary Health Care Services of the developing countries. The results of such CBR programmes upto date have clearly shown that family members and the community can under supervision train their own disabled very successfully, maintains Dr. Padmani Mendis, consultant on the Programme of Disability Prevention and Rehabilitation at WHO Headquarters in Geneva, since 1979, in this paper she presented in Kuala Lumpur in 1983. She points out that social justice and the UN declaration of the International Decade of Disabled Persons makes it imperative that we change our discriminatory practices and make available to our disabled population social integration with true equalisation of opportunity. The concepts of CBR provide disabled people, their families and their communities with the ammunition necessary to change that "care" into "full equalisation of opportunities".

THE NEED FOR A NEW APPROACH

The WHO estimates that on any one day 1.5 per cent of the population in the developing world is in need of rehabilitation. Thus today in our countries there are some 45 million people whose quality of life could be considerably improved by the availability of a rehabilitation service. It is further estimated that only 1 - 2 percent of the disabled people in need have access to rehabilitation services of any kind. This is illustrated in the figures at right, from Sri Lanka.

I have chosen Sri Lanka as an example not just because it is my own country, but because it has a long tradition of welfare services including free health care and education, a literacy rate of 88 percent, an Infant Mortality Rate of 36 per 1000, and a PQLI of 84, figures that are among the highest in Asia. And yet our rehabilitation coverage even in quantitative terms is only 2.2 percent. To mention random

examples from other regions, Botswana in developing Africa has a coverage of 0.7 percent (2), (3) while Grenada in the Caribbean provides a coverage of just 3.7 percent (4).

What of the feasibility of extending the present pattern of services which is based on the institutional model, to meet the needs of the entire 1.5 percent. To continue with Sri Lanka as an example, the Table below indicates that there are today about 225,000 people needing rehabilitation. Annual per capita cost of maintaining a disabled person in an institution, averages about U.S. \$ 600 (and this is very low in comparison to most other developing countries). Even if only 150,000 of the 225,000 need the services that institu-

tions provide, it would still cost U.S. \$ 9,000,000 per year to maintain institutions. U.S. \$ 9,000,000 for running costs for rehabilitation institutions alone when our total annual recurrent health budget is U.S. \$ 54,000,000. Also, we now have 50,006 institutional places. Imagine the capital outlay necessary to build and equip institutions and to train the manpower necessary to man them, to increase the number of places by 300 percent.

Yet, it is not the prohibitive costs alone that creates an urgent demand for the adoption of a new approach for meeting the needs of our disabled populations. Consider also the quality of rehabilitation that is available in our countries. In apeing the western model within the meagre financial resources

CHART 1 - Availability of Rehabilitation in Sri Lanka

Total Population	15,000,000
Estimated handicapped at 1.5%	220,000
No. of places in Rehabilitation Institutions	5,006
01 Rehabilitation Hospital	250
14 Institutions for mentally retarded	3,000
05 Institutions for the physically handicapped	140
15 Institutions for the hearing and visually handicapped	1,200
01 Institutions for the multiply handicapped	90
10 Vocational Training Centres	326
Total	5,006

Proportion of Places in relation to Need (Quantitative Coverage)

2.2%

(There are in addition 05 national level non-governmental welfare organisations for the disabled.)

Source: IYDP Secretariat and School of Physiotherapy and Occupational Therapy.

available to us for rehabilitation, we have fallen far short of the services they provide and of the high levels of habilitation achieved in the West. How often do rehabilitation institutions in our countries have the wherewithal to fulfil the goal of rehabilitation, which is to provide the disabled people with the opportunity for integration in the mainstream of their community life? Rehabilitation that is available even to the few nearly always leads to isolation or segregation of disabled people - homes for the mentally retarded, shops for the physically handicapped - where in these institutions is the full participation, the equal opportunity?

Another fact that should be mentioned is the absence of education in the total rehabilitation concept among those running and manning institutions. Compartmentalisation of rehabilitation has been successful to such a degree that separate departments and ministries have responsibility for the separate components (medical, educational, vocational, social) and vie with each other for larger slices of the same small cake. There is seldom a body to coordinate the components and make an integrated whole of the rehabilitation process.

It was just recently that I met a pretty young girl born without hearing, who had completed her primary and secondary education last December at a special School for the Deaf which comes under the purview of the Ministry of Education. She was accomplished in many skills that a young woman from the East should have - cooking, embroidery, lace making and so on. And yet she was lonely and miserable at home. Amidst her warm, loving, extended family the incomplete institutional model and the fine compartmentalisation had condemned her to a futile future of isolation. Her family had not been taught methods of communicating easily with her - neither singing nor speech reading which she had used at school; socialisation and income-generating opportunity for her was no one's concern.

The spectre of the paraplegic young man being given an imported ultra-modern wheelchair - or even a

locally produced tricycle - through the generosity of Service Clubs, unknowing, unconcerned, that the young man's home is a tiny hamlet on a rural hillside or on a sandy beach is all too familiar to us. Isn't this what passes off as rehabilitation today?

Social justice and the UN declaration of the International Decade of Disabled Persons makes it imperative that we change our discriminatory practises and make available to our disabled populations social integration with true equalisation of opportunity. Field trials of Community based Rehabilitation (CBR) conducted in 10 developing countries since 1979 with the cooperation of the WHO have proved that we now have within our means an alternative strategy to meet the rehabilitation needs of our disabled populations.

HOW CBR HAS BEEN IMPLEMENTED

For those who would implement CBR the W.H.O. has developed a Manual called 'Training the Disabled in the Community' (5). The Manual aims at enabling the disabled people to achieve social integration through the provision of certain basic opportunities such as independence in mobility, self-care and household tasks, education, income generation and family and social interaction. Where these aspects were seen earlier as separate components of the rehabilitation process and the responsibility of different professionals, departments and ministries, they are seen here as an integrated total concept. The Manual utilises a set of approaches designed to change family and community attitudes towards greater acceptance of the potential abilities of disabled people and of their right to develop these abilities to the maximum. It describes measures to be taken by the family and the community to enable their disabled members to participate and contribute to the life of their community instead of living in isolation or segregation.

The responsibility for rehabilitating the disabled people lies primarily with the disabled people themselves, their families and communities, under the guidance and supervision of 'Local Supervisors' (first-level supervisors).

Local Supervisors in a selected area participate in a Workshop of 9 - 10 days at which they learn how the Manual is to be used. Following the workshop, Local Supervisors return to their communities and using the material provided in the Manual, initiate a rehabilitation programme in the following way; they locate and identify the disabled members in their communities, assess them to determine if they require rehabilitation and identify their needs if they do, select the appropriate training material from the Manual for each disabled person needing rehabilitation, find and teach a trainer for each such disabled person from among the family or community, and thereafter motivate, supervise and guide the disabled person, the trainer and the family in the rehabilitation process. They also periodically evaluate and record the progress made by each disabled person and involve the community in the rehabilitation programme. They are also responsible for referring disabled people who need other available services both within and outside the health sectors.

Local supervisors are in turn supervised by Rehabilitation Professionals such as physiotherapists, occupational therapists, social workers and medical officers.

Let me illustrate the effects of CBR with a few typical examples of impact it has had on the lives of some disabled:

Deepu has difficulty with learning and at three years of age still could not stand up. He was not independent in self-care activities and did not interact in any way with those around him. His training was provided by a well motivated mother and took the form mainly of stimulation through playing using the training package on 'Play Activities' in the Manual. Deepu can now dress himself, and at the age of 4 he has started going to preschool and plays happily with his new friends.

Keeloboga was 10 months old when a local supervisor in Botswana first met her. She has difficulty with seeing and sat in one place all day unaware of what was happening around her. Her mother was given material to train her to get

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around 3 months later Keeloboga was crawling around, pulling at everything she could find, to satisfy her curiosity 3 months after that she was running after her play mates in the yard.

Encico was bedridden as a result of a stroke. He could also not speak clearly. The local supervisor provided his sister with training material with which she trained Enrico to move around again by himself, and to communicate easily with the family and community. He has also been trained to go back to his old job as a painter.

It was Kusumawathie's 29 year old younger brother who came forward to be responsible for her training. At 32 years she was severely handicapped by fits she used to have several times a day. Thinking of her future would make her quite depressed and she would spend her time sleeping and brooding. Medical treatment was arranged and the fits are now reduced to about one a month. Kusumawathi is very involved in family activities and has taken on the responsibility of looking after her young brothers. She also enjoys participating in village social life.

Before the community-based programme was started in her village, Mala, 13 years old, would spend her day sitting at the window gazing wistfully at the road. She has cerebral palsy and could not walk or use her hands well. Her parents had tried all the medical care they knew of, both western and traditional, but nothing made any difference. Her mother did everything for Mala. Mala was not allowed to do anything herself. Counselling and training changed Mala's life. Following instructions in the Manual, her father made walking bars from wood he cut from the garden. Helped by the local supervisor her mother taught Mala to walk. She can do so now with the help of one person. Mala now not only looks after herself, bathing, dressing, and eating independently, but also helps to look after her younger sister. She helps

her mother with cooking. She recently attended the wedding of a relative, something she had never done before.

10 year old Ntchadi is hydrocephalic and has difficulty with moving. She would watch with a sad face as her brothers left home each morning to go across to the school next door to their home. When the local supervisor approached the head teacher of the school, the response was just as it should be. Ntchadi now goes to school every day, happily crawling on her hands and knees. She is, at the same time, being trained to walk with crutches. Incidentally, neither neurosurgery nor orthopaedic surgery which may perhaps have improved Ntchadi's mobility are available in her country.

Indra Irangani was one of those unfortunate disabled children who, people believed, could not go to school because she could not hear or speak. But she proved them wrong. Given the opportunity of starting school at 9, she is now well integrated in the basic class of the village school. Indra Irangani is persevering and conscientious and illustrates just how much disabled people can achieve if only they are given the same opportunities we have.

Neighbours addressed and referred to 19 year-old Jayatilleke as 'Pissa', meaning madman, because of his mongoloid appearance and retarded development. He was teased and not allowed to go about his own business. His family, out of deep affection, had a protective attitude towards him, doing everything for him, even to the extent of buttoning his shirts although he was quite capable of doing it himself.

The positive influence that rehabilitation of the disabled people in the environment of their own community has on changing unhealthy attitudes is illustrated in this case. As part of the programme the family and neighbours were counselled by the local supervisor, as was his community, through the leaders. Jayatilleke is now accepted for what he is, and is Jayatilleke. This has given him tremendous confidence. He is quite independent in self-care activities and earns a living working on a plantation. He buys his own clothes and makes his contribution to the family income.

RESULTS OF CBR TO DATE

Participants at an Inter-regional Consultation held in Sri Lanka in June 1982 representing 10 countries which have been involved in field trials of CBR (Mexico, Botswana, Nigeria, India, Indonesia, Philippines, Sri

TABLE 1 : Case Distribution and Analysis after 5 weeks of Training

Source : Shih, (6)

TYPE OF HANDICAP	No of Cases	No. of cases showing	
		positive change	no change
Mentally Retarded	01	0	01
Blind	06	03	03
Epilepsy	04	02	02
Motor handicaps	06	05	01
Deaf and Dumb	03	01	02
TOTAL	20 100%	11 55%	09 45%

**TABLE 11 : Case Distribution and Analysis
after approximately 12 weeks of Training**

Source : Matiza (7)

TYPE OF HANDICAP	No of Cases	No. of cases showing	
		positive change	no change
Mentally Retarded	09	06	03
Blind	09	07	02
Epilepsy	10	06	04
Motor Handicaps	06	04	02
Deaf and Dumb	07	05	02
Strange behaviour (schizophrenia)	02	01	01
TOTAL	43 100%	29 68%	14 32%

**TABLE 111 : Percentage of patients requiring various
levels of assistance. Total 301 disabled**

Source: Hindley-Smith (8)

	CATEGORY	PERCENTAGE	NUMBER
Group 1	People who do not need any assistance with their disability to live a normal life	29	88
Group 11	People whose lives could be improved by rehabilitation at the community level (by community health workers with professional help)	59	177
Group 111	People whose lives cannot be improved without the services of a hospital or rehabilitation centre	12	36

**TABLE 1V: Classification of handicapped selected
for training and results of evaluation -**

Source: Meegolla & Hapuwita (9)

TYPE OF HANDICAP	TOTAL	POSITIVE CHANGE	NO CHANGE
Mentally Retarded	05	04	01
Hearing/speech	09	09	00
Mobility	04	04	00
Fits	03	03	00
TOTAL	21 100%	20 95%	01 05%

Lanka, Burma, St. Lucia, Jamaica) declared that the CBR approach had proved technically viable, effective feasible and appropriate in all the different areas in which it had been tried. Overall analysis revealed that 73% of the disabled people in the trial have shown positive benefits at the end of the latest evaluation period. Positive results were assessed on a series of 23 questions and on observations of social change in the interaction between the disabled people and their environment.

Detailed results from Botswana, Mexico and Sri Lanka are given below as examples:

BOTSWANA

Period of trial November 1979 - March 1980.

In the first evaluation done after five weeks of training, 11 out of 20 cases (55%) showed positive change. See Table I.

A subsequent evaluation approximately 12 weeks after training was commenced revealed that 29 out of 43 (68%) disabled persons showed positive change. See Table 11.

MEXICO

A report on field testing basic rehabilitation technology at the community level performed between October 1978 and March 1981 (8) reveals that out of a total of 213 handicapped persons needing rehabilitation the lives of 177 (84%) could be improved by rehabilitation at the community level. (See Table 111 below.)

SRI LANKA

A report on the field testing of the manual carried out as a social development project by two students of the Sri Lanka School of Social Work states that out of a total of 21 handicapped selected for training 20 showed remarkable positive benefits after six months. (9) See Table 1V.

COMMUNITY - BASED REHABILITATION AND PRIMARY HEALTH CARE

All our countries are committed to the achievement of (HFA) 'health for all by the year 2000' through the deve-

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lopment of Primary Health Care (PHC) services. By definition Rehabilitation is one of the four aspects that PHC addresses itself to, the others being the Promotive, Preventive and Curative aspects of Health. The concepts of CBR have therefore been built on the philosophy of PHC, so that rehabilitation can be successfully integrated into PHC systems making full rehabilitative coverage of disabled populations a realistic goal. Being part of PHC, CBR also "involves specifying measures to be taken by individuals and families in their homes, by communities, by the health service at the primary and supportive levels and by other related socio-economic sectors." It also involves "selecting technology that is appropriate for the country concerned in that it is scientifically sound, adaptable to various local circumstances, acceptable to those for whom it is used and to those who use it, and maintainable with resources each country can afford." Being part of PHC the success of CBR also depends on a high degree of community involvement. (11),(12)

Most countries which have adopted the CBR approach have done so by incorporating it in their existing PHC infrastructure. Community Health workers have taken on the role of Local Supervisors of CBR and field trials have proved this method to be very successful. The incorporation of CBR into PHC infrastructures would be essential in the long term for the achievement of HFA 2000. However, it should also be emphasised that community development organisations, both governmental and non-governmental, with grass-roots level workers (paid or unpaid) can also successfully implement CBR programmes. This is of particular relevance to us in Asia with our rich tradition of voluntarism.

CONCLUSION

The results of community-based programmes to date indicate emphatically that the approach is suited to the needs of developing countries in search of methodology and technology with which to provide rehabilitation coverage for all their disabled people.

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It has shown that family members and the community can under supervision train their own disabled members very successfully. The quality of care achieved cannot be questioned - for where better to provide freedom of mobility, create independence in daily life activities and enable disabled people to participate in the mainstream of community life, than in the environment of their own home and society? The integration of disabled children in existing local schools and the provision of income generating opportunity in their own community has ensured for disabled people "equal opportunity and full participation" with true integration. It has done away with the need for them to be transported to a new and strange situation to be "rehabilitated."

Comprehensive coverage has been possible not only in the ability to meet individual needs but also in ensuring the possibility of rehabilitating those

disabled through epilepsy, the hearing and speech disabled, mentally ill, mentally retarded, mobility disabled and the visually disabled.

Self care for health has deep roots in our socio-cultural past. The failure of other health systems to reach the core of the problem, as well as economic necessity, have given it a profound new significance. So it is with Rehabilitation. Our extended families have in the past "cared" for their own disabled members and still continue to do so. The concepts of CBR provide disabled people, their families and their communities with the ammunition necessary to change that "care" into "full equalisation of opportunities". For those of us who would cherish the preservation of the family unit as the base on which all modern development processes and welfare systems should be built, there is none more relevant than community-based rehabilitation for our disabled populations.

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FOREIGN NEWS REVIEW

THE DEVELOPING WORLD'S FOREIGN DEBTS

LATIN AMERICAN DEBT

Latin America's foreign debt stood at \$350 billion by the end of 1983, according to the July 2, issue of *TIME* magazine. The two heaviest debtors were Brazil (\$ 93.1 billion) and Mexico (\$ 89.8 billion), followed by Argentina (\$ 45.3 billion) and Venezuela (\$ 35.2 billion). Since the beginning of 1984 the pressure on both borrowers, and American Banks that lent most of the money, has grown sharply. A two percent jump in the interest rates has hit Latin American countries with a potential increase of \$ 5 billion, in annual interest payments. Some

bigger US banks had taken "a beating" on Wall Street as investors grew worried whether these debts will ever be repaid. In *TIME*'S view "The danger is that the borrowers would walk away from their loans or attempt to bargain collectively for much easier terms, resulting in an international banking crisis".

The worsening debt squeeze is already sending shock waves directly to the profit statements of US banks. Though in the last week of June Argentina paid \$ 100 million in inter-

est as a good-will gesture, the country had yet to pay \$ 350 million that was almost three months overdue. There was speculation that this sum would go unpaid because Argentina's rejection of the IMF's austerity plan which could prevent the country from getting new loans. From July banks were expected to subtract the missing funds from their second-quarter profits.

One chance of raising the cash to pay off their loans was if the debtors could boost their export incomes sharply and raise the cash for paying loans. Argentina, for instance, faced \$ 5.5 billion in interest payments due this year, but its anticipated trade surplus was only \$ 3.2 billion. Latin leaders complain that protectionism in the US and Europe hampers their export sales. In June Brazil cut steel exports to the US by more than half from

TABLE I EXTERNAL PUBLIC DEBT AND DEBT SERVICE RATIO OF SELECTED DMCs, 1980-1982 (\$ million)

Country	Debt Outstanding a			Service Payments			Debt Service Ratio (%)		
	1980	1981	1982	1980	1981	1982	1980	1981	1982
Bangladesh	3,521.1	3,851.8	4,352.9	75.5	97.6	111.3	5.5	6.8	8.3
Burma	1,453.0	1,638.6	1,960.1	111.7	136.4	120.2	22.6	21.9b	23.3b
China, Rep. of	4,357.3	5,012.7	6,035.4	980.7	1,063.3	1,263.1	4.3	4.1	4.9
Fiji	174.3	198.9	234.3	19.0	22.5	24.5	3.2	4.1	4.5b
Hong Kong	484.8	308.5	267.3	80.8	191.3	48.5	0.4c	0.9	0.2
India	17,575.7	17,999.5	9,611.5	1,055.9	1,025.1	1,157.5	7.0	8.4	13.1
Indonesia	14,882.1	15,737.0	18,421.2	1,771.9	1,978.1	2,308.5	8.0	8.3	10.9b
Korea, Rep. of	15,808.0	18,279.3	20,061.4	2,708.5	3,398.5	3,716.2	12.0	12.4	13.1
Malaysia	3,586.8	5,191.8	7,670.7	367.0	467.0	720.2	2.5	3.6	5.1
Maldives	24.8	36.9	45.1	0.3	0.7	1.6	2.9	4.6	9.4
Nepal	173.9	231.6	296.6	3.9	4.9	6.0	1.5	1.6	5.3
Pakistan	8,780.0	8,812.0	9,178.3	592.4	533.3	538.2	11.1	9.6	9.3
Papua New Guinea	510.3	629.0	748.0	61.3	68.1	94.5	5.6	7.0	10.2
Phillippines	6,463.9	7,577.6	8,836.0	585.3	850.3	1,029.0	7.2	9.9	13.2
Singapore	1,320.0	1,318.2	1,422.7	262.5	228.5	235.8	1.0	0.8	0.8
Solomon Islands	7.6	11.7	16.0	0.0	0.1	0.1	0.1	0.1	0.2
Sri Lanka	1,327.4	1,594.5	1,833.6	81.5	90.9	135.1	5.5	5.7	10.1b
Thailand	4,123.1	5,187.0	6,205.9	433.9	621.4	788.5	5.1	6.7	8.4
Western Samoa	55.0	56.5	60.5	4.6	3.5	2.8	17.0b	21.8b	17.5b
TOTAL	84,629.1	93,673.1	107,257.5	9,196.7	10,781.5	12,301.6	5.4	5.9	6.9

0.0 denotes magnitude less than half of the unit employed

a Disbursed only.

b Exports of goods and non-factor services were used in computing the ratio.

c Merchandise exports were used in computing the ratio.

Sources: IBRD, February 1984 and country sources.

Source: Asian Development Bank, Annual Report, 1983.

TABLE 2 Debt Service Ratios for all Developing Countries, 1970 -1982

Country group	1970	1980	1981	1982 a
All developing countries	13.5	13.6	16.3	20.7
Low -income				
Asia	13.3	7.9	8.4	10.1
Africa	6.5	8.8	11.6	28.3 b
Middle-income				
Oil importers	14.0	14.9	18.0	23.0
East Asia	6.7	7.0	7.6	8.6
Latin America	13.0	33.3	39.6	53.2
Oil exporters	13.9	13.0	15.7	19.1

a. Estimated.

Source: *World Development Report 1983*

b. The sharp rise in 1982 reflects the accumulation of arrears and does not allow for any rescheduling in 1982.

ASIA'S EXTERNAL DEBT

The external debt of 19 Asian countries by the end of 1982 had exceeded \$ 107 billion while debt services payments amounted to \$ 12.3bn. The heaviest debtors were South Korea (\$ 20.1bn) and Indonesia (\$ 18.4bn); followed by India (\$ 9.6bn) from \$ 18.0 bn the previous year, Pakistan (\$ 9.2 bn) Philippines (\$ 8.8bn) and Thailand (\$ 6.2bn). Sri Lanka was in the same league as Burma being close to \$ 2 billion.

The outstanding external debt in these 19 Asian countries had progressively moved up from \$ 84.6 bn at the end of 1980, to \$ 93.7 bn in 1981 and \$ 107.3 bn. in 1982; while debt service payments were rising from \$ 9.2 bn in 1980 to \$ 10.8 bn in 1981 and \$ 12.3 bn in 1982.

The average debt service ratio for these countries also kept increasing from 5.4 per cent in 1980 to 5.9 per cent in 1981 and 6.9 per cent in 1982. (See Table 1).

World Bank estimates placed debt service ratio of all developing countries at as much as 20.7 per cent by the end of 1982. According to these estimates the debt ratio of the low income countries of Asia in 1982 was 10.1 per cent and African countries as high as 28.3 per cent. The middle-income countries of Latin America, however; had reached a record of 53.2 per cent. (See Table 2).

900,000 tons to 430,000 because of US Commerce Department import duties.

Latin leaders point out that largely because of interest payments, their financial resources are being drained away to countries like the US at the rate of about \$ 30 billion a year. This has become a kind of reverse foreign aid with the poor giving to the rich. The situation has brought criticism even from some American institutional investors.

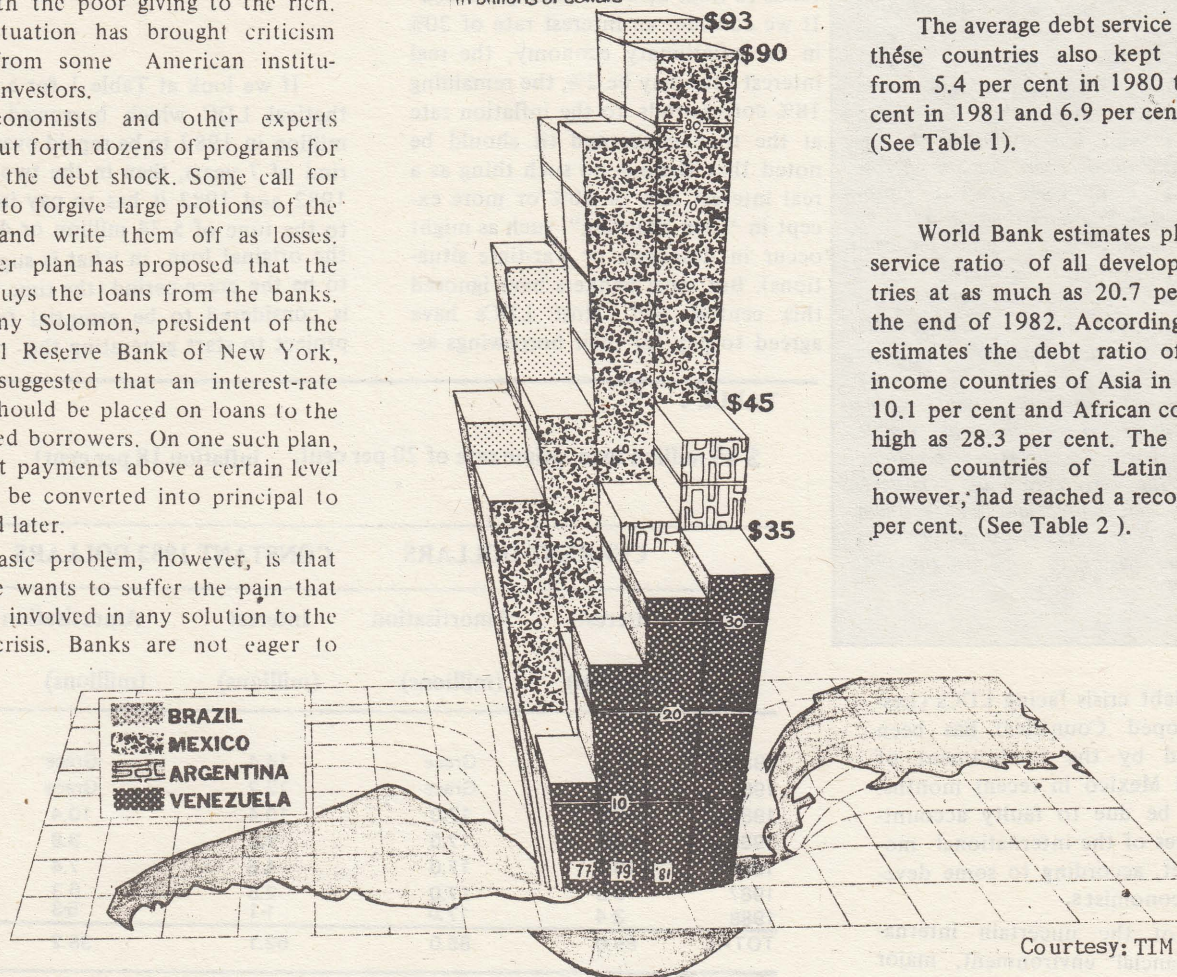
Economists and other experts have put forth dozens of programs for easing the debt shock. Some call for banks to forgive large portions of the loans and write them off as losses. Another plan has proposed that the IMF buys the loans from the banks. Anthony Solomon, president of the Federal Reserve Bank of New York, has suggested that an interest-rate limit should be placed on loans to the troubled borrowers. On one such plan, interest payments above a certain level would be converted into principal to be paid later.

The basic problem, however, is that no one wants to suffer the pain that will be involved in any solution to the debt crisis. Banks are not eager to

write off the bad loans and take the earnings loss, while governments in the developed countries are reluctant to halt economic growth just to please foreign moneymen, concludes TIME.

IN THE HOLE

Total external debt at year-end in billions of dollars



Courtesy: TIME

ACCOUNTING PRACTICES AND THE THIRD WORLD DEBT CRISIS

Hemal Jayasuriya

The debt crisis, particularly for the major borrowers among countries of the developing world, has caused much anxiety in international financial circles over the last two years. This situation has also given rise to questions on the accounting practices of the international money market. In this paper Dr. Hemal Jayasuriya with a PhD from Cambridge and an MA (Systems) and now working on computer operations in Britain, discusses the issues connected with the accounting practices of international money lenders. He illustrates how a developing country borrowing in the international market could end up by paying as much as 61.3 percent of the loan as interest. One explanation is that the recipient of loans has to pay the growing short term interest rate for the entire duration of the loan - a system that could work well and be fair to all parties concerned only as long as there is no inflation. What is happening is that by the inclusion of the inflation rate in the interest rate (rather than using the real interest rate excluding the inflation rate) lenders are forcing borrowers to pay in the early years of a project rather than at a later time period, when the development project for which the loan is utilised, can be realistically expected to yield the necessary cash for the repayment of the principal due to inflation. He suggests that what is required to cope with inflationary conditions is a fixed "real" interest rate and variable amortisation payments which will enable LDCs to have the necessary breathing space in the early years of a project, in a financial sense, and enable them to repay their debts in later years as the project begins to generate the projected cash.

The debt crisis facing LDCs (Lesser Developed Countries) has been highlighted by the predicament of Brazil and Mexico in recent months. This may be due to faulty accounting practices of the international money market, according to some development economists.

In view of the uncertain international financial environment, major

lending institutions have evolved a method for overcoming problems concerned with long term lending to LDCs at fixed interest rates, which can prove to be disastrous, if the short term interest rates prevailing in the money markets are several times greater than the rate agreed with the recipient country (e.g. 20% against a 2% fixed interest rate). Hence recipients have to pay the going short term interest rate which is defined as the average interest rate for a day on the London or New York markets, for the entire duration of the loan.

This system works well and is fair to all parties concerned as long as there is no inflation. However in an inflationary economy the interest rate tends to float upwards and "get stuck". If we consider an interest rate of 20% in an inflationary economy, the real interest rate may be 2%, the remaining 18% corresponds to the inflation rate at the time concerned (it should be noted that there is no such thing as a real interest rate of 20% or more except in "loan sharking", such as might occur in desperate or war-time situations). But most bankers have ignored this central fact. Most LDCs have agreed to pay for their borrowings as-

suming a historical figure varying between 0.5 and 5.0 per cent. They would also have agreed to repay the principal in equal amortisations over a fixed number of years, given a mutually agreed initial grace period. The cash flows of development projects for which the loan is utilised would also have been based on the above mentioned assumptions.

Table 1 shows calculations based on present procedures adopted by lending institutions. The formula $P=S/(1+r)^n$ where P is the constant 1982 dollar value of a sum of dollars in any subsequent year, r the interest rate, and n the number of years beyond 1982 under consideration, has been used for the correction of cash flows.

If we look at Table 1 for a hypothetical LDC which borrowed \$ 85 million in 1982 to be repaid over a period of 7 years, then in the two years 1982 and 1983 it has to pay interest to the tune of \$ 34 million or 40% of the original loan, in what is supposed to be the grace period (the time which is considered to be essential for the project to start generating the requir-

TABLE 1
\$ 85 million loan, prime rate of 20 per cent, inflation 18 per cent)

Year	CURRENT DOLLARS		CONSTANT 1982 DOLLARS	
	Interest (millions)	Amortisation (millions)	Interest (millions)	Amortisation (millions)
1982	17.0	Grace	14.4	Grace
1983	17.0	Grace	12.2	Grace
1984	17.0	17.0	10.4	10.4
1985	13.6	17.0	7.0	8.8
1986	10.2	17.0	4.5	7.4
1987	6.8	17.0	2.5	6.3
1988	3.4	17.0	1.1	5.3
TOTAL	85.0	85.0	52.1	38.2

ed cash.) When considered in this light it seems that the sounding of alarms in international monetary circles about defaulting on the part of LDCs is not justified. Default results from the in-built features of the lending practices of lending institutions and not as a result of the managing practices of the recipient countries. However it must be emphasised that limitations of infrastructure, skilled manpower, communications etc. necessarily make the utilisation of any given quantum of money for a chosen project by a LDC less efficient than a comparable project in a developed country or a multinational company. But this is a different problem, not directly related to financing, which the lending institutions are attempting to rectify by lending money in the first instance to LDCs, in order to promote development and increase efficiency, and thus help break the vicious circle.

Another striking feature (as seen from Table 1) is that the LDC ends up by paying 61.3% of the amount of the loan in interest, having borrowed from helpful and respectable international banking institutions and not from unscrupulous financial intermediaries or loan sharks.

If we study Table 1 in detail, it will be noticed that the repayment of the principal adds upto only \$ 38.2 million, less than half the original loan. However bankers will be satisfied that the terms of the loan have been fully met. But what has happened to the remainder of the principal? The answer to this lies in the fact that the sum of the interest payments of \$ 52.1 million plus \$ 38.2 million repayments of the principal add upto \$ 90.3 million. The bankers are thus satisfied that they have recovered their principal in full and also have received interest on the loan, although their accounting methods may be far from satisfactory (as will be shown later).

What is happening is that by the inclusion of the inflation rate in the

TABLE 2

Year	CURRENT DOLLARS		CONSTANT 1982 DOLLARS	
	Interest	Amortisation	Interest	Amortisation
1982	1.70	Grace	2.01	Grace
1983	1.70	Grace	2.35	Grace
1984	1.70	17.0	2.79	27.9
1985	1.36	17.0	2.64	32.9
1986	1.02	17.0	2.33	38.9
1987	0.68	17.0	1.84	45.9
1988	0.34	17.0	1.08	54.1
TOTAL	8.50	85.0	15.04	199.0

interest rate (rather than using the real interest rate excluding the inflation rate), the lenders are forcing the borrowers to pay in the early years of the project (rather than at a later time period, when the development project for which the loan is utilised, can be realistically expected to yield the necessary cash for the repayment of the loan) the loss of purchasing power of the principal due to inflation.

On the other hand if the procedure shown in Table 2 were adopted by the lenders, it can be shown that the total sum recouped by the bankers would be much larger, \$ 214.74 million, consisting of \$ 199.7 million (as opposed to \$ 38.2 million under the existing procedure) so as to maintain the purchasing power of the principal plus \$ 15.04 million from fixed interest rate payments, giving the recipients financial relief in the difficult early years of the project.

According to this scheme, loan repayments are made according to real interest rates, and amortisations are assumed to have clauses that guarantee their purchasing power. The principal would be corrected for the prevailing inflation rate (assumed to be 18% in Table 2 calculations) as measured by

some mutually agreed price index during the period between the loan and its amortisation.

Most loans negotiated by LDCs prior to 1971 were based on the assumption that inflation rates would be rather low (certainly less than double-digit inflation which became commonplace throughout much of the seventies). The subsequent high inflation put the LDCs into the so called "debt trap" requiring further borrowing merely to pay the interest on existing loans, leading to a vicious spiral. On the other hand, the present system also penalises the lenders as the principal is not inflation linked. Hence it would make it easier for LDCs to pay their debts at a future date with inflated dollars, provided the anticipated cash flows from the development projects were realised.

In conclusion, it can be said that what is required to cope with inflationary conditions is a fixed "real" interest rate and variable amortisation payments. This will enable LDCs to have the necessary breathing space in the early years of a project, in a financial sense, and enable them to repay the debts in later years as the project begins to generate the projected cash.

BOOK REVIEW

INTERNATIONAL COMMODITY CONTROL - A CONTEMPORARY HISTORY AND APPRAISAL - Fiona Gordon - Ashworth
(LONDON: CROOM HELEM, 1984, \$ 19.95)

Leelanda de Silva

The rhetoric of free markets is only to suit convenience and circumstance, and regulation is desirable where it is in one's interest. This is an issue that needs more careful study by Third World countries and emerges strongly in this book according to Leelananda de Silva a key official of the former Ministry of Planning and Economic Affairs and now attached to the Geneva based International Foundation for Development Alternatives (IFDA).

If the Wall Street Journal, and some of the current economic myth makers like Professors Hayek and Bauer are to be believed, most of the world's ills started with the abolition of the free market economy by Keynes. Everything was so beautiful in the world prior to the 1940's. In commodities, Professor Bauer would look back upon a halcyon age of free enterprise based on small-scale production. This excellent book of Fiona Gordon-Ashworth, an economist with the Bank of England (her views are personal and not to be attributed to the institution) and formerly a lecturer at the University of Southampton, in reviewing the history of the international trade in commodities over the six decades, proves empirically that the likes of Hayek and Bauer are wrong. There was never that kind of international free trade.

A 300 page information packed book, it should be extremely useful for commodity policy makers in national governments and international organisations, and to researchers to obtain a mass of relevant material for further analytical work. The author's coverage of a broad area does not enable her to analyse in great depth the problems of each International Commodity Agreement, of which there have been forty over the

last half-century. But there is a bird's eye-view of almost all of them. Apart from the appraisal of individual commodities, and the 39 agreements connected therewith, and the six commodities in which cartels operated, the book contains general chapters which provide the backdrop to the evolution of the contemporary international commodity economy, the features of commodity control common to most circumstances, and a general appraisal of the past and prospects for the future.

International commodity trade issues over the last two decades have been closely linked with UNCTAD, the Group of 77 and the controversy over the terms of trade (Prebisch-Singer thesis), and the price and earnings stabilisation themes that previous actions in another world milieu have been lost sight of. However, in historical perspective, UNCTAD is only the heir to the legacies of the British Empire. As the leading trading block prior to the Second World War, the British Empire had developed the requisite machinery to regulate most of the world's commodity trade by concerted policies within its own territories. If increased tea production was felt unnecessary, the colony of Kenya was told to stop new plantings. Global production was planned through the Colonial Office. As the author states, a major post-war problem has been the 'fragmentation of pre-war patterns of commodity trade, dominated as they were by developed countries with the UK playing the leading role, and their replacement by a growing number of often newly independent countries'. The new institution of Producer Associations - of which the members

are sovereign governments of Third World countries - has so far failed as an effective substitute.

It is intriguing that international commodity agreements, except in the case of tin, have been negotiated only in the case of agricultural commodities. However the practice of cartelisation is most evident in minerals and metals. The author's view is that cartelisation was 'not more successful than international commodity agreements in meeting their objectives'.

The support of rich countries is crucial to the negotiation of international commodity agreements. The volume discusses this aspect in some detail and looks specifically at the policies of the EEC and the USA.

"Although in general the US did not come out strongly in favour of international commodity agreements, it supported such agreements in cases where there was a strong US producer interest. The key examples were the wheat agreements of the 1950s. The US played an active role both within and outside these agreements by stock with drawal at the national level. Another factor inducing the US to enter international commodity agreements was the overruling of economic by political considerations. The most notable case was the 1962 Coffee Agreement. US adherence, which had been withheld in strenuous terms during the 1950's resulted from its new perception that Western hemisphere security would be improved by the stability of the coffee trade and prices. It might have been fascinating if this issue was investigated a little more in depth. The US government policies in these matters are shaped to a substantial extent by powerful business corporations, and the 1962 Coffee Agreement was endorsed primarily because it was possible for the US State Department in the early sixties to secure the agreement of the large food-processing corporations to the conclusion of the International Coffee Agreement" (Albert O. Hirschmann, *Essays in Trespassing*). The US probably supported the International Rubber Agreement, partly because of

its significance to the Asean region. The conclusion to be drawn is that the rhetoric of free markets is only to suit convenience and circumstance, and that regulation is desirable where it is in one's interest. It is important for international organizations and for Third World countries to study this aspect more carefully and in detail.

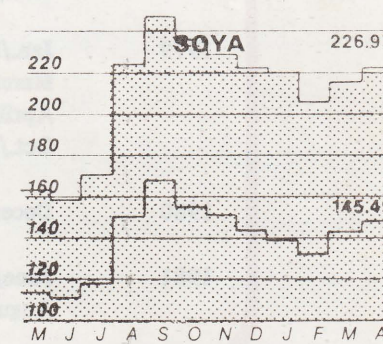
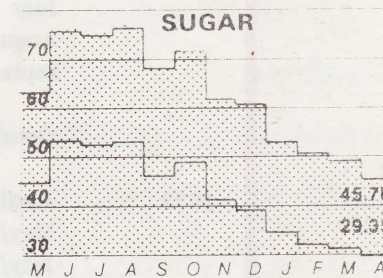
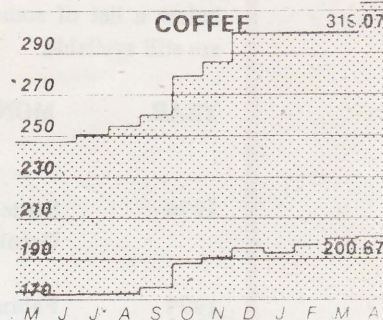
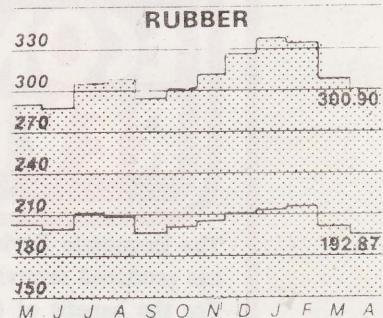
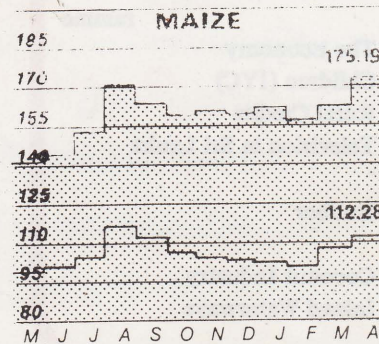
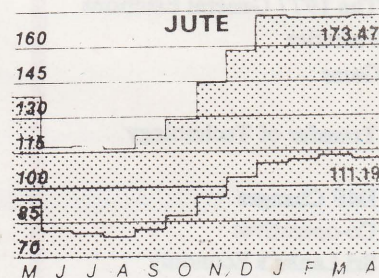
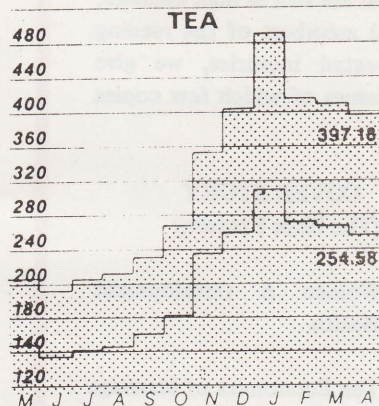
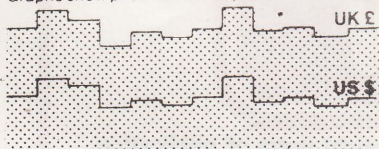
International commodity agreements, according to the author, have not been major success stories. "The success or failure of the agreements in their most common objective, the balancing of the supply of the commodity with the demand for it, may be measured, broadly, in terms of their ability to avoid large surplus and deficit positions. The evidence suggests that few of the agreements were no more successful in terms of their ability to stabilize prices, or bring about structural change through planned investment. Yet the author sees a future for these agreements, primarily as instruments for consumer-producer co-operation in stimulating orderly trading practices. She calls, among other things, for a "more integrated approach between international commodity organisations, the IMF and the IBRD for policy concerning the same commodities, for commodities covering similar markets (such as tropical beverages) or competing for similar land use (such as rice and jute.) Such an approach could be applied at many levels including data collection and dissemination, promotion and the allocation of development finance"

A brief review cannot do justice to the rich assortment of historical information on tropical beverages, rubber, tin, wheat and olive oil, which are to be found in the individual chapters dealing with these commodities. The synoptic presentation of commodity trade issues in the League of Nations days is no less interesting. Above all, the book provides a fascinating glimpse into the infinite variety and baffling complexity of commodity trade issues. Much more has to be done, particularly by UNCTAD, to treat more specifically the distinctive and unique characteristics of each commodity and to address the special problems of each. That is probably the conclusion to be drawn.

COMMODITY PRICE INDEX

Price index for April 1984
(1975 = 100)

Graphs show price index over previous 12 months



An index of commodity prices
prepared by the London based monthly SOUTH

Production problems beyond our control have compelled us to alter frequency of publication. Delayed publication has enabled us to include, in a few instances, data obtained after April 1984.

ECONOMIC REVIEW

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