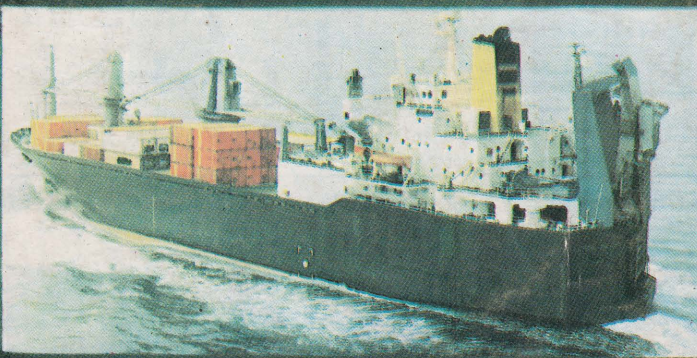


ECONOMIC REVIEW

August
1986

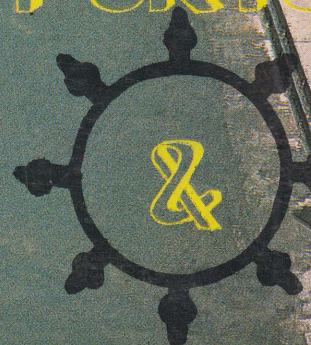
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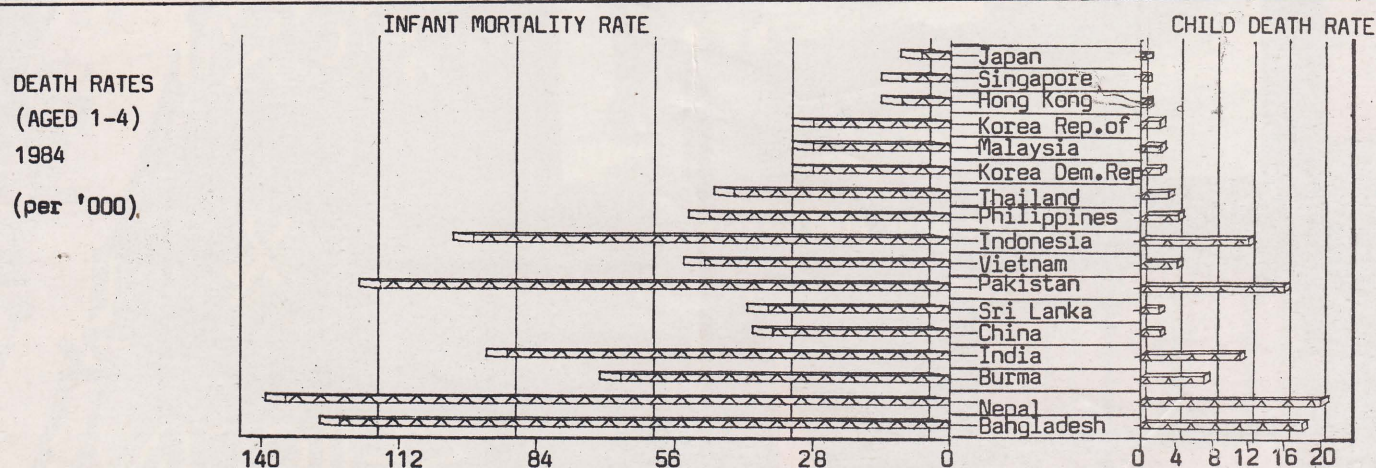
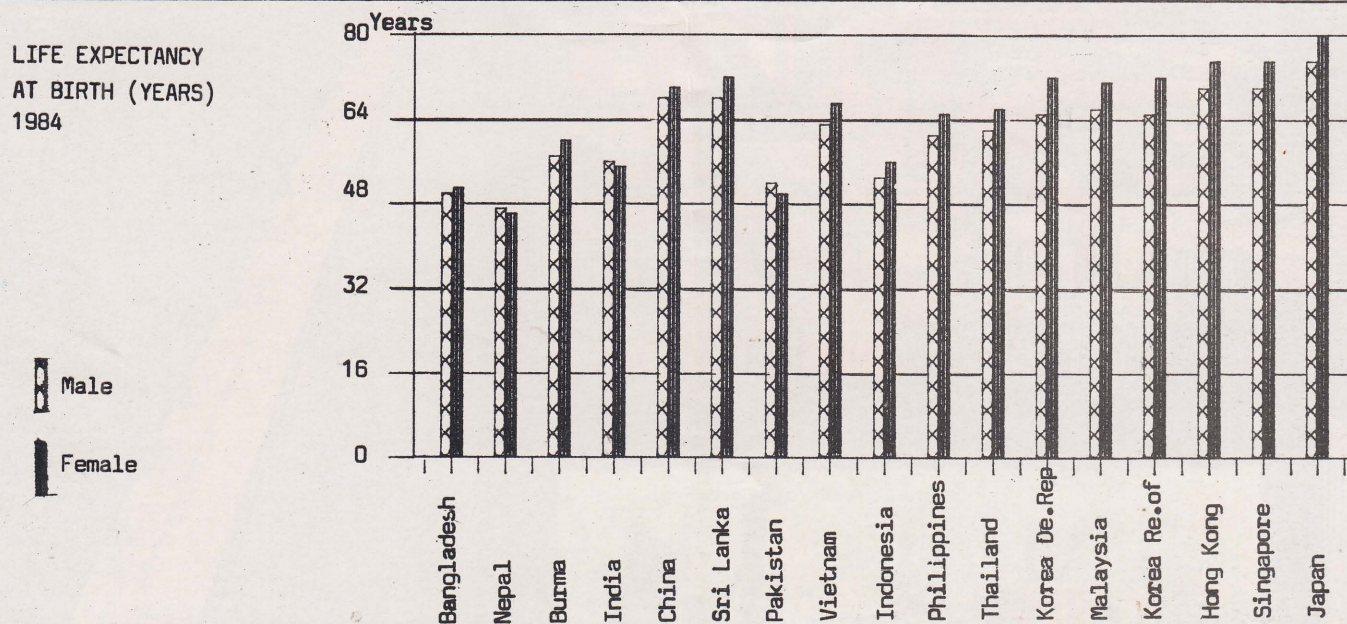
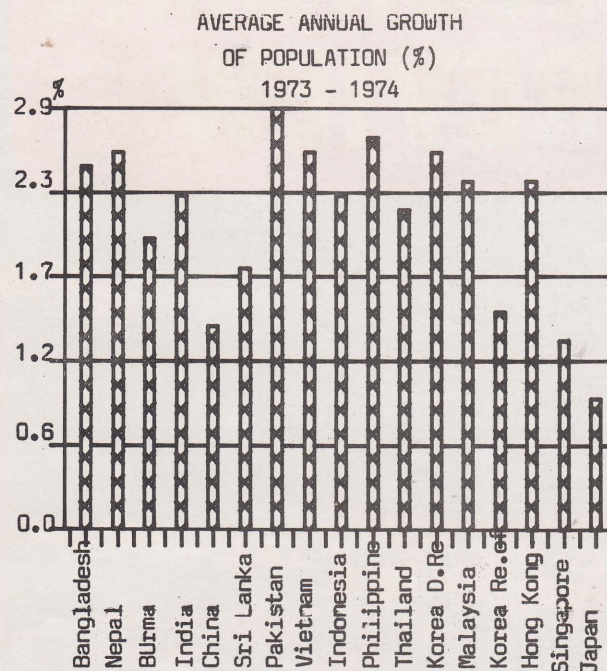
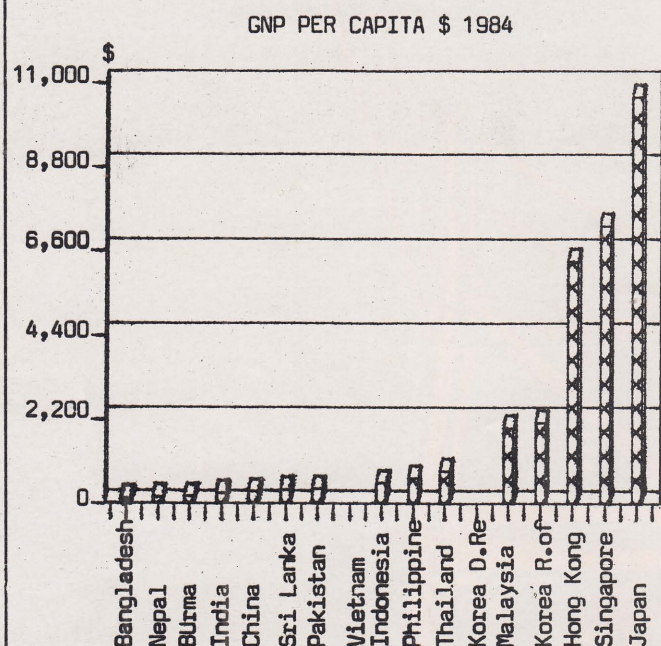
A PEOPLE'S BANK PUBLICATION

PORTS



SHIPPING

ASIAN DEVELOPMENT INDICATORS



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COLUMNS

Diary of Events	2	June/July 1986
Agriculture	20	Paddy harvest records drop in Maha 1985/86
Commodities	21	TEA: Declining prices and turnover
Health	22	Venomous snakes and snakebite treatment in Sri Lanka

SPECIAL REPORT**3 PORTS AND SHIPPING**

K.Dharmasena	4	Colombo: The Port of Asia
M.H.Gunaratne	17	Future prospects for the Port of Colombo

FEATURES

S.S.Colombage	24	Socio-Economic Development
Marc Nerfin	25	Chernobyl Fallout
J.Diandas	27	Some questions about the economics of nuclear energy
A South Report	30	Saudi Arabia - the worlds largest oil exporter holds the key to future production and prices

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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BOOK REVIEW

I.K.Weerawardena	32	Drought Hazard and Rural Development by M.U.A.Tennekoon
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NEXT ISSUE

- * Land Settlement - Policy and Practice
- * Planning perspectives for Sri Lanka
- * Drug trafficking and abuse in Sri Lanka

DIARY OF EVENTS

June

- 1 The Colombo Consumer's Cost of Living Index for June 1986 was 607.5 the Department of Census and Statistics announced. In May 1986 it was 600.7; and in June 1985 it was 567.4.

- 3 Six members of the Organisation of Petroleum Exporting Countries (OPEC) have reached a general understanding that calls for a target price of \$ 17-19 per barrel of crude oil in order to stabilize the world market, the specialized journal Middle East Economic Survey (MMES) reported.

All US oil prices sank under the \$ 14 level as they continued downward on the futures market of the New York Mercantile Exchange. Dealers said the price fall was due to an announcement the previous week that stocks of gasoline had risen sharply in the United States, according to a report from New York.

- 4 Cabinet approved a proposal by the Lands Minister for the River Valleys Development Board to begin reconstruction work on the Kantalai Tank. The first stage costing about Rs 25 million will involve clearing the site and filling it upto base level.

Cabinet approved a proposal - by Minister of Public Administration - for an amendment to the National Institute of Plantation Management Act No. 45 of 1979, to widen the scope of the training programme of the Institute by not restricting it to employees of the plantation sector.

- 6 The United States Agency for International Development (USAID) with the concurrence of the Ministry of Finance and Planning and the Sri Lanka Business Development Centre, has given as a grant US\$ 25,000, to the International Executive Service Corps (IESC), to bring technical skills and management expertise to small business organisations in Sri Lanka.

The Australian Government will provide A \$ 50,000 (about US\$ 35,000) to help victims of the Kantalai dam disaster Australia's Foreign Minister Bill Hayden stated.

- 8 President Jayawardene opened the Rs 850 million new factory of the Pelwatte Sugar Company Ltd., at Pelwatte. It will cultivate a total of 20,000 acres of cane producing 49,000 tons of sugar annually in the steady state.

- 16 The Ministry of Agriculture and Agricultural Research has finalised arrangements to set up a large scale sugar manufacturing plant in Siyambalanduwa for the benefit of the large number of cultivators who have taken to sugar cane planting in a big way, according to a press announcement.

- 17 Sri Lanka and Cuba have signed an agreement in Havana to foster and develop economic, scientific and technical co-operation between the two countries with a view to strengthening existing friendly relations. The agreement provides for co-operation in the fields of the sugar industry, agriculture, public health, education etc.

- 26 Cabinet approved a proposal by the Minister of Trade and Shipping to extend the cargo reservation scheme on vessels of the Ceylon Shipping Corporation for a

year with effect from May 1, 1986. The reservation scheme had assisted the Ceylon Shipping Corporation during the last 12 months to operate on a commercially viable service with operational profits.

- 28 The Economic Agency of the Mahaweli Development Authority, has embarked upon the re-construction and rehabilitation of irrigation projects in the Walawe Area in the Ratnapura district. \$ 130,000 has been released for this purpose and \$ 110,500 of this aid comes from the Asian Development Bank.

- 30 The Crop Insurance Corporation has made arrangements to bring 5,000 acres of sugar cane cultivated by farmers in Sevanagala under the Crop Insurance Scheme.

July

- 1 The Colombo Consumer's Cost of Living Index for July 1986 was 606.3 as against 607.5 the previous month, the Department of Census and Statistics announced. In July 1985 it was 565.6.

A proposal for the Government to enter into an agreement with the French authorities in a sum not exceeding French francs 70 million was approved by the Cabinet. Of this amount FF 35 million will be provided by the French Treasury and is payable over 30 years including a grace period of 10 years with an interest rate of 3% per annum. The balance will be obtained from the repayment period beginning ten years with a grace period of 6 months. The money will be used to finance specific projects.

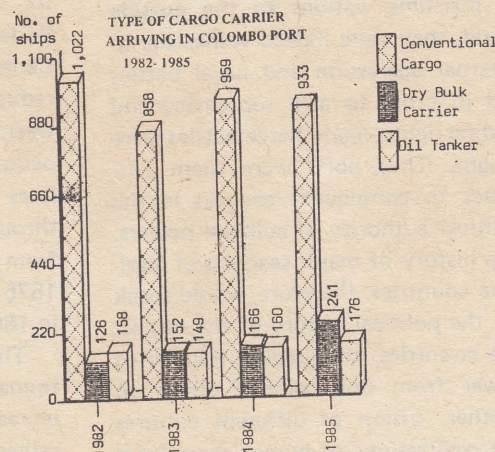
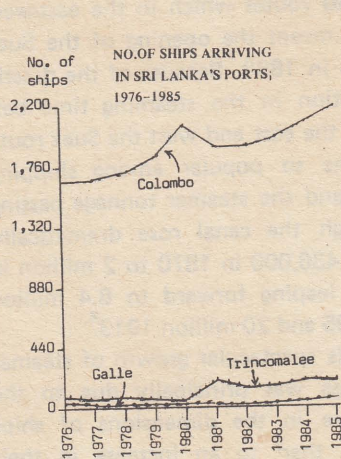
- 2 Rs 40.9 million of World Bank aid has been given to the Integrated Rural Development Project in Kegalle. The World Bank is cutting its interest rate on loans to developing countries from 8.50 percent to 8.23 percent the Bank announced in Washington. The reduction is the eighth consecutive cut since the rate was fixed at 11.43 percent in 1982.

- 3 The Cabinet approved a proposal for the Government to enter into an agreement with USAID for a loan not exceeding US\$ 11.7 million and a grant of US\$ 6.9 million for financing an irrigation system management project. The project is intended to develop the institutional capacity of the Irrigation Department to operate and maintain irrigation schemes.

The Asian Development Bank funded Rs 325 million second Fisheries Development Project which will help upgrade the fishing industry in the west coast will get off the ground soon, the Fisheries Ministry announced.

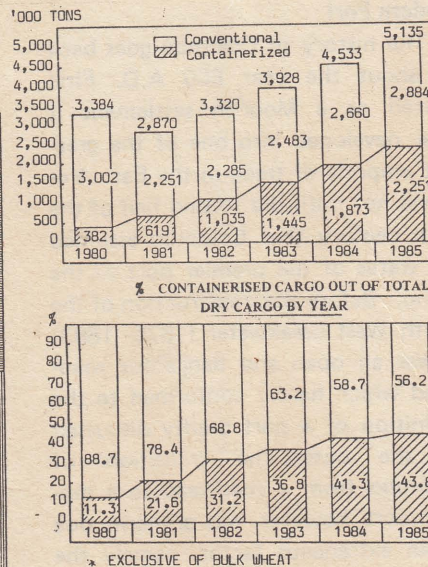
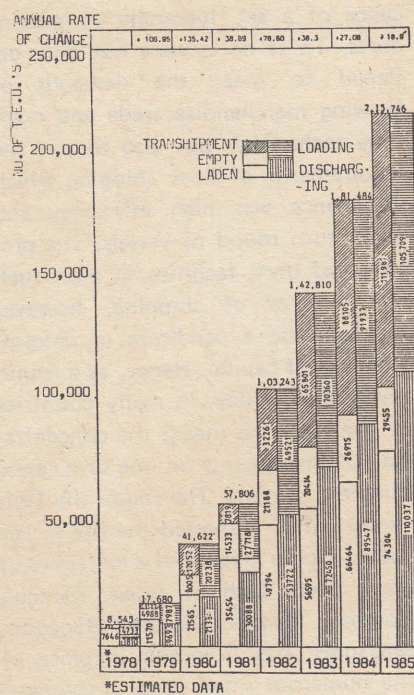
- 15 The exchange of letters confirming the understanding reached between the Sri Lanka Government and the Japanese Government for the provision of two Yen loans totalling Yen 17,000 million (approx. US\$ 102 million or Rs 2,856 million), was signed at the Finance Ministry. The first of these loans in a sum of Yen 14,500 million (approx. US\$ 87 million of Sri Lanka Rs 2,436 million) will be used to implement the Samanawewa Hydroelectric Power project. The loan will be rapid over a period of 30 years inclusive of a grace period of 10 years and carries an interest rate of 3.25 percent per annum.

PORTS AND SHIPPING



CONTAINER THROUGHPUT T.E.U'S
PORT OF COLOMBO

SHARE OF CONTAINERIZED CARGO IN
TOTAL DRY CARGO BY YEAR - PORT OF COLOMBO



Source: Statistics Branch, Planning, Research & Development Division
Sri Lanka Ports Authority.

GROWTH OF TRAFFIC THROUGH COLOMBO PORT

Sri Lanka's major port - Colombo - has earned a reputation as the premier port in South Asia today. Lloyds Shipping authorities have in their reviews indicated that by October 1984 Colombo had elevated itself to this leading position. Through improved port efficiency and by keeping pace with the developments in maritime technology, states the Lloyds Economist, Colombo was able to pull out traffic from the weaker regional ports, particularly those from the Indian sub-continent.

Colombo is also being placed among the world league of container ports and a leading transshipment centre in the region. As the following paper by Professor Dharmasena shows, the number of TEU's (twenty-foot equivalent units containers) handled by Colombo which averaged only 200 a month in the early 1970's rose to 1,400 a month by 1979 and in the four years from 1979 to 1982 container traffic through Colombo grew by about 483 percent. This impressive rate of growth is also illustrated graphically in a diagram on this page. What is significant in this growth is that this upward thrust in traffic was experienced by Colombo at a time when the world and shipping was hit by recession which brought negative growth rates to some major ports of the world.

The other notable feature in Colombo's growth as a port is the changing nature of the type of cargo handled. As the diagram on this page indicates containerised cargo in 1985 took up nearly 44 percent of all dry cargo handled in Colombo as against only 11 percent in 1980. Of the smaller ports traffic through Trincomalee increased significantly from 1980.

Sri Lanka's shipping fleet has helped to buttress this growth of traffic though global recession of the last few years has resulted in fluctuating fortunes for the national carriers. The Ceylon Shipping Corporation in keeping with trends in the shipping industry began converting its fleet from conventional to container vessels from the early 1980's, and purchased eight container vessels upto 1986 on official and commercial credits. With depressed freight rates worldwide, in recent years, the CSC has found it difficult to maintain its commitments on these credits, underwritten by government guarantees. This support of the Treasury to the CSC had exceeded Rs 900 million by 1986.

The background to the growth, in this sector, problem areas, and future prospects are discussed by two specialists in this field in the two papers that follows.

COLOMBO: The Port of Asia

K.Dharmasena

A port has been defined as a protected place where ships can land and ride at anchor as well as a place where ships can load, unload and harbour. It is normally recognised and supervised for maritime purposes by public or private authorities. The term also includes a city or a township for the reception of mariners, traders or tourists and therefore, denotes something more than a harbour. In a general sense the term harbour means an area of water with the works necessary for its formation, protection and maintenance, such as breakwaters, jetties etc. A port on the other hand is made up of harbour plus the freight and passenger structures such as docks, wharves, quays etc. with their cargo handling apparatus. The main difference between a 'port' and a 'harbour' hence is that a port may possess a harbour but a 'harbour' is not necessarily a 'port'.¹ Any natural creek or islet on the seashore with adequate depth of water and sufficient shelter for ships, fulfils the essential conditions of a 'harbour'. To make it a 'port' in the accepted sense of the word there must be, in addition accommodation and facilities for landing passengers and goods and an appreciable quantum of overseas trade.

The English word 'port' is said to have been derived from the Latin word 'port-us' meaning haven, harbour. Later the word became reinforced by the French word 'port', Spanish word 'puerto', Portuguese word 'porto' all meaning 'port'.

Apart from holding the life line of a country's economic, commercial and social life by functioning as inlets to and outlets from hinterlands for the transfer of domestic and foreign seaborne trade, ports have also served as international centres for the amalgamation and cross fertilisation of human races belonging to different cultures and civilizations. As ports were 'external openings' or 'windows'

of maritime nations to the outside world, they were indeed vulnerable to external aggression and naval battles and in order to gain supremacy and trading rights, many fierce battles were fought. Thus ports were silent witnesses to consequent changes in the political authority of colonial powers. The history of major seaports of maritime countries, therefore, would speak for the political history of the respective countries, the gradual transfer of power from one colonial power to another, fusion of different cultures and civilizations of human races from far and near, the commercial exploitation of the region and its resources. Finally, the installation of respective national governments and their administration.

The Development of Colombo as a Modern Port

The history of Colombo goes back to about the year 800 A.D. First started as a Moorish settlement it later developed into one of the greatest emporia of trade in the East. Yet it was not until the second half of the 19th century that Colombo assumed the status of the premier port of the island. Before the construction of the South West breakwater (1875- 1883) it was an open and dangerous roadstead which hardly conformed to the definition of a port briefly discussed at the outset. The transition of Colombo from a roadstead to a modern port, however, was primarily due to an extraneous factor, namely the technological revolution in the maritime sphere that took place in the 19th century.

The industrial revolutions in the western world brought about a vast expansion in international trade. In the maritime sphere that expansion of trade demanded the improvements in speed and carrying capacity of ocean going vessels. In consequence, the age old sailing vessels that depended on

nature were replaced by the fast moving steamers run on coal. Coupled with the adoption of steam propulsion in ocean transportation was the search for sea routes which in the east-west trade meant the opening of the Suez Canal in 1869. Because of the drastic reduction in the steaming time between the east and west the Suez route became so popular among shipping lines and the steamer tonnage passing through the canal rose dramatically from 436,000 in 1870 to 2 million in 1875 leaping forward to 8.4 million in 1895 and 20 million 1913.²

This spectacular growth of steamer tonnage was principally due to the increase in the dimensions of ships rather than to an increase in their number. The modern ocean transport system introduced by steamer on the otherhand was characterised by falls in freight charges, increased mobility of passengers and of merchandise trade and improved access to markets. Along with these developments was the emergence of a set hierarchy of modern ports. These ports were not only designed to meet the demands of growing merchandise trade and maritime technology but also to suit the requirements of liner shipping which in essence was high efficiency and quick turn round of vessels. The provision of port, facilities to meet such requirements of shipping, however, involved the expenditure of colossal amounts of capital. Hence, as a sound investment policy, in many countries of the east, this meant the concentration of investments on one or a few numbers of ports. The end of the 19th century thus witnessed the rise in the Indian Ocean Region of a hierarchy of great ports such as Aden, Karachi, Bombay, Madras, Calcutta, Rangoon, Singapore and Colombo in place of the numerous small ports in the past.

These ports varied in size and importance according to the functions that each port performed in the network of trade routes in the Indian

(1) Encyclopaedia Britannica.

(2) Source: Suez-Canal, A.T.Wilson.

Ocean. Bombay and Calcutta on either side of the Indian sub-continent, which had inherited vast hinterlands, primarily served the overseas trade of that country. Whereas Singapore, with no hinterland of its own but situated in a strategic position in the Straits Settlements, developed mainly as an entrepot in the entire South East Asian region. Quite different indeed was the 19th century Sri Lanka on the allocation of functions among its ports.

Before the opening of the Suez Canal, Sri Lanka, had some sixteen outports serving the coastwise trade and three main ports in the service of international shipping and each performing different functions. Trincomalee was one of the grandest natural harbours in the world though, it was off the main sea lanes and besides had no communication links with the hinterland. Therefore, it served as the naval headquarters from the 17th century to the opening years of this century. For Sri Lanka too the most important ports, therefore, were

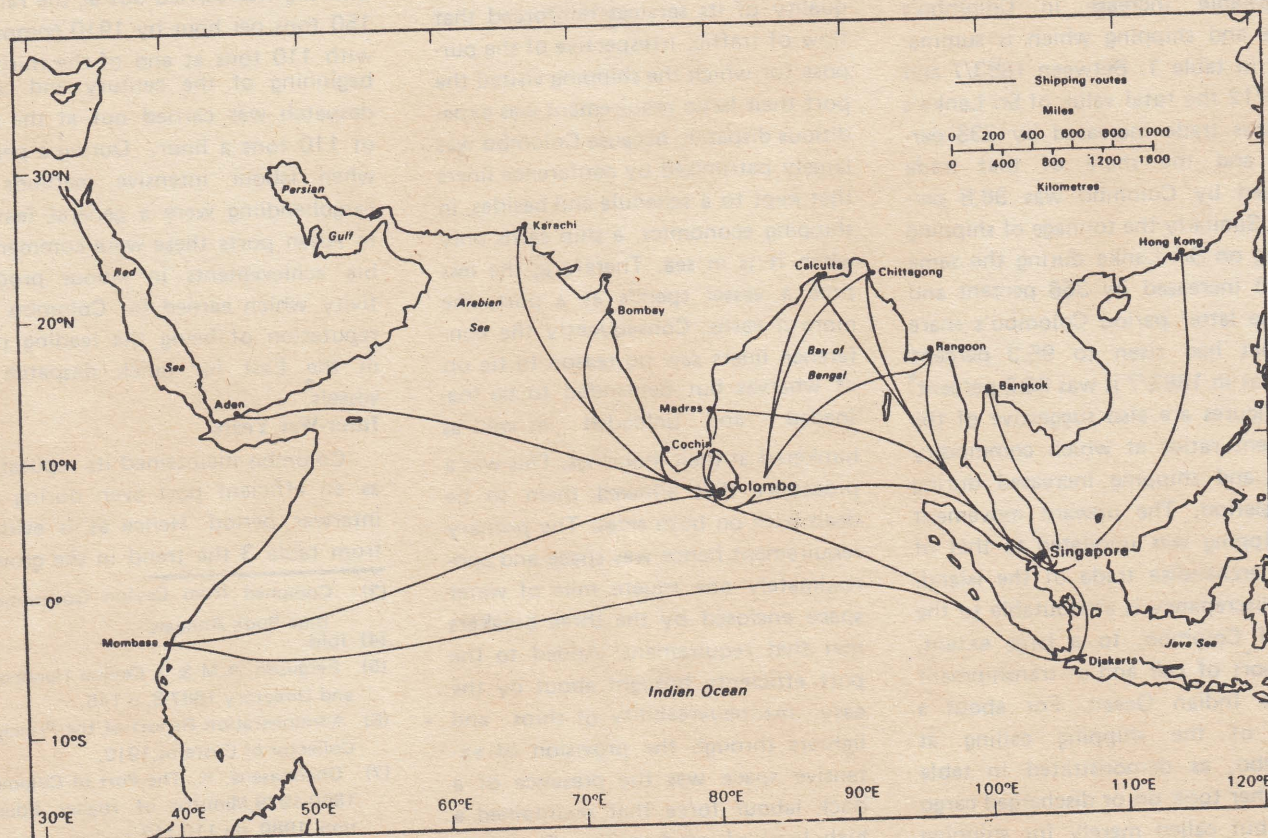
Galle and Colombo in the western coast.

Situated on the southern tip of the island, Galle also lacked communication links with the hinterland to become a gateway to its seaborne trade. But until the last quarter of the 19th century, Galle was the greatest centre of shipping in Sri Lanka and this was largely attributed to its locational advantage vis-a-vis the sailing routes and later the steamer routes of the Indian Ocean.

For centuries, Galle, consequently served as an important port of call in the Indian Ocean as well as of a transshipment centre for those regional ports outside the main sea lanes of South Asia. By 1870 Galle Harbour, for instance, handled 50 percent of the shipping calling on the shores of Sri Lanka; whereas Colombo which handled almost the whole of Sri Lanka's overseas trade accounted for less than 45 percent of that shipping. The divergence in the distribution of shipping among the two ports was to a

great extent due to the fact that in the 19th century the main attraction of Sri Lanka for international shipping was more as a centre for shipping services (Coaling, supply of water, ship repairs etc.) and for transshipments than for loading or discharging of cargo. To exploit that potential of a port of call and of a transshipment centre to the fullest extent Sri Lanka had to modernise her ports, in view of the ever increasing dimensions of steamers engaged in international trade. What was more the geographically strategic position of Sri Lanka in the Indian Ocean as depicted in the map fully justified modernisation its ports to attract more of such shipping.

Although Galle provided safe anchorage for sailing vessels of any size it was scarcely so far steamers. Because of the submerged rocks Galle Harbour was considered a trap rather than a place of shelter for steamers with long draft. Similarly, the open roadstead of Colombo too needed improvements to provide deep water berths. To have to



modernise two ports on the same coast within some seventy miles from each other, however, meant a wild waste of funds of a plantation economy depending at that time on a single crop, coffee. What appeared to be the most plausible course was to concentrate investments on a single port and the obvious choice was Colombo which served Sri Lanka's commercial interest best. But there was optimism that once Colombo was developed the ships visiting Galle for services and transhipping would start calling on her. That expectation was fulfilled as by 1881, i.e. two years before the completion of Colombo's South West breakwater, the steamers of the P & O (Peninsula and Oriental) company, the principal user of Galle harbour abandoned her in favour of Colombo. By the end of the eighties more than 80 percent of shipping calling on Sri Lanka called on Colombo while Galle's share fell below 15 percent.³ More importantly, the facilities created by the Port Improvement Programmes implemented between 1875-1911 brought about a remarkable increase in Colombo's trade and shipping which is summarised in table 1. Between 1883/7 and 1908/12 the total value of Sri Lanka's overseas trade increased by 333 percent and the share of that trade handled by Colombo was 96.8 percent. Similarly the tonnage of shipping calling on Sri Lanka during the same period increased by 366 percent and by the latter period Colombo's share of that had risen to 95.3 percent whereas in 1883/7 it was 80.2 percent.⁴ The figures are also suggestive of the different ratios at which commodity trade and shipping increased during that period. The upward movement of shipping was unrelated to that of the merchandise trade of the island. This discrepancy is attributable to the use of Colombo, to a large extent, as a port of call and of transshipment in the Indian Ocean. For about a third of the shipping calling at Colombo, as demonstrated in table 2, neither took on or discharged cargo there but called merely for shipping

services and for transhipments. There is also evidence of a similar category of vessels that while bunkering at Colombo, took on board or unloaded some usually small consignments of cargo although the delivery or collection of such cargo was not the main purpose of their visit. The visiting steamers, it seemed were glad to have a little cargo to and from Colombo to cover, at least, some part of their operating costs.⁵ Notwithstanding the relative smallness of Sri Lanka's volume of overseas trade, Colombo, in terms of the tonnage of shipping it handled was thus able to rank as the seventh greatest port in the world and the third in the British Empire by 1910, a year before the completion of some 37 years of its Port Development Programme.⁶

It is true that the geographical location of Sri Lanka had an overriding influence on Colombo to attract a large volume of shipping to its shores in the late 19th and the early 20th centuries but it is equally true to say that high level of efficiency and the quality of its services reinforced that flow of traffic. Irrespective of the purpose for which the shipping visited the port their basic requirement was expeditious dispatch, because Colombo was largely patronised by conference liners that kept to a schedule and besides, in shipping economics, a ship earns only when it is in sea. Therefore, the less time a vessel spends at a port, the more it earns. Consequently the conference liners saw no reason to tie up at wharves but demanded to be loaded and unloaded as well as bunkered at their moorings. This was a procedure that allowed them to be dealt with on both sides. The primary requirement hence was space and approximately one square mile of water space enclosed by the three breakers met that requirement. Added to the port efficiently brought about by the easy manoeuvrability of ships and lighters through the provision of extensive space was the presence of a dock labour force that maintained a high level of productivity. Since the

late 19th century there was a continuous stream of immigration of labour to Colombo from the Malabar coast in search of urban employment. Such workers formed a pool of casual labour upon which the stevedores could draw as the need arose. The dock workers, the majority of whom came single, lived in improvised dwellings, tenements and slums in the area around the dockland and returned to their homeland to join their families in a year or two. Unlike their brethren in the plantations, the dock workers, therefore, worked hard to earn as much as possible during their short stay in Colombo. Since dock work at that time was casual it was an added factor to work hard to get continuous employment.⁷ Consequently, the level of efficiency reached by Colombo was such that a vessel arriving in port was moored, and the operations of cargo discharge, coal bunkering and other activities were in progress after an hour from the vessel passing the harbour entrance. Coaling was carried out at the rate of 150 tons per hour by 1910 compared with 110 tons at end of the thirties, beginning of the century and cargo despatch was carried out at the rate of 110 tons a hour. During a period when labour intensive methods of cargo handling were a general feature in Asian ports these were commendable achievements in labour productivity which earned for Colombo the reputation of being the leading port in the East for quick despatch of vessels.⁸

Inter-War Years

Colombo maintained its reputation as an efficient port even during the interwar period. Hence as is evident from table 3 the trend in the growth

(3) Compiled from Ceylon Government Blue Book Annuals.

(4) Ibid.

(5) Ferguson, A.M & J; Ceylon Handbook and Directory 1887-8, p 145.

(6) Administration Report of the Principal Collector of Customs, 1910.

(7) Dharmasena, K. The Port of Colombo 1860-1939, Ministry of Higher Education, 1980, pp 110-113.

(8) Sessional Paper of XXI of 1911.

THE TRADE AND SHIPPING HANDLED BY COLOMBO

TABLE I

1883 - 1913						
Year	Total Value of Trade in Sri Lanka (a) in Rs. 000	Value of trade Colombo (b)	(b) as a % of (a)	Total Shipping Sri Lanka (c) (in 000 tons)	Shipping Colombo (d)	(d) as a % of (c)
1883 -7	74,230	N.A.	-	3,724	3,064	80.2
1888 -92	107,511	N.A.	-	5,178	4,243	81.6
1893 -7	158,792	N.A.	-	6,569	5,611	85.4
1898 -02	207,109	N.A.	-	8,398	7,534	89.6
1903 -07	231,682	N.A.	-	11,860	11,028	93.5
1908 -12	321,466	310,270	96.8	14,635	13,860	94.6
1913	434,504	418,424	96.2	16,126	15,371	95.3

(Source: Ceylon Blue Book Annuals, Sessional Paper X of 1913; Administration Report of the Chairman, Colombo Port Commission).

of merchandise trade and shipping which commenced in the early years of this century continued to rise although slightly checked by the two world wars and the word-wide depression of the early thirties. Nevertheless it was apparent that some branches of the port's trade were in jeopardy. The table indicates that the import of oil which was negligible in the first decade of this century rose spectacularly from the third decade and by 1939/43 it had overtaken the

coal trade which bulked the import trade of Sri Lanka since the late 1890s. This, however, was a direct result of the growing number of diesel engined vessels employed in international trade which created an increasing demand for oil as a bunker fuel at Colombo. But the disturbing feature was that the switch from coal to oil as a bunker fuel was making a significant change in the fortunes of Colombo as a bunkering station. It was becoming obvious that some regional ports were

finding greater opportunities in the new situation than Colombo. Between 1924 and 1932 the oil imports at Aden, for example, had doubled while at Colombo it had remained almost stationary despite an increase by 50 percent in the number of vessels taking on oil, figures that suggested that many of the larger vessels were taking on enough oil at Aden to reach Singapore or vice-versa.⁹

The situation regarding the sale of water to shipping appeared more alarming. One of the attractions of Colombo as a port of call for decades had been the quality and abundance of its water supply. For instance, on the eve of the depression the annual sale of water to shipping reached 120 million tons a year from some 24 million gallons per year at the end of the last century. Nevertheless, by 1930 such sales had dropped by nearly 16 percent while by 1936 it had declined further by some 27 percent. The decreased intake of water by vessels was alleged to have been due to the high cost of water at Colombo compared with that of Bombay and Karachi. Thus the Port Commissioner had to utter the warning that

(9) Sessional Paper XIII of 1985; Report of the Chairman Colombo Port Commission.

TABLE 2

TONNAGE OF SHIPPING THAT ENTERED AND CLEARED AT THE PORT OF COLOMBO TO LOAD OR UNLOAD CARGO 1883-1912

(Quinquennial Averages)

Year	Tonnage of Shipping at Colombo (a) (in 1000 tons)	Tonnage Shipping entered and cleared to load or unload Cargo (b)	(b) as a % of (a)
1883 - 7	3,064	1,850	63
1888 -92	4,243	2,601	63
1893 - 7	5,611	3,527	58
1898 - 1902	7,534	5,615	74
1903 - 07	11,028	7,173	64
1908 - 12	13,860	9,188	66

(Source: Ceylon Blue Book Annuals).

TABLE 3

The tonnage of shipping entered and cleared, the volume of goods imported and exported and the tonnage of fuel imported at Colombo, 1904 - 1938

Year	Shipping	Imports	Exports	Coal	Liquid Fuel
(Quinquennial Averages in 100 tons)					
1904 - 8	11,734	576	385	670	06
1909 - 13	14,202	843	467	742	16
1914 - 18	8,652	873	495	436	27
1919 - 23	12,661	888	553	655	87
1924 - 28	19,620	1175	706	673	189
1929 - 33	22,791	1028	693	520	244
1934 - 38	22,874	1068	624	446	382

(Sources: Administration Reports of the Principal Collector of Customs;
Administration Reports of the Chairman, Colombo Port Commission).

since there were well equipped regional ports offering services at economic rates Colombo's ascendancy as a port of call would be impaired unless it provided services at competitive rates.¹⁰

Although the warning was taken seriously by the authorities the thirties were a troubled period to take positive measures in respect of some problems. Besides, the determination of the price of water, for example, rested with the Municipality, and despite the argument of the Port Commission that a reduction in that price would raise the income from its sales, the municipality was not responsive because of its own financial difficulties. The same problem stood in the way of finding solutions to those that were directly under the purview of the Port Commission and it was not until the late thirties that something could be done. In 1937 the Commission submitted a memorandum to the government specifying the need for an inner graving dock, an oil dock, deep water quays and basin. Since all could not be done at once priority was given to an inner graving dock. In the following year the construction of such a dock 350 feet long, 50 feet wide and 20 feet deep at a cost of Rs. 1 million rupees was completed. The dock became capable of handling both harbour and small naval craft and thus made the larger dock constructed in 1906 free for the use of bigger vessels.¹²

The next major problem was the improvement of bunkering facilities. That involved both the provision of adequate facilities for discharge of oil imports as well as of facilities for the bunkering of ships without delay and under safe and easy conditions. In the thirties another requirement that the oil bunkering trade demanded was alongside accommodation which the authorities had failed to realise when steps were taken to provide facilities for that business in the twenties. For, the oil jetty constructed was too small to accommodate the vessels of the thirties whose dimensions had vastly improved.¹³ Hence to arrest the diversion of Colombo's bunkering trade to its competitors and to maintain its position as a popular port of call a scheme for the construction of a basin, an oil dock and deep water quays at a cost of Rs. 12 million was approved by the legislature towards the late thirties. But the intervention of the World War II delayed its implementation until the early fifties.

Post Independence Period

Despite the need for improvements in facilities which arose towards the tail end of the colonial period a valuable asset was bequeathed to independent Sri Lanka in the form of one of the greatest artificial harbours of the world. Basically what remained to be done thereafter was to transform it from a lighterage to a fully equipped

port with alongside deep water berths and other facilities that were urgently in demand at the end of the thirties. Hence in the development plans of the immediate post independence era port development became a priority area. The major port development programme executed between 1955-58 consequently provided the port among other things with extra breakwater protection, alongside berths (9-11m deep) complete with quayside portal cranes, two coaster berths 7.5 m deep, and oil dock 55,000m of pillarless transit sheds and other ancillary ship repair and servicing facilities.¹⁵ Surprisingly these improvements in port facilities seemed to have had very little effect on the fortunes of Colombo. Rather Colombo's reputation as a leading shipping centre in the East began to wane in the fifties and the sixties. The tonnage of shipping that it handled fell to 8,694,700 in 1965 from 21,869,000 in 1953 registering a drop of nearly 80 percent.¹⁶ To some extent of course as is

(10) Sessional Paper xi of 1901; Administration Report of the Chairman, Colombo Port Commission 1936.

(11) Administration Report of the Chairman, Colombo Municipal Council 1937.

(12) Administration Report of the Chairman Colombo Port Commission 1938.

(13) Ibid.

(14) Ibid.

(15) Administration Reports of the Chairman Colombo Port Commission (1955-1957); Port (Cargo) Corporation.

mirrored in table 4 this decline was due to the import controls imposed in the early sixties on account of Sri Lanka's unfavourable balance of trade. But the most potent cause was alleged to have been the growing unpopularity of Colombo as a port of call as well as of atranshipment centre for which it held away in the Indian Ocean for over half a century. Apart from Sri Lanka's central location in the Indian Ocean sea routes, the efficiency of port services as has been mentioned earlier was the other important factor which helped attract shipping to Colombo. But since the fifties this began to suffer seriously due to problems of labour. Quite interestingly, labour relations at Colombo deteriorated during a time, as the table 5 demonstrates, when the transition from immigrant to Sri Lankan labour was almost complete. The indigenous dock workers, unlike their immigrant brethren of the past, not only formed a strongly unionised labour force but were also being decasualised. Hence they had a permanent stake in dock work and besides had an awareness of their rights. With the post-war deterioration of economic conditions their unions under the leadership of some national political parties thus launched a series of strikes for improvements in wages and for better conditions of work. In the fifties and in the early sixties the labour problem at the Port of Colombo became so acute that a government appointed commission made the following observations about its effect on shipping.

"The inevitable result has been that shipping circles and general trade in all

TABLE 5
THE DISTRIBUTION OF COLOMBO'S DOCK LABOUR FORCE ACCORDING TO NATIONALITY

Year	Total Labour Force	Sri Lankan	Non Sri Lankan
1948	6477	1979	4498
1949	7578	3831	3747
1950	8404	5050	3354
1951	N.A.	N.A.	N.A.
1952	9666	6433	3233
1953	9883	6772	3111
1954	10077	7311	2766
1955	9954	7405	2549
1956	9806	7596	2210
1957	10335	8224	2111

(Source: 'Colombo Port Commission).
corners of the world can speak only in terms of despair and disgust of the pathetic daily tonnage and output at Colombo.¹⁷

The immediate victim of the worsening labour situation was the bunkering trade. Unlike the coal business of the preceding era the new generation of diesel engined vessels were able to by pass intermediate ports without the need to refuel unless efficient services were offered at competitive rates. The regional ports with comparatively better labour relations and with improved port efficiency, hence, became the beneficiaries of the unsettled conditions at Colombo.¹⁸ The worse sufferer, however was the transshipment trade which plummeted to an average of 4,070 tons a year in the period 1958/1962 from 49,400 tons per year during the 1948/52 period.¹⁹

The most distressing factor yet was its effect on the economy of the

country as a whole since Sri Lanka still continued to depend almost entirely on the labour dominated Port of Colombo for the flow of its overseas trade. Moreover in the absence of a national carrier Sri Lanka was solely dependant on foreign liners for the carriage of its overseas trade. Because of the chaotic labour situation at Colombo, the conference liners, more often than not, imposed discriminatory freight charges, on Sri Lankan exports which faced strong competition in the world market. Besides, the liners also took the further step of levying heavy surcharge on Colombo. The conference surcharges from the United Kingdom and the continent, for example, which amounted to a levy of 15 percent in November 1955, was raised to 50% in March 1964.²⁰ Other than reducing the competitiveness of our exports in the world market such conference tactics also had the opposite effect of escalating the prices of our basic imports to the detriment of the well being of the people.

TABLE 4
MERCHANDISE TRADE OF COLOMBO 1950 - 1964
(Quinquennial Averages in 000 tons)

1950 - 54	2,818
1955 - 59	3,025
1960 - 64	2,609

(Sources: Colombo Port Commission;
Port(Cargo) Corporation).

(16) Administration Reports of the Chairman Colombo Port Commission; Port (Cargo) Corporation.

(17) Report on Cargo Handling in the Port of Colombo, 1959,p.2.

(18) Ibid.

(19) Administration Reports of the Chairman Colombo Port Commission; Port (Cargo) Corporation of Ceylon.

(20) ESCAP Report on Ports of Ceylon, 1966 p.2.

Thus, the industrial strife that existed at Colombo in the fifties and the sixties was too serious a problem to be ignored. As a first step towards the resolution of that problem the port was nationalised and the Port (Cargo) Corporation was set up in 1958. But partly because of the presence in the corporation of a large number of insufficiently trained officers, lacking in practical knowledge of port administration, and partly because of the lack of proper industrial relations, the labour situation at the port hardly changed for the better. The shipping companies complained, that the nationalisation of the Port brought no improvements in port efficiency and that the daily output was hardly comparable with other regional ports.²¹

The root cause of that situation was the need for a different approach in labour management to deal with a new generation of dock workers who differed considerably from the immigrant Indian workers of the past. This was realised after a few years of experience. Consequently, since the early sixties the port authorities looked into the welfare component of the port workers, resulting in introduction of a series of welfare measures. Port workers were brought under the category of monthly paid workers thus bestowing on them the numerous benefits enjoyed by their counterparts in the government service. Labour relations at the Port showed much improvement in the seventies, when the number of man hours lost due to strikes, go slows etc. averaged at 22,578 hours a month compared with 40,686 hours a month in the previous decade. The early eighties were so devoid of industrial unrest that the port record observed complete silence about labour disputes. (Colombo Port Commission, Sri Lanka Ports Authority) From the mid sixties there had thus been a progressive improvement in the turn round of ships as well as of their daily output. The average output per ship per day had risen from 133 tons in 1964 to 25 tons in 1967 and to

360 tons by 1974. The average stay time per ship in the harbour, on the other hand, had declined from 10.0 days in 1964 to 8.97 days in 1967 and still further to 4.4 days by 1973.²²

The remarkable gains made in port efficiency, unfortunately, were not as illustrated in table 5 commensurate with similar gains in the volume of shipping and the merchandise trade of the Port. The poor performance in the spheres of shipping and trade was due to Sri Lanka's rigorously imposed import restrictive policy and to the recession in world trade following the oil crisis. Nevertheless, the greatly improved port efficiency was not altogether unrewarded. The transshipment trade which sank very low by the mid sixties registered, as is shown in table 7, an impressive growth in the seventies both in absolutely as well as in percentage terms.

Table 6
Shipping and Dry Cargo Tonnage, Colombo 1965-1979
(in '000 tons)

Year	Shipping	Dry Cargo
1965-69	16,560	2,809
1970-74	12,721	2,509
1975-79	14,690	2,636

Source: Port (Cargo), Corporation.

The transshipment tonnage which registered a 75 percent growth rate in the period 1965/69 to 1970/74 increased to nearly 228 percent between 1970/4 and 19/5/79. The figures also suggest that the seventies marked a revival of a branch of trade in which Colombo dominated in South Asia.

Table 7.

Transshipments, Colombo 1965-1979

Year	Quinquennial averages in '000 tons
1965-69	4,557
1970-74	7,141
1975-79	23,117

Sources: Port (Cargo) Corporation; Sri Lanka Ports Authority

The Port of South Asia

1979-1980

The late seventies opened a new era for the Port of Colombo in which it witnessed not only a progressive increase in its shipping and the trade but also a radical transformation of its administrative structure and the physical layout. The decades of trade stagnation came to an abrupt end after 1977. The new government that came into power in that year abandoned the inward looking economic policy in favour of trade liberalisation. To encourage foreign investments with the primary aim of increasing employment prospects a Free Trade Zone was set up. Massive development projects were launched the most important being the Accelerated Mahaweli and the Urban Development Schemes. These developments in the economy happily coincided with an improvement in the import capacity of the country on account of Sri Lanka's exports fetching better prices in the world market, perhaps since the time of the Korean boom of the early fifties.

Compared with the earlier years these factors consequently led to a growth in the tonnage of shipping and the cargoes handled by Colombo in a manner set out in table 8. In the great revival of Colombo's trade and shipping in the post 1979 period the most striking achievement seemed to be in the realm of transshipment trade as exemplified in table 9. By 1980 transshipment tonnage at Colombo had surpassed the annual average for the period 1949/52, which was the highest annual average between 1949 and 1979 and although a set back was suffered in the following year the trade nevertheless made a dramatic recovery in 1982. For between 1980 and 1982 the Port witnessed a more than threefold increase in the transshipment tonnage. More dramatic however was its growth. After 1982, as

(21) Report on Cargo Handling in the Port of Colombo 1959, p.3.

(22) Port (Cargo) Corporation.

by 1985 transshipment tonnage had registered a 300 percent increase over the former year.

gestion free port in the region. On the other hand the container revolution enhanced the geographically strategic

too slow to react to the new technology in ocean transportation.

It is true that conservatism and conference agreements long in force about the type of vessels to be employed, were at first sight, responsible for such an attitude. But it is equally true that capital was also an impediment for some countries to revert speedily from conventional to container vessels. Being a new entrant to shipping business Sri Lanka on the other hand was not shackled by such factors and hence was able to follow a more forward policy than others in the path to containerisation. Established in 1969 as a joint venture, the CSC, became a fully state owned enterprise in the following year. It was first created to act as a broker to charter vessels for the Food Commissioner's Department but later ventured into shipping services direct. During the first ten years of its existence, the CSC, built up a modest fleet of conventional break-bulk vessels to trade mainly with Europe and with the Far East. A turning point, however, came in 1980 when in collaboration with the NOL (Neptune Orient Line) of Singapore, the CSC started a full container service from Colombo to Felixtowe, Hamburg, Rotterdam and Bombay, utilising for the purpose two 560 TEU* vessels chartered from the NOL. This was followed by a second service linking Singapore and Colombo with Rea Sea ports which too was a joint service with PIL (Pacific International Line) of Singapore. Here also the two Shipping lines chartered a 372 TEU fully cellular geared vessel from West Germany.

Two years later the CSC made another progressive step towards the objective of containerising Colombo's trade in deploying its first four new buildings commissioned for its own operations. The two gearless container vessels of 3,000 dwt/175 TEU capa-

* Twenty foot equivalent units which means that a 40ft. is counted as two.

(23) Containerisation International, 1980, p. 53.

Table 8.

The Tonnage of Shipping & Cargo Handled By Colombo 1979-1985 (in '000 tons)

Year	Shipping	Cargo
1979	16,098	4,982
1980	17,954	5,711
1981	17,039	5,186
1982	17,966	5,831
1983	18,810	6,090
1984	19,421	6,638
1985	20,806	7,338

Source: *Port Statistics, Sri Lanka Series VI-SLPA 1986*

Table 9.

Transshipment Tonnage: Colombo 1979-1985

Year	Tons
1979	14,475
1980	61,481
1981	49,811
1982	193,622
1983	362,720
1984	595,670
1985	772,018

The basic factors behind this colossal growth in transshipment tonnage are to be found, first, in the container revolution and secondly the progressive steps taken by Sri Lanka, in comparison with regional ports, to meet its demands. Fundamentally, containerisation was a concept developed for drastic reductions in shipping operating costs by western shipping enterprise intolerant of congestion in ports. In the late seventies when the container traffic in the Indian Ocean was increasing by leaps and bounds, many of its ports had gained notoriety for congestion. Bombay, the premier port of India, for example, had been paying annually about Rs 40 million as demurrage charges for berthing delays.²³

Through better labour relations, as referred to earlier, Colombo on the contrary, had reputedly become a con-

position of Sri Lanka whereby it further strengthened Colombo's claim for a great shipping centre in the Indian Ocean. The Indian ports of Bombay, Cochin, Madras, Calcutta and the Bangladesh port of Chittagong are easily accessible from Colombo. So are the Gulf ports, Karachchi and those of East Africa and the Straits of Malacca. The central situation along with its relative efficiency hence led many lines that went into containerisation to choose Colombo as a base port to operate feeder services to many of the regional ports about which reference was made. Initially, however, it was the non-conference liners that pioneered the containerising of the routes as well as the operating of feeder services to and from Colombo. The lead was given by the American President Lines (APL) in 1973, to be followed in the early eighties by other lines, the most important being the (The Continental Britain Asia Container Services (COBRAO) and Sri Lanka's national carrier, the Ceylon Shipping Corporation (CSC). It is to the credit of the CSC that, unlike national carriers of some countries, in the region it made a significant contribution in Sri Lanka's efforts towards promoting containerisation of the Port and the routes serving it. Many countries of the region with established shipping lines were

city (Lanka Seedeivi and Lankasiri) built in South Korea started operating on CSC's own service from Singapore and Colombo to Dubai, Damman and Kuwait providing a 15 day sailing frequency. The other two fully cellular vessels (Lanka Srimani and Lanka Srimathie) each with 410 TEU capacity built in the same country began their operations on CSC's new service, Sri Lanka/Far East container service.

This service provides 15 day sailings between Colombo, Singapore, Yokohama, Nagoya, Kobe, Keelung and Hong Kong. In addition, there is also a feeder link service operated by the CSC's fully owned Ceylon Shipping Lines which maintains a regular schedule between Colombo, Madras and Calcutta. This feeder service ties with the CSC vessels to the Far East, Europe and Red Sea and the Persian Gulf. Besides, the link also provides a common carrier feeder service and hauls transshipment boxes for such lines as the APL and the Gold Star. The year 1983 saw another significant development in the national carrier's efforts to expand its container service when two more vessels, the 3000 dwt/101 TEU multipurpose vessel Lanka Muditha and a similar vessel of 10,000 dwt/254 TEU, Lanka Mahapola both built in Japan were added to its fleet. The most noteworthy development yet was the purchase in 1984 of an Argentine built 10,500 dwt/550 TEU vessel.

The efforts of the CSC to containerise a wide network of routes in a short span of time was to a great extent, helped by the policies of the state controlled Central Freight Bureau (CFB) set up in 1973. Section 14 of the Freight Bureau Law that lists the objectives of the Bureau, which in the process of promoting the interests of the CSC also helps Colombo's drive towards containerisation. Amongst other things its main purposes are: to provide for a central freight booking office for the allocation of freight space to any ocean going vessel; to ensure economic loads to vessels calling at the ports of Sri Lanka; to rationalise the frequency of

calls and the availability of vessels to foster the development of the national merchant fleet; and to negotiate with the shipowners and shipping lines on matters such as freight rates, surcharges, adequacy and frequency of services. Although all these powers only concerned outward bound cargo from Sri Lanka they were nevertheless adequate to advance the cause of containerisation and help the CSC to build up its fleet. In a situation in which the conference liners as a result of agreements made in the sixties were prevented from containerising the routes linking Colombo and other regional ports, the CSC by investing on cellular vessels and the CFB through greater allocation of cargo to its vessels helped the cause of containerisation.

Besides, the Bureau also gave preferential treatment in cargo allocation to nonconference liners which pioneered the containerisation to the East West trade. Through this device the CFB, moreover, was able to counter the negative role of the conferences in the containerisation of routes and also prepared Colombo to face the container explosion predicted for the eighties.

The majority of third world countries are exporters of primary products and the conference liners and shippers were generally indifferent to containerise such cargoes. In the case of tea, for example, the reasons for their reluctance to containerise have been attributed to:

(a) The distribution infrastructure of the tea producing countries does not permit door to door containerisation and national railways are not equipped for the purpose.

(b) Tea producing countries do not have sufficient foreign exchange reserves to invest in container hardware.

(c) There is a plentiful supply of cheap dock labour available in tea producing countries for conventional cargo handling. Containerisation would merely increase already high unemployment rates.

(d) Large scale containerisation of tea shipping would result in considerably higher freight rates.²⁴

However, Sri Lanka which accounts for nearly 30 percent of the world demand, stands unique among tea producing countries by reacting favourably to containerising, at least in some aspects of the industry. First introduced by the APL it soon proved that the box could reduce the amount of damage and radically improve the transit time. Sri Lanka's Tea Traders Association representing all companies connected with growing, broking and export of tea hence began to assess the possibilities of containerising the trade. As a result of this Association's endeavour Sri Lanka's tea export trade saw a gradual transition to containerisation after 1972, and by the early 1980's about 60 percent to 70 percent of our tea exports began to go out in containers.²⁵

If not for the preference of certain routes—Middle East to remain break bulk—there is a possibility of further improving the containerisation of this trade. The same reason makes about 65 percent of cinnamon and 40 percent of rubber exports go into uncontainerised areas.

The high cost of handling, it has been alleged, was a major disincentive for containerisation of many regional ports. In 1984, container handling charges in Bombay for instance, have been raised by 30 percent over the previous level.²⁶ To entice more transshipment trade as well as to encourage the flow of container traffic in general, Colombo on the other hand, introduced concessionary tariffs after 1980 which had made its handling charges comparatively lower than the rates prevailing in the regional ports. This was supplemented by other measures to win transshipment trade. A 28 day rent free dwelling time is allowed for transshipment cargo if re-shipped within that period, effective security

(24) Containerisation International April 1978, p 43.

(25) Ibid March 1983 pp4/-

(26) Ibid February 1984 p 65.

arrangements and easy customs documentation. In addition transhippers are also given priority berthing and provided with equipment on a round the clock basis to ensure expeditious dispatch.²⁷

The Sri Lanka Customs too had its share in enhancing the movement of container traffic to Colombo by doing away with some of the rigid practices which in the past had inhibited the smooth flow of traffic. Earlier containers, for instance, were considered as dutiable items of import. Any container removed out of customs thus had to be inspected first and a deposit to be retained with a guarantee that the remover would return it in the same condition to the Customs area for re-export. This cumbersome practice is given up and has thereby minimised the time wasted on a lengthy procedure.²⁸

It is a fact that containerisation brought with it an insatiable appetite for land in and around ports, the satisfaction of which became a fundamental decongestion measure for port authorities. In the normally congested ports of developing countries the problem was felt more acutely than elsewhere as space had to be found for marshaling yards and for freight stations in proximity to ports. The problem in fact became so serious with the rush of container traffic that some countries in the region took steps to construct new-Nhava Sheva project in Bombay —or satellite ports specifically ly for the purpose of handling container vessels. The pragmatic way in which Colombo solved this problem from the inception, however, was by the novel method of allowing private organisations to establish Inland Container Freight Stations(ICFS) or Inland Container Depots (ICDS) outside the port area. Moreover, with the concurrence of the customs,FCL (Full Container Load) containers were permitted to move out for destuffing and stuffing. Another measure taken to relieve congestion was to make all empty containers to move out of the port premises without congesting the

area by imposing penal storage rates beyond a certain number of days. The first Container Depot set up outside port area under this facility was by McLaren Ltd. in 1980, and the idea rapidly gained acceptance by other

private agencies. By 1984 there were 12 Container Freight Stations established and as shown in table 10 they were sited within a convenient distance of 2 to 16 km from the Port.
(27) Ibid December 1981 p 51.

TABLE 10 CONTAINER FREIGHT STATIONS AND INLAND CONTAINER DEPOTS

Name of CFS/ICD	Address	Distance from Port	Land Area
1) ABC Containers	1&2, Avissawela Road, Wellampitiya	4	8000 M ²
2) ACE Containers	174, Sri Wickrema Mawatha, Mattakuliya	2	30500 M ²
3) Asha Agencies Container Freight Services and Depot	87, Nungamagoda Road, Kelaniya.	8	20300 M ²
4) Bartleet Container Freight Station	100, Negombo Road, Wattala.	6.4	4050 M ²
5) Cargo Boat Desptach Company	97, Negombo Road, Wattala.	6.4	3050 M ²
6) Ceyhans Ltd.	104, Nawala Road, Colombo 05.	6.4	8100 M ²
7) Container Services Ltd.	Pathiwila, Gonawela, Kelaniya	16	13100 M ²
8) Ceylon Shipping Lines Ltd.	8/2, Awissawella Rd., Orugodawatte	8	40500 M ²
9) East-West Containers Ltd.	346, Dutugemunu Mawatha, Kandy Road, Peliyagoda.	7.2	40500 M ²
10) InterOcean Container Depot	480, Hendala Road,	9.6	12159 M ²
11) Maritime Agencies CFS	54, Centre Road, Mattakuliya	3.2	600 M ²
12) McLaren's Container Depot	776, Negombo Road, Welisara	13.5	20300 M ²

(Source: SLPA).

From the early sixties government appointed commissions had repeatedly recommended the establishment of a unified administration for the port. A major cause which impeded the smooth functioning and developing of the physical layout and modernisation of the Port's facilities, the Commissions revealed, was the existence of three organisations in charge of its activities. The Port (Cargo) Corporation, the Colombo Port Commission and the Port Tally and Protective Services Corporation had no co-ordination and hence what was urged was to amalgamate the three bodies into one Authority. Such a move, it was presumed, would help to streamline and co-ordinate the activities of the Port. However, it was not until the late seventies when the container explosion appeared making improved port administration vital, that effective steps were taken in that direction. The Sri Lanka Ports Authority (SLPA) was established on August 01, 1979 and the Act defines its principal objectives as: provision of efficient and regular services for stevedoring, shipping and transshipping, landing and warehousing, wharfage, the supply of water, fuel and electricity to vessels, for handling petroleum products and lubricating oil to and from vessels and between bunkers and depots for pilotage and mooring vessels for diving and under water ship repairs and any other services incidental thereto".

The other objectives of the SLPA are:

- (a) Provision of efficient and regular tally and protective services.
- (b) Regulation and control of navigation within the limits of and approaches to the port.
- (c) Maintenance of port installations and promotion of the use, improvement and development of the specified ports and such other duties as defined.

In the early eighties when Colombo began to feel the thrust of container traffic, the newly created SLPA with such wide powers was thus able to take positive measures to deal with the situation. The task of the Authority

became all the more easier since it received the blessings of a government that was firmly committed to improve the transport infrastructure of the country and make the new economic strategy a success. Consequently the SLPA was able to undertake a massive Port Development Plan, that was basically geared to meet the urgent demands of the container revolution. In scale it is perhaps second only to the massive port development project carried out between 1875 to 1911 to meet the then challenge of maritime technology, the steamer.

Sri Lanka is one of the few countries of Asia to foresee the possibilities of a container revolution as far back as the sixties, when plans were being made to prepare for it. According to the Port of Colombo Handbook for 1968, the construction of a container Berth was undertaken in the year 1964 but the execution of the work was so slow that by 1977 only 450 of the proposed 1000 quay length had been constructed. Faster progress was made thereafter and by April 1980 the remainder of the 1000 quay length was completed. At the back of the quay was made available a newly reclaimed 10 acres. The slow progress made before 1977, however was due to the curtailment of development projects which followed the financial crisis of the late sixties that persisted into a greater part of the seventies. The result was that port development was given low priority. Nevertheless it is commendable that investigations, design, planning and execution of the project was carried out by a very limited cadre of local engineers and supporting staff in the port, without any foreign exchange, consultants or contractors. It was because of the employment of local expertise and resources that the project was completed at a cost of about Rs.30 million; with the completion of this berth although the Port was ready to receive the first generation of container vessels it was ill equipped to handle containers. The Port (Cargo) Corporation having no specialised equipment to

handle containers, the APL, which started the first service in 1973, for example, used its own. Towards the end of 1977 another new line, Austrian Limited appeared with their fully containerised ro/ro strider class vessels introducing a service between Iran and Australia and this line too used its own equipment. Moreover, both lines retained their equipments within the port premises. But as traffic increased the lack of handling apparatus appeared to be the greatest impediment for the quick dispatch of vessels. To remedy this the SLPA in 1983, therefore, invested US\$ 5.5 million of its own funds on two LIEBHERR Gantry Cranes and hired a Tango 80 pending the installation of the two gantries.³¹

The unexpectedly high rate at which container traffic was growing at Colombo from the late seventies made it imperative that the Port should prepare itself to handle a larger volume of traffic in the not too distant future. For example the Japanese International Co-operation Agency (JICA) which made a study in 1980 made a forecast of 185,000 TEU's for Colombo by 1988. What followed from the JICA study was a Master Plan drawn up in 1981. In order to meet the immediate demands of container traffic what was known as an 'urgent plan' forming Part I of the Master Plan was prepared. This envisaged the construction of a modern Container Terminal with a new quay 300 metres long with a water

(28) Welmillage, Rohitha, Containerisation in Sri Lanka, an unpublished dissertation submitted for the Diploma in Shipping and Port Administration, Department of Maritime Studies, University of Wales Institute of Science and Technology, 1985 pp 41-42.

(29) Gunaratne, M.H., A concept of Countervailing Power in Maritime Affairs. Central Freight Bureau of Sri Lanka, Colombo 1978, pp 24-30.

(30) Cinnakoon, C.D; 'Ports and Port Development' in Progress Volume 1 March 1981, Ministry of Plan Implementation, p 33.

(31) Port of Colombo Handbook 1985, corporate Plan 1981-85.

depth of 12 metres complete with adequate back up area, Gantry Cranes, 4 Transfer Cranes and auxillary equipment and a Container Freight Station. The construction work, by Penta Ocean-Wakachiku Joint Venture of Japan, commenced in May 1983. The foreign component of the project amounting to US \$ 32 million has been loaned by the Japanese Government while the local components of US \$ 16 million was borne by the Ports Authority. The scheduled date of completion was August 1985.³²

Although the JICA made a forecast of 185,000 TEUs for the year 1988 this target was achieved in 1984 largely because of transshipment cargoes which rose by nearly 46 percent in that year. Apart from its very high growth rate the transshipment trade also became a major revenue earner of Colombo. Hence, it justified the construction of a fully equipped second container berth of 300m which was to be a southward extension of the first berth. Known as Stage II of the Port Development Plan the construction of this berth was started in 1984 by the same firm which undertook the Stage I and the expected date of completion is December 1986.

The first container vessels that were in operation were those converted from conventional and for greater economy they were gradually being replaced by cellular ships. They carried no handling gear but were dependent on quayside gantry cranes. By about 1983 the container ships having passed the first, second and third had entered the fourth generation. Faced with high cost shipping operations some western countries in 1983 started building very large container vessels capable of carrying over 4000 TEU's compared with the third generation one's with a 3000 TEU capacity. From the point of view of ports the fourth generation vessels are destined to change the destinies of some of them. Designed to make round the world voyages, these giant sized vessels will call at fewer ports. Cargoes will be transhipped

out from a selected few 'base ports' which will be fed by the neighbouring ports. Hence in order to make Colombo an important 'base port' in the Indian Ocean for the fourth generation container vessels, the SLPA, took the realistic step to upgrade the two normal full-size cranes ordered for Stage I for extra height to handle the fourth generation vessels. A decision was also taken to deepen the harbour basin to 13 m which is one metre deeper than the Stage I requirement. With the completion of stage II of the Development Plan which is the construction of the second Container Berth, the capacity is expected to rise to 200,000 TEUs by the end of 1986.

The progressive policies of Sri Lanka to meet the demands of containerisation in a matter of few a years has been amply rewarded. Colombo is not only being placed among the world league of container ports but according to the Lloyds Shipping Economics of October 1984 it had elevated itself to the leading port in South Asia. Through improved port efficiency and by keeping pace with the developments in maritime technology, says the Lloyds Economist, Colombo is able to pull out traffic from the weaker regional ports, particularly those from the Indian sub-continent. To quote the same source:

"Criticism has also been directed towards the increasing amount of container traffic which is moved by feeder services as opposed to direct calls to and from Indian ports via transshipment centres elsewhere in Southern Asia, notably Singapore and Colombo. The rapid development and progressive attitudes of the Sri Lankan Port, in particular, have done a great deal to pull traffic away from the East, and to a lesser extent West Coast Indian Ports. Colombo still handled some 200,000 TEU in 1984, 50 percent of which will be transshipment containers. Plans in progress will see four gantry cranes in operation by August 1986 as part of the development facilities capable of handling the largest fourth generation containerships, including

*U.S.Lines' 2400 TEU new buildings. Colombo's expansion presents a threatening challenge to India's ports but they themselves are to a large extent guilty of pushing larger capacity container ships away from direct calling and, indeed, of restricting the development plans of India's three largest liner companies-Shipping Corporation of India, Scindia Steam Navigation and India Steamship."*³³

The pull of traffic to Colombo from the regional ports was so strong the number of TEUs it handled in the seventies, which started as only a trickle turned into a flood by the end of that decade. The number of TEUs handled by Colombo which averaged at 200 a month in the early seventies, for example, rose to 1400 a month by 1979. The more significant trend, however was that, as demonstrated in table 11 Colombo in terms of the TEUs it handled had overtaken Bombay, the premier port of India. In the four years from 1979 to 1982 while container throughput of Colombo grew by about 483 percent growth at Bombay was by some 239 percent. Paradoxically, Colombo experienced that very high growth rate in container throughput at a time when the world was hit by recession which brought negative growth rates to some major ports of the world. In 1982 Marseilles and Le Harve, for example, experienced growth rates of 0.1 percent and 12.4 percent respectively whereas Colombo that year registered a 74 percent growth rate in the TEUs handled and was second only to Southampton which enjoyed a growth rate of 104.6 percent.³⁴

The remarkable lead that Colombo heralded in the region was, undoubtedly, due to its growing popularity as a model Indian Ocean port capable of efficiently handling containerised transshipment cargo. The summaries in table 12 besides exemplifying a drama-

(32) Port of Colombo Handbook 1985.

(33) Lloyds Shipping Economist October 1984, p8.

(34) Containerisation International July 1983.

tic growth in transshipment cargo also point to the fact that the tonnage of such cargo in containers witnessed a very rapid rate of growth. For, while the container throughput as indicated earlier rose by 506 percent from 1979 to 1982, the proportion of that cargo moved in containers rose at a rate as high as 2400 percent.

The transshipment trade is not the sole beneficiary of Sri Lanka's forward policies to promote containerisation of the Port and routes linking it. The general cargo movements too made steady progress in the path to containerisation. Table 13 bears testimony to the fact as from 1980 onwards the dry cargo trade had been making remarkably good progress in the proportion of it moving in containers. In 1979 while 94.2 percent of its dry cargo moved in the conventional way the proportion of such cargo containerised was as low as 5.8 percent. But in five years in 1984 the gap between the two forms of cargo movements was drastically reduced.

CONCLUSION

Sri Lanka, a plantation economy with a relatively a small population of about 15 million cannot hope to attract a large volume of shipping to its shores through its merchandise trade alone. Hence, Colombo essentially has to concentrate more on the transshipment trade to maintain its leading position in South Asia. However, the past and present trends indicate that

Table 11.

Container Throughput (TEU'S) at Bombay and Colombo, 1979-1985

Year	Bombay	Colombo
1977	5,472	N.A.
1978	13,599	8,543
1979	38,820	17,680
1980	77,832	41,622
1981	101,281	57,806
1982	131,900	103,243
1983	130,695	142,810
1984	N.A.	181,484
1985	N.A.	215,746

Sources: Port Statistics Series UI, SLPA 1986.
Containerisation International February 1984.

TABLE 12

TRANSHIPMENT CARGO - COLOMBO CONTAINERISED PROPORTIONS, 1976 - 1985

Year	Total Transshipment tonnage	Tonnage Conventional	Tonnage Containerised	% Containerised
1976	9,455	9,455	Nil	-
1977	6,662	6,662	Nil	-
1978	4,571	4,571	Nil	-
1979	14,275	6,920	7,355	58.5
1980	61,481	4,475	57,006	92.7
1981	49,811	4,580	45,231	90.8
1982	193,622	14,195	179,427	92.6
1983	362,720	8,288	354,692	97.6
1984	595,670	66,516	529,164	87.3
1985	772,018	134,591	637,427	80.5

(Source: Port Statistics, Sri Lanka, Series VI SLPA 1986).

TABLE 13

The distribution of conventional and containerised cargo as a percentage of total dry cargo handled at Colombo 1979 - 1984 (in 000 tons)

Year	Total Dry Cargo	Conventional	Containerised	2 as a % of 1	3 as a % of 1
1979	3006	2832	174	94.2	5.8
1980	3384	3002	382	88.7	11.3
1981	2870	2251	619	78.4	21.6
1982	3320	2285	1035	68.8	31.2
1983	3928	2483	1445	63.2	36.8
1984	4533	2660	1873	58.7	41.3
1985	5135	2884	2251	56.2	43.8

(Source: Port Statistics Sri Lanka, Series VI SLPA 1986).

this branch of Colombo's trade will continue to grow and it is conservatively estimated that by 1990 it will reach 1,480,000 tons. But with confidence it could be placed even higher in view of Sri Lanka's strategic position and the progressive port

policies followed. Besides, the acute congestion and poor port facilities in most regional ports too will act in Colombo's favour. The construction of Nhava-Sheva, the new port to ease congestion at Bombay, for example, was started in 1984 and scheduled to be completed in 1987 will provide berths to handle container ships of 1300 to 1400 TEU capacity only. Then, given the world wide trend towards rationalised service schedules using ever larger and more costly containerships intolerant of inefficient port operations, feeder services will play an increasingly important role in the future. Colombo with preparations ahead in anticipation of such developments in the shipping world will undoubtedly enhance its position as a base port in South Asia.

FUTURE PROSPECTS FOR THE PORT OF COLOMBO

M.H.Gunaratne

The development of the Colombo Port since 1977 has been spectacular. In August 1979 the Sri Lanka Ports Authority was formed and three institutions which conducted different functions relating to the activities of the Port namely, the Colombo Port Commission, the Port Tally and Protective Services Corporation and the Port Cargo Corporation were merged for better administration and efficiency. This measure paved the way for a dramatic development which has been recounted in an earlier part of this issue. The amalgamation overcame the duplication of functions and helped to eliminate pilferage and strikes and also secured greater welfare benefits for the employees.

The efficiency that was introduced resulted in elevating the Port to the position of the most efficient among the well managed ports in South East Asia.

Modernisation was a pre-requisite for efficient management of the Port whilst providing for additional income generating functions.

Initially the Queen Elizabeth Quay was developed into a container terminal with a quay length of 500 metres and a draft of 12 metres with 10 acres of back up area adjacent to the berth. The Port, however, had 18 alongside berths and 16 stream berths. The shore facilities available to handle containers were strengthened regularly and commenced with the purchase of three gantry cranes; One Tango 3 Ton Gantry and two 130 tonne Liebherr. These purchases were imperative with the containerisation of the national fleet. The effects of this innovative development soon began to change the scenario of the Port. Shipment of containerised cargo developed at a greater speed and tended to transform the shipping activities of this part of the world.

The number of fully containerised vessels that called increased with fee-

der services operating from Colombo as the pivotal port servicing the Indian sub continent, Singapore and other Indian Ocean islands and even Africa, the Gulf and the Continent. Colombo began to offer facilities to serve all types of modern cargo carriers in addition to the conventional traffic and Lash ships, Roro Vessels, and bulk carriers.

The container terminal at Queen Elizabeth Quay designed and constructed entirely by Local Engineers was ceremonially inaugurated on 1.8.80. Since then facilities became operational. The container throughput of the Port which reached 9,500 TEU per month in 1983 soon increased to 150,000 per year. The rapid development of container traffic through the Port of Colombo made it necessary to provide more backup land and infra structural facilities for the handling of containers. This resulted in the construction of the Jaye Container Terminal under a Japanese Loan Agreement beginning in May 1983 with a fully equipped terminal berth of 300 metres, alongside depth of 12 metres and a back up area of 97,500 sq.mt. The project included the installation of modern terminal handling equipment and back up yards including two more gantry cranes. This terminal was opened in August 1985 and since has been functioning efficiently, augmenting facilities provided by the Colombo Port to achieve a higher throughput. Its second berth is due to be completed by the end of 1986.

The two gantry cranes are capable of handling 35 tons under spreaders

and the berth well equipped to handle third generation containers which are built with the least amount of gear to handle cargo. With a higher throughput of containers a computer system was indispensable and one was therefore installed to assist the Ports planning unit. Greater automation inevitably is a desired objective of the authorities to bring operational activities of the Port on parallel with other developed international ports.

The container throughput of the port easily surpassed the 215,000 TEU mark and now greater strain is placed on marshalling and stacking area, though containers are stored three stacks high.

Transshipment

The feeder activities commenced by Ceylon Shipping Lines to the West Coast of India, including Mangalore, Cochin and Karachi laid the foundation for meeting the challenge. Subsequently the COBRA feeder. Service (Continent Britain - Asia Container Service) operating across the Bay of Bengal, extending the service area to cover the ports of Chittagong and Calcutta with availability for Chalna and Haldia in feeding overseas Containers Ltd.(OCL), buttressed the transshipment potential. Sealand one of the largest container carriers in the world started calling at Colombo from 1983, though with restricted services, as OCL in bringing in-bound cargo and lifting of Indian transshipment cargo from Colombo. Many other lines servicing Sri Lanka developed further transshipment container services through Colombo and transshipment container traffic in this port soon reached considerable proportions. The following table (TEU) (including empties) brings out the dramatic pace of development over this six year period.

	Discharged Transshipment		Loaded Transshipment	
	Laden	Empty	Laden	Empty
1979	636	N.A.	436	N.A.
1981	3,562	171	3,682	224
1982	14,158	2,004	14,118	1,981
1985	47,882	9,337	45,635	9,093

The future potential Sri Lanka enjoys in the development of transshipment is obviously greater due not only to its favourable location, being only a few hours away from the main sea lanes - but also due to many other advantages over, and weaknesses of, its competitors. The comparative advantage of Colombo and weakness of Singapore, Cochin and Madras as effective competitors of transshipment cargo should form the basis of the Port Authority's strategy to consolidate its gains and advantages.

In India, Malaysia, Singapore and Karachi changes are taking place on the same magnitude as in the Middle East, with all these neighbouring countries developing transshipment facilities. Madras is flexing itself to give Colombo competition as the premier transshipment centre in addition to the development of Cochin, where they are planning to develop a Container Terminal at Vallar Pallam. Delhi has already commissioned the dry port of Patpangang and 22 other sites have already been identified by India. Singapore, however, has taken full control of the transshipment of the Malaysian Peninsula and Port Kelang in Malaysia. The various port facilities in the region are therefore competing with Colombo both on facilities and rates. Singapore recently introduced a new tariff with significant concessions for transshipment. This tariff is attractive for operators with a high frequency of calls.

In this context it is very necessary for Sri Lanka to gear itself to the growing competition by offering advanced facilities and attractive rates and conditions.

It is to be ascertained whether Sri Lanka has become the dumping ground for empty transshipment containers. The strain on stocking and marshalling space could be initially reduced by limiting empties off loaded to provide space for laden transshipment containers. Certain warehouses had recently been demolished to provide space for the QEQ marshalling yard.

On account of the limitation on expansion of space within the port a balanced transshipment policy would need to be followed. The problem could be exacerbated with the arrival of fourth generation container vessels. The public is aware that negotiations are being conducted with Evergreen Line of Taiwan and United States Lines are already in service from Colombo both of which possess fourth generation container vessels in their round the world service. These are capable of lifting over 4,000 tons and space should be adequate to meet the requirements of these vessels. On the contrary it should be opened on account of the large capital expenditure incurred in Stage 1 of the port development programme covering the Jaye terminal funded Japanese aid amounted to nearly Rs.1,002 million; while Stage 11, also funded through Japanese aid is estimated to cost Rs. 1,099 million. Implementation of the project commenced in 1985 and is expected to be completed by 1984. It includes further improvement to the Jaye terminal, purchase of gantry cranes, other equipment and construction of infrastructure facilities including the improvement of narrow access roads within the port premises. It is presumed that infra-structural improvement will also cover the provision of direct railway access to the port.

An important challenge is to derive most benefit for the nation from the large investment made. We presume that the investment has been guided by the degree of traffic generation. Criteria of investment such as the internal rate of return and nett present value on different demand projections has been taken into account.

In this context it may be mentioned that investment by public corporations or parastatal bodies should not be determined by their own decisions but related to the general potential of the country and effectively co-ordinated to avoid over investment and distortion in costs. With more investments it is presumed that these

considerations would be taken into account particularly on account of general regional development and likely port development.

In this context it is considered appropriate to discuss the potential development scenario of Trincomalee Port. It is not certain whether Trincomalee with its good water depths and wide calm area would play a complementary or competitive role to Colombo. Mahaweli development should undoubtedly elevate Trincomalee port and give it a bigger role in marine transport in the region.

Modernisation of other Ports *TRINCOMALEE*

The natural conditions of Trincomalee port make it a suitable deep sea port, although the facilities for loading and unloading are limited.

The regional development of Trincomalee district cannot be considered in isolation of Trincomalee's port development. The Government is now considering a Master Plan for development of Trincomalee and a short term feasibility study for urgent development of Trincomalee port.

With the progress on the Accelerated Mahaweli Development Programme port development becomes a necessity not only to help accelerate and carry out Mahaweli Development but also to play an important role as a nucleus for regional development.

The industrial activities which are presently located in the Port include two small scale ship yards (belonging to Colombo Dockyard and to Prima Milling Plant with modern port facilities near the Tokyo Cement Plant).

A group of 980,000 ton capacity petroleum storage tanks (98 tanks have been constructed of which 15 are now in operation) is another facility available in Trincomalee.

A coal fired thermal power generation plant is also due to be constructed here.

GALLE

The Galle port has always been an auxiliary port to Colombo. The ton-

nage handled has been minimal. In 1982 only 0.2 percent of the total cargo handled by our ports came through Galle. Even its recent performance amounting to 1 percent in had not altered its character substantially. In spite of all the incentives offered shippers have not been attracted to Galle. Government efforts to induce rubber and tea shippers to patronise Galle have not met with success.

However, a regional development strategy could usher in a better environment for not only the development of the port but also help in generating additional employment avenues and generally help raise living standards.

Multi Modalism

Another challenge to the port in the future is the ability to accommodate multi modalism. In the very near future multi-modal transport would be a reality in Sri Lanka as a through transport system.

Hitherto the main container movements have been between (a) Container Freight Stations and the Port (less than Container loads) and (b) Shippers warehouses in the neighbourhood of the city and port (Full Container Loads):

city and port (Full Container Loads). Development of multi-modalism involves door to door service eliminating double handling and direct delivery to the port for loading where export cargo is concerned and vice-versa for imports.

The Government Railway is alive to this challenge and efforts are already being made to containerise tea in the producing areas for direct delivery by train to the port. The port will be required to provide the smooth change-over and the necessary railway access to the port premises. In this situation both exporters and importers will decide on their modal preferences and certain cargoes will move by highway direct to the port. It will be impossible for a 40 ft. container to traverse beyond the hilly terrain of the Central highlands transporting tea or vegeta-

bles. The port may be compelled to oversee a network of container freight stations (depots) and dry ports in the interior as an aftermath of these changes. The present scenario of receiving cargo from the Freight Stations in the hinterland of the port will be replaced or reduced. There are many compelling reasons for the encouragement of multi-modalism particularly as the system has assumed importance with most of the Sri Lanka's trading partners which should influence Sri Lanka. It is apparent that the economic pressure of shipping Sri Lanka cargo in containers is increasing.

The future development on Sri Lanka's railway's has taken into account the need to move tea in container loads and the economics of this move could be realised if direct deliveries are made to the port. Additionally, security factors now require packed tea to be sealed so that no tampering would be possible and cargo is accordingly safe for loading.

The present arrangement, however, in the movement of containerised tea by the daily harbour train from Maradana railway yard to port via the Kolonnawa/Port railway line.

It should be noted the railways will purchase over a 3 year period, from 1986-1985, 100 container flats with bogis to accommodate 30ft. and 40 ft. containers. It may be noted that ship-owners would find it fairly unpalatable to be faced with inland distribution and container unpacking costs etc. while with the development of multi-modalism shippers themselves would reject any additional costs.

This would however require a form of rationalisation meeting aspirations of both shippers and shipowners. Today the continuing slump in the shipping market requires more than ever cost effective systems.

Shippers had various reasons to deliver estate produce to Colombo prior to shipment as for example the need to grade in the case of rubber or

need to blend in the case of tea. Regional development would encompass such activities in the interior and would greatly facilitate multi-modal development. The economic consequences of the introduction of the door to door concept of multi modalism could be spectacular as this will further compound economic consequences of regional development.

In spite of rapid containerisation it should be noted that it has been possible to containerise only 46 percent of our trade. The port therefore has to expand facilities to accommodate further development of containerisation for other types of cargo, as for example the bulk handling of cement facilities have to be extended. A case in point is the proportion of cement to the accelerated dam sites of the Mahaweli since 1980 by Mahaweli Marine Cement Company. Since 1980 nearly 950,000 metric tons of cement have been unloaded from 14,000 tons calling at the Mutwal Silos.

The trends are expected to continue as the Company is programmed to supply Samalawewa and Rantambe projects as well for the next three years.

Bulk handling of fertilizer has been proposed in order to explore the potentialities of canal transport. This would take the form of large vessels delivering at suitable points.

The port also has to meet another challenge from the greater use made of coasted shipping. The tonnages presently handled are bound to increase as revealed by 195,000 tons generated in 1985. Further, the coverage would most likely extend to other products as well, including movement of salt, fertilizer and general cargo.

It may be concluded that many challenges face the port in the wake of modernization. Global competition in trade and consequently in port facilities provided by competitors would most likely exert further pressure on the port. Therefore judicious choice of facilities is of crucial importance.

Paddy Harvest Records Drop in Maha 1985/86

Paddy production in the Maha 1985/86 is expected to be 1.69 million metric tons or 81 million bushels, according to Department of Census and Statistics estimates. This indicates a decrease of 3.6 percent or 63,000 metric tons compared with the previous Maha paddy production. Paddy production in the Maha 1985/86 is also 11 percent lower than the target production figure of 1.90 million metric tons set for the season by the Ministry of Agricultural Development and Research. However, 1985/86 Maha paddy production indicates a 25 percent increase compared with the 83/84 Maha which recorded the lowest level of paddy production in recent years for a Maha season. Though the average yield increased, total paddy production in the Maha 1985/86 decreased due to the drop in the extent cultivated as well as harvested.

Paddy production in the Northern and Eastern Provinces in the Maha 1985/86 has faced a severe set back mainly as a result of increasing ethnic disturbances in these provinces and this has contributed to a large extent to the decrease in total paddy production. While paddy production in Kilinochchi district in the Northern Province decreased by 37.7 percent (15,000 MT), in Trincomalee, Batticaloa and Amparai districts in the Eastern provinces it decreased by 44 percent (41,000 MT), 114 percent (43,000 MT) and 18 percent (30,000 MT) respectively. Had such a big drop in paddy production not taken place in these districts total paddy production would have even increased marginally. In the Maha 1985/86 the highest paddy production of 266,000 metric tons or 16 percent of the total paddy production is recorded from the Kurunegala District as in the case of the

previous Maha; followed by Anuradhapura, Polonnaruwa and Amparai Districts producing 159,000 43,000 and 135,000 metric tons respectively. Jaffna district which produced 71,000 metric tons in the Maha 1982/83 continued to decrease its production to the lowest production of 13,000 metric tons in the Maha 1985/86.

The average yield per hectare for the Maha 1985/86 is estimated at 3,585 kilogrammes or 69.5 bushels. This indicates a 2.6 percent increase compared to the Maha 1983/84. However, the average yield in the Maha 1985/86 is still 3.8 percent lower than that of the Maha 1982/83 which was the highest ever recorded average yield. Increase in average yield in the Maha 1985/86 is a result of the increase in the average amount of fertilizer used per hectare and weather conditions that prevailed during the season which were less unsatisfactory than previous years. This increase in the average yield took place mainly in the areas under minor irrigation schemes where productivity was up by 9.6 percent. However, the average yield in rainfed areas decreased marginally by about 2.5 percent while the

average yield in the areas under major irrigation scheme is more or less equal to the previous Maha average yield in these areas. In the Uda-Walawa agricultural district an area where almost all paddy lands come under major irrigation schemes the highest average yield of 5,093 kilogrammes per hectare was recorded. Polonnaruwa district which recorded the highest average yield in the previous Maha achieved the second highest average yield of 4,876 kilogrammes in the Maha 1985/86. As in the previous Maha Jaffna district obtained the lowest average yield (1,792 kilogrammes per hectare).

The total gross extent harvested in the Maha 1985/86 is 527,000 hectares which shows a 5.7 percent decrease compared to that of the previous Maha. The gross extent harvested decreased as a result of the decrease in the gross extent sown as well as due to an increase in the extent of crop failure. The total gross extent sown in the Maha 1985/86 is 555,000 hectares and this indicates a 2.5 percent decrease compared with that of the previous Maha, despite the increase in the extent under asweddumized paddy land by about 1.6 percent (70,000 hectares) during the year.

PRODUCTION, AVERAGE YIELD, EXTENT HARVESTED, EXTENT SEWN, ISSUE OF FERTILIZER AND INSTITUTIONAL CREDIT IN PADDY SECTOR MAHA 1983/84 TO 1985/86

Item	Unit	1983/84			1984/85			1985/86
		Maha	Yala	Total	Maha	Yala	Total	Maha
		1983/84	1984	1984	1984/85	1985	1985	1985/86
1. Production	ooo M.Tons	1,353	1,060	2,413	1,751	910	2,661	1,688
2. Average yield per hectare	Kgs.	3,031	3,146	3,076	3,498	3,343	3,464	3,585
3. Net extent harvested	'000 Hectares	451	336	787	498	270	768	469
4. Gross extent harvested	'000 Hectares	509	377	886	559	305	864	527
5. Gross extent sewn	'000 Hectares	606	384	990	569	312	881	555
6. Fertilizer issued	'000 M.Tons	113	72	185	120	75	195	126
7. Institutional Credit Granted	Rs Million	136	40	176	83	37	120	

Source: Department of Census and Statistics; National Fertilizer Secretariat; People's Bank.

In the 1985/86 maha season the extent of crop failure, the difference between the extent sown and harvested, is reported at 28,000 hectares or 5.1 percent of sown extent. Though the rate of crop failure in the 1985/86 Maha increased considerably compared to the rate of 1.7 percent in the previous Maha, this is still not much higher than that of recent Maha seasons and particularly the 1983/84 Maha rate of 7 percent. When the area cultivated is considered in terms of types of irrigation usually the highest rate of crop failure (6.6 percent) is recorded from the area under rainfed. However, unexpectedly the second highest rate of crop failure (5.4 percent) was recorded from the areas under major irrigation schemes while the lowest rate of crop failure (2.5 percent) was recorded in the areas under minor irrigation schemes.

Fertilizer use in the paddy sector in Maha seasons continued to increase from the 1981/82 Maha onwards. In the Maha 1985/86 as much as 126,000 metric tons of fertilizer was used in the paddy sector, according to the statistics compiled by the National Fertilizer Secretariat. This shows an increase of about 5 percent in total fertilizer consumption in the paddy sector in the Maha 1985/86 compared to that of the previous Maha. The average volume of fertilizer used per sown hectare in the paddy sector is estimated at 227 kilogrammes which also indicates an 8 percent increase, compared to that of the previous Maha. Increase in the use of fertilizer in the paddy sector is partly a result of the continuity in price stability in fertilizers since May 1983 when the last fertilizer price revision was made.

Credit granted by the institutional sources to the paddy sector seems to have further decreased. For instance, credit issued by the People's Bank - a main institutional credit source - to the paddy sector has dropped from Rs 35.3 million in the previous Maha to Rs 33.7 million in Maha 1985/86.

H.L.

COMMODITIES

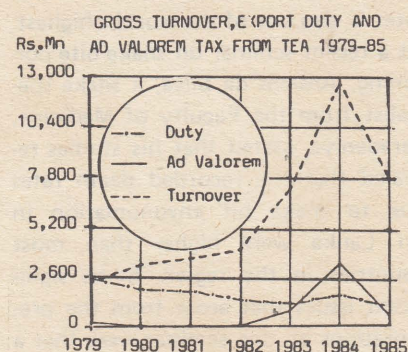
TEA

Declining Prices and Turnover

Global tea production was down by almost 10 percent at the end of August, compared to the same period last year. There were indications that Sri Lanka's 1986 crop was not likely to reach the record 214 million kgs. of last year. While Sri Lanka's production had fallen 2.6 percent upto August production in North India had fallen 13.9 percent and in Bangladesh 21.7 percent. The table below gives this comparative position of 5 major producer countries upto August.

Prices had not responded to this overall drop in global supplies and weekly sales averages continued to be well below that of 1985. The cumulative average prices for the 8 month period of 1986 were Rs 28/56 (gross) and Rs 28/31 (net) per kg as against Rs 42/28 (gross) and Rs 37/31 (net) per kg in January - August 1985. At the London Auctions average prices had fallen from approximately 225 pence per kg in 1985 to 125 pence per kg this year.

Rs 19.7 million as against Rs 647.5 million in the same period last year. This same trend was observed in export duties which reached Rs 1,768 million in 1984 and came down to Rs 1,178 million in 1985. This declining trend also continued in the case of export duty during 1986. (See Graph)



Falling prices also had an adverse impact on gross turnover in the tea industry. As in the case of other indicators gross turnover too reached a peak of Rs 12,708 million in 1984 and then declined sharply to Rs 7,696 million in 1985. In the six months of 1986, gross turnover declined by 34 percent from Rs 4,496 million in the 1985 period to Rs 2,973 million this year. It is interesting to note that

TEA PRODUCTION JAN-AUGUST

	1985	1986	Percentage Change
North India	318,090	274,000	13.9
South India	92,326	90,156	2.4
Sri Lanka	146,131	142,290	2.6
Bangladesh	26,040	20,389	21.7
Kenya	92,315	87,074	5.7
Malawi	26,902	26,880	.1
Total	701,804	640,789	8.7

These falling prices meant lower export revenue for the government and a falling profitability on most estates. The ad valorem sales tax which recorded a peak of Rs 3,373.4 million in 1984 dropped to Rs 731.6 million in 1985. The decline continued into 1986 and in the period January-June in 1985 ad valorem tax fell to

more tea was sold at the Colombo Auctions (126 kgs against 121 kgs) in the 1986 period of Jan-July and also more Sri Lankan tea was shipped to the London Auctions (3.0 mn kgs against 2.3 mn kg) but overall returns to the tea industry has been lower this year because of lower prices.

G.J.

Venomous Snakes and Snake Bite Treatment

Facilities in Sri Lanka

Sri Lanka has long had a reputation for having some of the most varied snake fauna in the world. More recent findings, however, have shown that Sri Lanka's rate of fatalities from snake bites is also one of the world's highest. At a recent seminar on snake bite poisoning, Anslem de Silva, a snake specialist from the Faculty of Medicine, Peradeniya, stated that his studies revealed that the recorded death rates due to snake bite envenomation in Sri Lanka were higher than most countries in the region. Some significant issues that arose from the presentations at this seminar were that a high percentage of these deaths could be avoided if the rural peasantry was more educated on the dangers of this menace; and if those who were bitten by venomous snakes realised that the treatment of some traditional practitioners was not fully effective and if they sought proper treatment many lives could be saved.

Another interesting issue raised was whether rural people still believed that it was only the traditional practitioner who had an effective cure for snake bites. A key health administrator commented that many snake bites which could have been prevented had occurred as people did not have faith in the treatment given in government hospitals. "During my ten year career as a medical practitioner, I didn't have the occasion to treat a single snake bite patient" he said.

It was a question of belief in the traditional system causing lack of faith in the modern; resulting in a vicious circle of events. Most often snake bite victims in the rural areas are rushed to a traditional practitioner when stung by a serpent. In serious cases this practitioner's treatment is not fully effective and when it is too late and the venom is taking deadly effect the patient is

taken to a hospital where his life is not easy to save. The result is that more people begin to believe that modern anti-venom treatment in hospitals is ineffective and not that unscientific or unskilled traditional practitioners had brought the victim to his hopeless state. This situation drives them more towards the traditional practitioner and in extreme cases, when it is often too late, to the hospital.

An understanding of the biology and habits of venomous snakes has helped to determine the biting pattern. This was particularly evident with Kraits (Sinhala - Karawala), when almost all bites took place inside the house or watch hut at night, mainly on sleeping people.

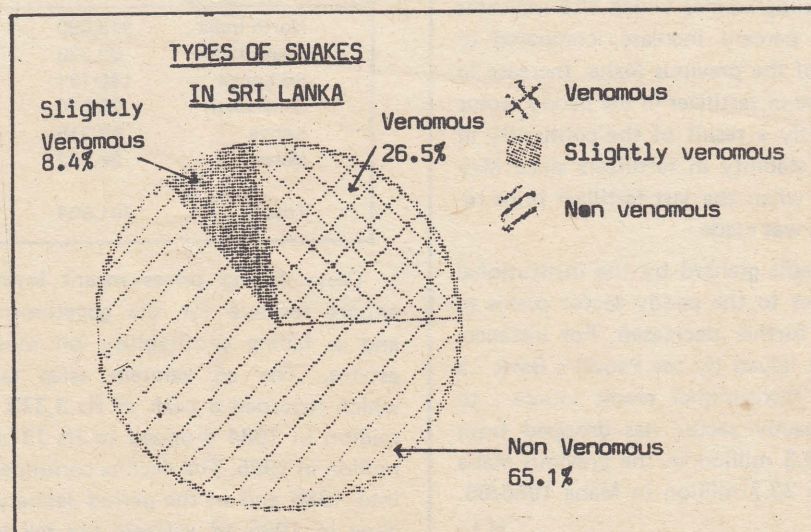
In terms of ecological habitat there were 4 categories of snakes in Sri Lanka namely earth, land, tree and water snakes. Among the earth snakes there were 31 species of which 29 are endemic, although the validity of 10 of these species are questionable. All these snakes are small and harmless. Among the land snakes there are 27 species and sub-species of which 18 are endemic. Five of these land snakes

are highly venomous, 3 moderately and 1 slightly. There are 13 species of tree snakes recorded from Sri Lanka of which 4 are moderately or highly venomous. The water snakes are broadly divided into fresh water and marine, and among marines there is a greater variety.

Scientific findings have recorded 34 species and sub-species of venomous snakes in Sri Lanka; although there are only seven responsible for the high rate of snake-bite morbidity and mortality. These are the Russells Viper - *Polonga*; Cobra - *Naya*; Common Krait - *Thel Karawala*; Krait - *Mudu Karawala*; Merrem's Hump Nosed Viper - *Polon Thelissa*; Green Pit Viper - *Pala Polonga*; and Saw Scaled Viper - *Veli Polonga*.

But studies on snake bites in Sri Lanka and clinical evidence show that approximately 97 percent of the fatalities are caused by the Russells Viper, Cobra and Common Krait. A classification of snakes in Sri Lanka reveals that 54 to 65 percent of them are non-venomous. (See diagram)

An understanding of these snakes is important as relatively little is known of their use to humans. For instance, some snakes predate on rodents and are therefore an asset to an agricultural country like Sri Lanka. This is one reason why wanton killing of snakes should be discouraged. It has been ob-



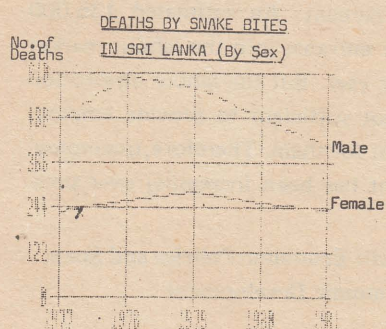
served, however, that the majority of snake bites (upto 85%) have taken place during agricultural and related pursuits. Under this criteria are direct agricultural activities like preparation of fields, harvesting, weeding, and spraying and indirect activities like guarding fields, cleaning of scrub jungles for land preparation and checking of field conditions.

As many as 69% of snake bite victims were in the 10-40 year age group. Demographic trends were also gaining significance with an increase in the rate of snake bites in the Dry Zone, (specially in the Mahaweli Area) due to the heavier migration of people into these areas and opening up of more forest lands in recent years. A large number of males were exposed to snake bites, the ratio being 2 males to 1 female. The recorded deaths occurring from snake bites in Sri Lanka sex-wise in the past few years is as follows:

Year	Male	Female
1977	482	229
1978	601	261
1979	573	284
1980	489	254
1981	407	236

Source: Registrar General's Office.

The above statistics reveal that the majority of Sri Lanka's snake bite victims have been men. Another important feature is that the number of deaths appear to have reached a peak at a time of most intensive activity in opening of lands in the Mahaweli regions. The number of deaths among females has not fluctuated as much as it did with males. (See graph)



The following table shows that the highest percentage of deaths occurring from snake bites among selected Asian countries in 1980 were recorded in Sri Lanka.

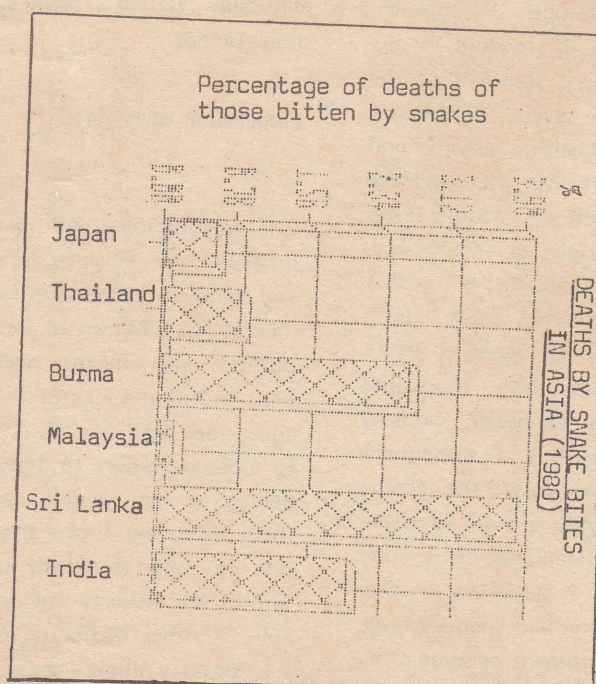
Country	No. of Snake bites	No. of deaths	% of deaths for every 100,000 of population
Japan	610	36	0.56
Thailand	3,985	302	0.86
Burma	8,508	759	2.7
Malaysia	2,480	16	0.18
Sri Lanka		743	3.9
India		1,093	2.1

These statistics show that the highest percentage of deaths are indicated for Sri Lanka which is 3.9% per 100,000 of the population; with Burma and India showing the next highest percentage of 2.7 and 2.1 respectively among selected Asian countries in 1980.

strict Medical Officer Galagedera, Dr Priyantha Hewage, most snake bite victims in this area sought modern treatment at hospital; generally the anti-venom serum. The result was a

negligible death rate from snake bite, as seen in the table below.

The statistics above indicate increasing faith of snake bite victims in hospital treatment from the Anuradhapura District. This trend has encouraged the Health authorities to set up an anti-venom research centre, to



Number of Patients seeking Treatment from Galnewa Hospital

Year	1983	1984	1985 June
No. of patients	92	115	156
No. of deaths	0	3	4

A significant change in attitudes was occurring in the Galnewa area where farmers are constantly exposed to snake bites. According to the Dis-

identify and classify the different snake venoms and to initiate more medical practioners into the modern methods of treatment. K.G.

FEATURES

SOCIO-ECONOMIC DEVELOPMENT

S.S.Colombage

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It is difficult to give a precise definition for the concept of socio economic development since the content and the evolution of such a development process varies from country to country depending upon factors such as the objectives of the government, stage of development of the economy, structural characteristics of the economy and the nature of the institutional and political framework. However, socio economic development broadly implies an improvement in the living standard of the people. The living standard of the public involves several dimensions like nutrition, health, education and housing. It is obvious that all these aspects are based on income levels of different groups of the society. For example, a good harvest with a new seed variety may push a farm family's income to the point where they can obtain more food and better facilities of health, housing and education. But a subsequent crop failure may worsen the income level of this family and will adversely affect its living standard. Thus, one's living standard is based on his production capacity and income level, unless the government or some other organization intervenes to provide welfare facilities.

Since the basic needs of the people depend on their income levels, the issue of raising their living standard is a question of eliminating poverty. Thus, a major objective of socio economic development has been to eliminate poverty. However, poverty

cannot be eliminated totally without a steady rise in the national product, and therefore, socio economic development has been combined with a strong concern for economic growth. In the background of these considerations, socio economic development encompasses better facilities of nutrition, health, education, training and housing. The objective of this paper is to discuss the dimensions of poverty and to analyse some policies and issues relating to socio economic development.

Dimensions of Poverty

The measurement of poverty is a difficult task. Poverty is a broader and more complicated term than low income. In addition to low income, poverty also means malnutrition, poor health and lack of housing and education facilities. It is difficult to ascertain where to draw a line to delineate the people undergoing these problems from the affluent rest. In other words, the exact location of the 'poverty line' is questionable. Another difficulty in deciding the 'poverty line' is the inadequacy of data relating to household income and expenditure. Most of these data have been collected through occasional socio-economic and consumer finance surveys and the estimated data are either under-estimated or over-estimated for various reasons. However, it is generally acceptable that a very large proportion of the world population is extremely poor.

According to World Bank estimates, half of the people in absolute poverty live in South Asia, mainly in India and Bangladesh. A sixth of them live in East and South East Asia, mainly in Indonesia. Another sixth are in Sub-Saharan Africa. The rest are divided among Latin America, North Africa and the Middle East.

In the case of Sri Lanka, the Consumer Finance Survey data suggests that the pattern of income distribution has shifted to greater inequality over the years. Income distribution becomes more uneven in 1978/79 in comparison with 1972 and it deteriorated further in the period 1981/82. The deterioration of the income distribution pattern was more prominent in the urban sector. The changes in income distribution in the areas of agricultural expansion were more favourable due to opening up of new income generating sources in agriculture and dependent activities.

Unemployment has been another major socio economic problem in Sri Lanka as in many other developing countries. The Consumer Finance Surveys indicate that the unemployment rate was 14 percent in 1973 and it remained at 15 percent in 1978/79. According to the Census and Statistics Department the present unemployment rate is over 15 percent. An estimated 135,000 new entrants join the labour market every year. But the labour absorption is not sufficient to provide employment for them. Therefore, unemployment has been increasing over time.

Macro Economic Policies and Socio Economic Development

Developing countries have adopted

various economic reforms so as to attain a higher economic growth rate and stability and these policy revisions will obviously involve implications for socio economic development. In Sri Lanka a major economic reform was implemented in 1977 largely on the basis of a stabilisation policy package of the IMF. This included various policy measures such as dismantling of exchange and foreign trade restrictions, removal of price controls and demand management.

The adoption of an export oriented growth strategy has been a major element in the policy package of the IMF, implemented in Sri Lanka as well as in many developing countries in recent years. Accordingly, measures have been taken to raise the profitability of the traded sector as against the non-traded sector. In consequence a rise in the relative incomes of those who are involved in export activities can be expected in this process. It is envisaged that exports would rise and contribute to promote economic growth. But it is important to consider here the effects of these measures on wages. The competitiveness of the export sector is attained mainly by means of a realistic exchange rate. The currency is usually devalued for this purpose. The immediate impact of a devaluation will be a rise in the domestic prices of both exports and imports. As a result, exporters and importers will realise higher profits. The extent and the time period of realisation of the profits depend on various factors such as elasticities of demand, supply of these goods, bargaining power of trade unions and factor substitution. The rise in import prices tends to accelerate inflation and thereby reduces real wages. Thus, a redistribution of real income from wages to profits occur in the

short run following a devaluation and there might be a greater concentration of income as a result of these policies.

In view of the above considerations, it has been emphasised in recent years that developing countries should attempt to achieve a more equal distribution of income and to eliminate poverty in their effort to promote economic growth. As we mentioned earlier the ultimate aim of socio economic development is to raise the living standard of the people. A fair distribution of income and elimination of absolute poverty are pre-requisites for this purpose. These issues have been particularly emphasised in connection with the redistributive effects of stabilization programmes adopted by the IMF in a large number of developing countries in the recent past. Although the distributive effects of these policy packages are inconclusive, the general criticism against them is the fact that such programmes are merely designed to promote economic growth and combat inflation and balance of payments difficulties without giving any consideration to income inequality or poverty. The counter-argument for this is that such programmes may entail adverse implications for the poor in the short run, but will benefit in the long run through rapid economic growth and overall price and external stability resulting from the reforms based on the policy packages.

Several countries have used incomes and prices policies to maintain a balance between growth and equity. A possible framework for incomes and prices policies should therefore be formulated in the context of specific socio-economic characteristics and policies that have been followed in the country concerned.

CHERNOBYL FALLOUT

Marc Nerfin

Marc Nerfin, President of the International Foundation for Development Alternatives, writing in the *IFDA Dossier* raises many of the fundamental issues brought into focus by the Chernobyl disaster.

Chernobyl, a name unheard of until the April 26 nuclear blast in Ukraine, has become the code name, in the North, for our nuclear vulnerability, but its meaning cannot be limited to the North. Of the 383 reactors currently in operation, 23 are in the Third World (six each in India and Taiwan, four in South Korea, two each in Argentina and South Africa, one each in Brazil, Pakistan and Yugoslavia); of the 118 units to be completed by 1990, nine are located in the South (four in South Korea, three in India and one each in Argentina and Brazil¹). The dangers in the Third World are growing with its share.

Chernobyl offers the world several urgent lessons. First, it is the worst, but only the latest in a series of nuclear accidents. In the US, the most widely known is that of Three Mile Island (1979), but there were many more, from Idaho Falls (1961) to Gore, Oklahoma (last January) through Detroit and Savannah River, South Carolina (1966); Okonee (1972); Palisades (1973); Decatur, Alabama (1975); Erwin, Tennessee (1981); or Ohio and California (1975). The number of accidents has increased every year since 1979, reaching 2,974 cases last year (20% more than in 1984); there were 601 emergency shut downs in 1985. The UK never stopped having problems and accidents with the Windscale/Sellafield plant (300 occurrences in 30 years, including the 1975 fire which destroyed a reactor), as a result of which 39 people died of cancer by 1983, and four alerts in seven weeks this

year. There were also accidents in Italy (Trino, 1967), Switzerland (Lucens, 1969) France (Choos, 1968; St Laurent, 1969 and 1980), Japan (Tsuruga, 1981) and Argentina (Constituyentes, 1983). In 1984, the French narrowly escaped a major accident at Bugey, near the Swiss border. In Spain eight accidents were reported at Almaras over the last twelve months. And the Russians themselves had accidents at Obninsk, Kyshtym (1957), Novovoronej (1969), Shevchenko (1974), and certainly others. The Americans are now concerned that 'the Chernobyl plant had enough of the advanced safety features of US reactors to raise questions about the effectiveness of plant designs in the United States'.

All this points out that nuclear energy is unsafe in its present operations. Further, no one can say with any certainty what may happen when existing plants are decommissioned, and no one knows how much it will cost (estimates range from US Dollars 50 million to Dollars 3 billion per reactor).

The risk is so obvious that the US nuclear industry is reported to be 'on its death bed', having received no contract for the last eight years. Its Swiss counterpart is not much better off. In Europe there were only nine new orders in 1985, and none in either the UK or Western Germany since 1981. In 1983, Spain adopted a moratorium on new plants and 'paralyzed' five existing ones. As a result of Chernobyl, the Netherlands have now halted the expansion of nuclear power; the City Council of Trino, in Northern Italy, has ordered the suspension of work on a new nuclear site; the Yugoslavs have abandoned plans for a second reactor at Prevlaka near Zagreb; Finland has postponed the decision on whether to build a fifth reactor; Sweden, which had already

decided to phase out all nuclear reactors by 2010, may shut down some of them before that deadline.

Second nuclear clouds ignore national borders. The Chernobyl cloud has affected the whole of Europe, and the EEC banned (two weeks after the accident) all imports of fresh food and milk products from locations within a 1,000 km radius of Chernobyl. Full human health implications are still unknown, but economic damage has been estimated at US Dollars 50 million in Poland, Dollars 150 million in Italy, Dollars 460 million in West Germany.

Third, the nature of the nuclear energy leads governments to violate, more than in other cases, the people's right to be informed. The Kremlin has been rightly condemned for failing to inform immediately its people and other European countries. In France, where the nuclear lobby is strong and the ecological movement weak, the government waited for two weeks before making public that radiation was sometimes 400 times higher than normal. The French press itself, before accusing the government of lying, was silent for one week. But Washington does not have a better record. In 1954 when it exploded its first deliverable hydrogen bomb on the atoll of Bikini in the Pacific, producing an unexpectedly high level of radiation, which still affects many people, it took ten days to acknowledge the fact. And this was only after a US marine wrote to a newspaper. In contrast, one may mention that in Italy, three weeks after Chernobyl, the newspapers still report daily on the level of contamination of foodstuffs. Fourth, as usual, people are ahead of governments. Demonstrations have taken place against nuclear power all over Europe; in Athens, in Brittany, in Lucerne, in Munich, in Rome, at

the French-German border, in Yugoslavia, and even in Poland. In Western Germany, 60% of the people are against new plants (and 54% want existing plants to be phased out), as are two thirds of the Finns, three quarters of the Americans, four fifths of the Italians. In the UK, according to the industry itself, only 40% of the British still want nuclear energy, and 70% of the Dutch are opposed to it. In 1978, the majority of Austrians voted against the starting of an already built Dollars 500 million reactor at Zwentendorf. The Danish Parliament requested, early in May, that the Swedish plant at Barseback (40 km from Copenhagen) be closed down. Fifth, the Third World, a usual dumping ground for dangerous products, from drugs to pesticides, banned in the North, is now more threatened than ever. The crisis in the nuclear industry in the North will make it look for new markets in the South. Since governments are no better in the South than in the North, nuclear Bhopals will necessarily follow.

Finally, whatever its huge costs in human terms (100,000 persons in the USSR will have to be subjected to medical checks for the rest of their lives), Chernobyl is not Hiroshima, but they cannot be disassociated. Chernobyl is also a dramatic reminder of the nuclear apocalypse's permanent threat.

The lessons from Chernobyl are clear. The Faustian bargain of nuclear energy has been lost. It is high time to stop building nuclear plants, to decommission existing ones and to speed up research to avoid the risks for future generations - and to ban nuclear weapons. This is the price to pay to enable life to continue on this planet. It is an urgent task for people's movements to force governments to act in this direction, and to hold them accountable if they do not.

SOME QUESTIONS ABOUT THE ECONOMICS OF NUCLEAR ENERGY

J. Diandas

This paper was presented recently at an SLAAS seminar on Sri Lanka's Nuclear Options after the Chernobyl Disaster. Diandas maintains it is commonly claimed that nuclear energy is cheap; but this depends on the size of the plant. At 300 MW or above it appears competitive with oil. But calculation of cost is a matter of perception. Different appraisers can find different costs.

1. Introduction

1.1 The aspects that I will deal with in this paper are:-

- .1 the uncertainty of cost, which is a matter of perception
- .2 a comparison of cost/kwh by coal and nuclear
- .3 The SMPR (small or medium power reactor)
- .4 the habit of discounting costs and benefits.

1.2 In a previous Section E Panel Discussion in Aug 80 I addressed a different list of commercial questions for Sri Lanka energy planners:-

.1 Very long lead time: for a project to be switched on 11-13 years after commitment, how does one assess the capital cost? the actual switch-on date? the cost of uranium from that date on? the cost of operating expenses from that time on? and the cost of other alternatives at that time?

.2 Risk of premature close-down: what is the likelihood of a mishap compelling close-down? how long would a close-down last? and how much would diagnosis, inquiry and repair cost?, all assuming no catastrophe or third party damage.

.3 Dependence on expatriate personnel: how many expatriate personnel will be needed at the stages of planning and preparation, construction, start up and teething, normal running, mishap (if any) and de-com-

missioning? how much will they cost? and what will be the availability of expatriate specialists in any given international political scenario?

.4 Cost of waste disposal: how much will it cost to store waste? or to dispose it abroad? will anybody accept it?

.5 Cost of de-commissioning: what estimate should be made for de-commissioning cost? to what extent should installers of nuclear power stations concern themselves with costs likely to arise after they have left the decision-making arena, by which time the ingenuity of man may have found low-cost solutions....(or may not have)?

.6 Future cost of uranium: what are the world's total uranium resources? what will world demand for uranium be in the period 1990-2025? how much will uranium cost in that time span? will re-cycling be generally adopted? will fast-breeders elsewhere take the pressure off world demand for uranium?

.7 Potential obsolescence: what would be the commercial risk, and how much would it cost, if a reactor's supplier went out of business, or a reactor or a component in it was embargoed?

1.3 These are still live questions.

2. The uncertainty of cost

2.1 In any economic analysis one seeks to ascertain the cost of one option as against another. If electricity is needed, is it better to grow trees, import coal, impound rivers, or set up a nuclear reactor? Which is better may depend on many factors. One of the most important is comparative cost. To assess comparative cost, one must know what the cost per kwh will be in each option.

2.2 However, because of difficulties in projecting the future, and in allocating the capital investment over

life-cycle production, cost itself is no more than a perception. I have adverted to this on several occasions when addressing hydro-electricity as well as nuclear energy, but for now I will quote from a publication of the NEA (Nuclear Energy Agency, a wing of OECD) entitled:-

"The costs of generating electricity in nuclear & coal-fired power stations" 1983.

2.3 This publication confirmed my view in many aspects. I quote just a few:-

"Any manufacturing or production cost can be calculated in a number of different ways which yield different numerical results....The method chosen depends in part on the purpose for which the calculation is made..... Depreciation repayment period may be the expected economic life or any shorter period, chosen arbitrarily or by convention....A station's performance may vary from year to year (hence) the capital annual charge may be spread over a greater or smaller number of kwh, thus giving apparently lower or higher kwh cost.....There are several ways in which a calculation can be performed and there is a range of factors that may or may not be taken into account, depending on the perspective of the group conducting the calculation".

2.4 Following from these quotations, I warn that if anybody is making a decision, or forming an opinion about competitive cheapness of nuclear or any other form of energy, based on costs statements presented to him, he should have those costs independently evaluated without taking anything for granted. And if anybody is preparing such cost statements, let him consult with a dozen others before issuing them.

2.5 Regrettably I have not done this for this paper. In the next section I present a tentative table of comparative costs which I hope will be challenged in at least some particulars so that it can be refined or even significantly amended.

3. Comparative Cost

3.1 The following is an oversimple computation of comparative cost per kwh:

	Hydro	Nuclear (Candu type)			Steam		Combustion	
		1GW	300MW	60MW	coal	oil	gas	diesel
Capital Cost								
Cost RsM		30000	12000	3000				
Cost RsM/MW	60	30	40	50	20	15	12	12
De-com RsM		3000	3000	3000				
De-com RsM/MW		3	10	50				
Life years	100	20	20	20	30	25	20	20
Hours yearly	6000	6000	6000	5000	4000	5000	2000	2000
Life gwh/MW	600	120	120	100	120	125	40	40
Rs/kwh	.10	.25	.33	.50	.17	.12	.30	.30
Fuel Cost								
CPC Rs/litre						4.72	7.83	4.00
raw cost \$		55/kg	55/kg	55/kg	60/T	12/bl	12/bl	12/bl
delivered \$		330/kg	330/kg	330/kg	72/T	14/bl	16/bl	14/bl
delivered Rs		9/gr	9/gr	9/gr	2/kg	2½ lt	3/lt	2½lt
kwh/input		32/gr	30/gr	28/gr	2/kg	2.8/lt	2.5/1	4.2/1
Rs/kwh		.28	.30	.32	1.00	.89	1.20	.60
Cost Rs/kwh								
capital	.10	.25	.33	.50	.17	.12	.30	.30
de-commission		.03	.08	.50				
fuel		.28	.30	.32	1.00	.89	1.20	.60
run	.10	.10	.18	.74	.10	.10	.10	.10
desilt	.03							
safety	.01	.03	.11	.67	.01	.01	.01	.01
total:	.24	.69	1.00	2.73	1.28	1.12	1.61	1.01

3.2 I have not been able to verify the basic inputs to this table. If any participant would like to correct any of the figures, such as prices, we can adjust the table here and now. For example Prinath claimed last week 10,000 mwd (th) per Ton Uranium, which means, say, 72 kwh (e) per gram. If this was substituted in the above table the cost of nuclear energy would come down by 10 cents per kwh. But my price for delivered nuclear fuel does not include fuel waste disposal cost at the rate of \$ 800 per kg fuel cited in IAEA Spring 85 Bulletin, or enrichment cost, which does not arise for Candu reactors.

3.3 I have taken Nuclear reactor life at 20 years and 120 million kwh per MW, which is close to the 20 years and 126.8 gwh used in the NEA calculations.

3.4 I have taken nuclear de-commissioning to cost \$ 100 per KW (say Rs 3,000) for a 1000 MW plant vide IAE Bulletin, Winter 1985, page 14, giving an absolute cost of \$M 100, which according to the bulletin "for smaller plants may not be significantly different". Hence Rs M 3,000 for de-commissioning in all 3 nuclear co-

lums in the table. Note the difference in cost per KW and per kwh on this basis.

3.5 The same Bulletin mentions that the Canadian 250 MW Gentilly 1 cost \$25M for partial de-commissioning so far, full dismantlement to take place 50 years hence with appropriate (costly) security measures in the meantime. The Bulletin also mentions a Uranium processing plant (no energy generated) at Weldon Spring USA which will cost \$ 357 million to decontaminate in a decommissioning project running from 1987-1996, and gives \$ 98.3M as estimated cost for dismantling the 72MW Shipping-

Japan given in US\$: converted at Rs 28/\$

Rs/kwh	hydro	nuclear large	thermal		
			coal	oil	LNG
capital RsM/MW(given)	67	30	22	15	19
life cycle gwh/MW (?)	67	120	80	120	100
cost Rs/kwh	1.00	.25	.28	.12	.19
interest (?)	1.00	.25	.28	.12	.19
total capital	2.00	.50	.56	.24	.38
fuel (given)	-	.34	.84	1.79	1.49
other costs (?)	.24	.50	.28	.21	.26
total (given)	2.24	1.34	1.68	2.24	2.13

port plant in USA which delivered 7,200 gwh during its 25 year life. This works as follows:-

	kwh	\$	Rs(at 28/)
kwh/KW	100,000		
kwh/KW/year	4,000		
decommission		\$M 98.3	RsM2752
decom/MW		\$M 1.36	R\$M38
decom/kwh		\$ 0.014	Rs 0.38

3.6 If there is a lot of foreign expenditure involved, then the exchange rate at time of de-commissioning is critical, even if inflation perse is ignored. Will the rate still be Rs 28/- when Sri Lanka's possible first nuclear plant is due for de-commissioning in say 2020?

3.7 To complete the section on costs, the following are a few examples from France, Canada and Japan cited in IAEA Bulletin for Spring 1985, which could be mentally adjusted by reducing oil fuel cost to 50% of the figure given to reflect recent petroleum prices changes:-

France Projection for 1992: converted at Rs4/Fr

Rs/kwh	nuclear (large)	thermal	
		coal	oil
capital	.48	.33	.28
fuel	.25	.84	2.52
other	.17	.14	.12
total	91	1.3	2.92

Canada 1979: converted at Rs 25/c\$

Rs/kwh	nuclear	coal
capital	.27	.09
fuel	.07	.55
other	.09	.03
total	.43	.67

3.8 The Japanese figures do not make sense with my interpolations between the given figures (or with any interpolations) against the question marks. But they illustrate the effect of differing cost perceptions and of including interest. In effect the capital cost of hydro is recovered from just 33½ gwh or 6,700 kwh/KW over 5 years, leaving the scheme to deliver zero-cost energy thereafter. This shows that Japanese hydro sales are overpriced just as are Lanka's if yesterday's newspaper report is to be believed to the effect that Victoria has already, in 1½ years, reaped one seventh of its cost, implying that Victoria's electricity after 10½ years will have zero capital cost.

4. SMPR (Small and Medium Power Reactors)

4.1 IEAE has been promoting small reactors as a means of making power plants acceptable in small grids. Sri Lanka's 1,000 MW system, perhaps 2,000 MW in ten years time, can only accept a maximum 200 MW capacity plant then in order to fit the rule that no single plant should occupy more than 10-15% of the grid.

4.2 Manufacturers have had a bad field for the last several years. If they are to stay in business and retain their highly skilled multidisciplinary teams of experts, they must get some orders, and better small than never. They would be under business pressure to offer small reactors at less than cost, or on interest-free supplier's credit.

4.3 In respect of financing of nuclear plants, the IAEA Winter 85 Bulletin says at page 47:-

"industrial nations have been willing to provide assistance, many times under exceptionally generous terms, to assist their manufactures in establishing a position in the nuclear power export market".

4.4 Perhaps this accounts for the claim that small reactors can be as cheap per KW as large ones, despite the normal economies of scale. In-

house prefabrication is said to be in vogue as a means of reducing installed cost. But the cost of location studies, preparation and planning can hardly be scaled down.

4.5 Yet even if the capital cost per KW could miraculously come down to the same level as for 1,000 MW plants, and thus remove the disadvantage of smallness from the capital cost per kwh, the running and safety costs can hardly be scaled down. I estimate Rs 200 M per year as the minimum staff cost per annum however small the plant, and this would have to be shared by fewer kwh. This explains, in the table above, why cost/kwh rises so sharply as nuclear plants become smaller. The impact of de-commissioning cost has already been discussed.

4.6 A intriguing IAEA argument says that introducing a 100 MW plant once a year is better than introducing a 1,000 MW plant every 10 years, because there is less gap between supply capacity and demand before and after the new introduction. However this does not create an advantage, it merely removes one disadvantage of nuclear as against coal, which can easily be incremented at 100 MW/year because, in the case of coal, the economies of scale are not so marked.

4.7 In respect of SMPRs, Prinath Dias said last week that 60MW plants were contemplated, but the Winter 1985 IAEA Bulletin quotes EPRI's Braun as saying only "a strong interest exists in evaluating plants with output less than 600 MW; apart from India, which has its own interest in building up to a total of 18 plants between 210 and 235 MW, only the following are mentioned in the SMPR range (i.e. less than 600MW):-

4.8 Even IAEA's Director General Blix only noted that the nuclear industry is showing greater interest in smaller nuclear reactors, typically those below 600MW; that suppliers are now ready to offer smaller reactors for export; that potential buyers in developing countries are expressing renewed interest as well; and that the likely next steps are economic feasibility studies for particular solutions.

5. Discounting

5.1 The only other thing I wish to address in this presentation is the vexed question of discounts. For the Channel Tunnel the British-French Bankers adopted a 3% discount rate as representing the real rate of commercial long-term interest shorn of inflation. It is common in feasibility studies undertaken for the purpose of obtaining loan financing, or even government funds, to discount all future costs and benefits at a rate of discount approximating real interest rates if cash flows are to be projected in constant money terms, or at a rate enhanced by projected inflation rates where cash flows are to be forecast at inflated monetary values. In a sense, the inflation component and the discount enhancement cancel out, leaving the real rate of interest in the calculation.

5.2 However, discounting itself is originally a banking practice for approving commercial loans, when the bank is concerned to retrieve its money plus interest within its lending period rather than within the lifetime of the project. It suits the banker to ignore the value of benefits coming in over the long-term future and to ignore future costs too. This discounting habit has been justified in a whole library of literature, but also criticised by authors like Clifford Sharp of Leicester University.

country	name	plants	on-line date	each MW
Argentina	Atucha 1	1	1974	367
China	Quinshan	1	due 1989	300
India		12	1995-2000	500

5.3 The effect of discounting in the present instance is to change the perception of cost and benefit, and in particular:-

- :make the future energy flows of hydro schemes look insignificant.
- :make the de-commissioning and after costs of nuclear schemes look small.

6. Conclusions

6.1 Although large-scale nuclear looks to be the cheapest non-hydro source of electricity according to the figures in para 3.1, small-scale nuclear electricity, even if made available, will not be cheap.

6.2 Although large scale nuclear looks cheap, it too could turn out dear in a number of circumstances leading to lower productivity. One such circumstance could be a non-catastrophic accident like that at 3-Mile Island, where two plants have been non-productive for the last seven years.

6.3 The figures in para 3:1 are very sensitive to the assumptions on which they are based. The following table shows how they vary cumulatively if:-

- 1 Interest on capital is included in the cost
- 2 Prices rise to Uranium \$ 82½, Coal \$ 90, oil \$ 18,
- 3 The US dollar goes up to Rs 35
- 4 Hydro scheme life is reduced to 33 years
- 5 All capital costs increase further by a factor of 2

Rs/Kwh	para 3.1	cumulatively adjusted ¹				
		.1	.2	.3	.4	.5
HYDRO	.24	.34	.34	.39	.79	1.39
NUCLEAR						
1 GW	.69	.94	1.08	1.34	1.34	2.00
300 MW	1.00	1.33	1.48	1.81	1.81	2.73
50 MW	2.73	3.23	3.39	2.03	2.03	3.90
STEAM						
Coal	1.28	1.49	1.95	2.41	2.41	2.83
Oil	1.08	1.20	1.64	2.03	2.03	2.18
COMBUST						
gas	1.61	1.91	2.51	3.11	3.11	3.86
diesel	1.01	1.31	1.61	1.98	1.98	2.73

6.4 If on top of these adjustments, or any of them, discounting were

applied, those sources with higher capital costs, viz hydro and nuclear would look progressively worse as the rate increased, but nuclear's decommissioning cost would appear to decline.

6.5 Sensitivity of output has not been tested. Yet the nuclear capital cost allocations are based on 6000 hours/year which is 68½% load factor. However the world's average only reached 69% in 1984. It is likely that Lanka would be lower than average, perhaps 60% or if plagued with teething and later problems as Pakistan has experienced, less than 50%. Such low outputs would again increase cost/kwh.

6.6 There remain the many unanswered (some unanswerable) questions in para 2.2, a number of them of the "what if?" nature. How much would we have to pay other countries to take away the spent fuel? What happens if the supply of some critical operating material (eg heavy water) or of nuclear fuel itself, dries up for political reasons? All these are commercial questions.

6.7 Out of 374 working reactors in the world there has been only one Chernobyl and one 3-Mile Island, but there have been a couple of dozen lower level incidents that have caused premature closure. Insurance would have to be taken for the risk involved covering rectification costs and loss of output.

6.8 And finally what size of plant could Lanka's grid accommodate? When total demand reaches 2,000 MW, base load might be 800 MW or less. Would

it be wise to place more than 200 MW in a single nuclear station at that time?

SAUDI ARABIA

World's largest oil exporter - holds the key to future production and prices

The settlement reached at the August OPEC ministerial meeting, which set a production ceiling of 16.7 million barrels per day, was a victory for Saudi Arabia. After a tempestuous period of six months during which the kingdom raised its b/d, effectively abandoning attempts to support prices, the Geneva deal could bring stability to the oil market. Member states have agreed to Saudi Arabia's terms for production levels knowing they are in a weak position to challenge its economic power. When Saudi Arabia moves, the rest of the oil world shudders.

The kingdom's sub-soil contains one-quarter of the world's extractable oil reserves. By 1983, the level of proven reserves had risen to just under 170-billion barrels. Oil production has a forecast lifespan of 70 years but the process of depletion could be drawn out into the 22nd century by new discoveries in the huge southeastern Empty Quarter.

Production is concentrated in four large oilfields, al Ghawar, as Safaniya, al Abqaiq and al Berri, all operated by the Arabian American Oil Company, Aramco, which is 100 per cent owned by the Saudi government. Al Ghawar is the largest onshore oil field in the world. As Safaniya is the biggest offshore field. In addition, the kingdom gains a percentage of production from smaller fields run by Getty Oil and the Arabian Oil Company in the Neutral Zone disputed with Kuwait.

Saudi Arabia maintains a sizeable cost advantage over other competitors in the export market. On average Saudi Arabia's production costs range between US\$ 1 and US\$ 2 per barrel; the minimum in the North Sea is about US\$ 4 per barrel, while US "stripper wells" cannot produce below US\$ 10 per barrel. It has acquired a pivotal position in the crude oil market.

Since 1979, the Saudi share of crude oil exports has contracted sharply from 20 per cent of world exports in 1979 to an estimated 4 percent last year. Output fell from a highpoint of 9.8 million b/d in 1981 to a low of 3.2-million b/d last year. Saudi Arabia's share of OPEC production amounted to no more than 20 per cent.

Production restraint was primarily responsible for the deterioration in the terms of trade. At a conference in March 1982, OPEC introduced a production ceiling in an attempt to remove slack from the market. Saudi Arabia, with the largest capacity, became the organisation's "swing producer", supplying the balance between



Oil minister Sheikh Yamani

tween the output of member states and the OPEC ceiling. Without a sustained recovery in the world oil market Saudi production became squeezed between the output of member states and the overall production ceiling.

Saudi Arabia's recent change on oil policy was not forced by failure to absorb the costs of production restraint. The main concern is to fight off the mounting challenge of the non-OPEC producers, principally the UK, which have expanded their market share at its expense. At the beginning of 1986, non-OPEC producers accounted for 51 per cent of the world supply of crude oil; OPEC production was 36 per cent – down from 53 per cent in 1973 and 48 per cent in 1979.

The turning point for the government came in the summer of 1985. At the OPEC ministerial conference in Taif in Saudi Arabia, King Fahd took the unprecedented step of addressing the gathering. He warned the meeting that Saudi Arabia would raise output to 5-million b/d if other OPEC members did not observe the organisation's price and production guidelines. At the same meeting, the kingdom's longstanding minister of petroleum and mining, Sheikh Ahmed Zaki al Yamani, announced that his country was no longer prepared to perform the role of "swing producer" within the organisation. With Saudi output down to 2.2-million b/d Yamani indicated that his country's priority was to win back markets lost to non-OPEC producers.

Following the Taif meeting Saudi Arabia began to implement a crucial shift in strategy. To increase market penetration, the government, starting in July 1985, signed a series of netback deals with the oil companies. These based prices on the market value of the refined products obtainable from crude oil shipments and guaranteed the companies a clear margin of US\$1 to US\$2 on every barrel of crude sold.

OPEC formally agreed to the market-orientated strategy at its ministerial conference last December. Despite strong objections from some member states, especially those under balance of payments pressures, like Algeria, Iran, Libya and Nigeria the organisation came out in favour of what the final communique termed "a fair share of the world oil market". Sheikh Yamani said: "When we defend our market share, this means that non-OPEC producers must give up part of their share in the market. That's the basic premise of the policy."

In the first quarter of 1986 OPEC production rose from an average 15.9-million b/d to 17.3-million b/d. The result, in the absence of an increase in demand, was a crash in oil prices. Prices tumbled from US\$27 per barrel in the last quarter of 1985 to US\$10 per barrel in the second quarter of 1986. By July, at the height of summer, the prices had dipped to almost US\$9 per barrel. On the spot market, some oil was trading at US\$5.50 per barrel.

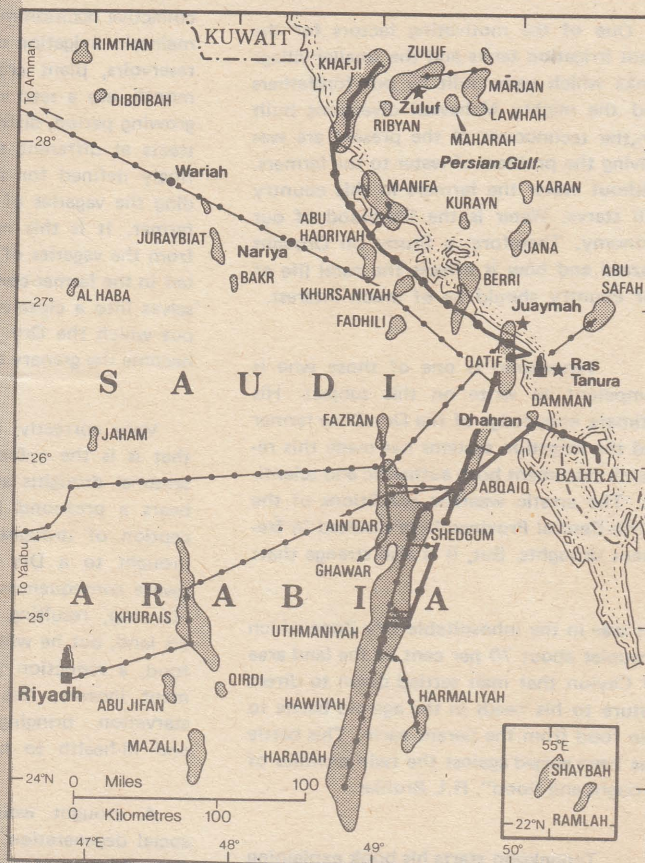
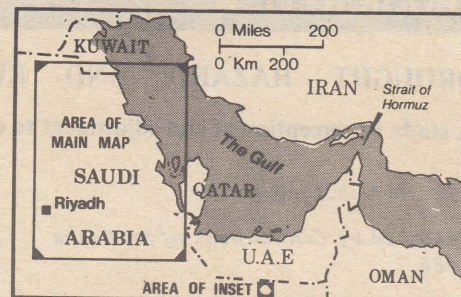
Not even Saudi Arabia anticipated the scale of the price collapse. The kingdom expected that non-OPEC producers would respond to increased OPEC production by cutting back on their own output to maintain prices. The government believed that non-OPEC producers would try to hold prices around US\$15-US\$20 per barrel. The fact that non-OPEC producers have let prices slide has therefore meant a number of unforeseen problems, not least on Saudi budgetary planning (Refining the five-year-plan).

Despite the objections of other OPEC members, the Saudi leadership recognises a number of important benefits in lower oil prices. In the short term the decline in revenues will impose additional pressure on the country's balance of payments but, in the longer term, lower oil prices could work to the kingdom's advantage, eventually bringing about a sustained recovery in global demand for crude oil.

Slack demand in the world oil market has increasingly threat-

Oil fields and facilities

- Proven fields
- Marine terminal
- Refinery
- Pipeline
- Multiple pipeline system



ened earnings from oil sales. Due to several factors – the world economic recession, oil conservation and energy substitution – global consumption of crude oil declined by an average of 5 per cent per year between 1979 and 1983; in trade terms, net imports of crude by OECD countries fell by 10-million b/d from 26-million b/d to 16.6-million d/d. Lower oil prices, deliberately maintained by higher Saudi oil production, could counteract the downturn in net imports among the industrialised states. Cheaper oil could remove much of the incentive for oil substitution and the development of new oilfields in non-OPEC countries.

Due to destocking by oil companies the oil price may firm during the coming winter months. In a rare interview published in the Kuwaiti daily *al Seyassah* in June, King Fahd optimistically said: "In my opinion, oil prices will stabilise around US\$20 a barrel, because consumer countries have now used up nearly all their reserves and, as prices go down, consumption tends to rise." But at the OPEC ministerial meeting in Geneva in July, Saudi Arabia had lowered its sights to around US\$14.

Most analysts do not expect a more sustained recovery in the oil price before the end of the current decade.

Courtesy: South

BOOK REVIEW

DROUGHT HAZARD AND RURAL DEVELOPMENT

A study in perception of and adjustment to drought

By M.U.A.Tennekoon

Published by Central Bank of Sri Lanka 1986.

One of the motivating factors for the giant irrigation tanks and the smaller village tanks which were built by our forefathers and the mighty Mahaweli diversions built by the technocrats of the present era was solving the problem of water to the farmers. Without water the farmers in this country will starve. Water is the life-blood of our economy. Therefore, a Study on Drought Hazard and how it effects the rural life of our country should be of much interest.

Tennekoon is one of those who is competent to write on this subject: His intimate knowledge of the Dry Zone farmer and the irrigation systems has made this research document both authentic and scientific. The erratic weather conditions of the North-Central Province have resulted in frequent droughts. But, it is also strange that:

"It was in the inhospitable Dry Zone which occupies about 70 per cent of the land area of Ceylon that man settled down to direct nature to his needs in the age-old battle to win food from the parent earth. This battle has been waged against the twin enemies of drought and flood". R.L. Brohier.

Tennekoon starts his book explaining evidence of research done on this subject by earlier authors. However, when it comes to Sri Lanka one could see that very little has been done and, therefore, Dr. Tennekoon's research is both timely and original.

In this Study, he has selected five settlements which fall into the transitional zone between the North Western arid and the North-Central dry zones. Further, he has selected both the traditional and the colonization schemes, and gone further to divide the selected colonization schemes into new and old schemes. His reliance on data has not only been statistical but has been extended to an opinion survey.

The author has also been able to explain some of our traditional systems of cultivation aimed at maximizing the benefits of irrigated farming and to manage the likely crop losses due to rainfall vagaries. The collective decision-making at farmer level to maintain irrigation canals, release water for reservoirs, plant crops during a particular month, use a seed variety with a particular growing period, distribute water to different tracts at different times: are all a process finely defined for the purpose of out-bidding the vagaries of drought to the N.C.P. farmer. It is this need to protect oneself from the vagaries of the weather that resulted in the farmer-community building themselves into a closely-knit social fabric without which the Dry Zone would never have become the granary of this country.

Very correctly, Dr. Tennekoon explains that it is the colonists past experience of seasonal droughts and rainy periods which bears a profound influence on their perception of droughts in the Dry Zone. A drought to a Dry Zone farmer has very severe consequences: Not only will he lose his crop, resulting in physical damage to his land, but he will lose all his surpluses of food, a reduction of his on-farm employment income, loss of animal husbandry, starvation, bringing disease, malnutrition and ill-health to himself and his family.

A drought would also bring about a social degeneration, disappointment, frustration of hopes for the future for himself and his children which would take long years to repair. Therefore, the effect of a drought should be one of the most cardinal issues to which the leaders of this country should pay attention in deciding on the development of the Dry Zone.

Tennekoon, in the final Chapter of his book, goes on to explain the farmer's adjustment to conditions of a drought. The adjustment to a drought has not only resulted in the construction of both large and small reservoirs but has also resulted in the cultivation of upland chenas, pre-sowing and after-sowing adjustments, the utilization of available resources sparingly,

so that he would be able to hold on as long as possible until the rains arrive.

The author further explains how droughts have affected the land tenure system in traditional villages, and how attempts have been made to modify this system in the face of droughts. The very system of land inheritance, by dividing it into equal shares, is itself the result of an attempt to cushion the effects of drought hazards. Bethma cultivation and the strip system of holding ownership of land are all the result of their adaptation to drought conditions.

He calls for a National effort, involving the services of many Departments to form an Organization for drought protection and to adopt a systematic and meaningful programme of work to mitigate the recurrent drought losses. He also suggests a very scientific Study of Drought Patterns in order to arrive at better conclusions and to provide protection to the farmers in time.

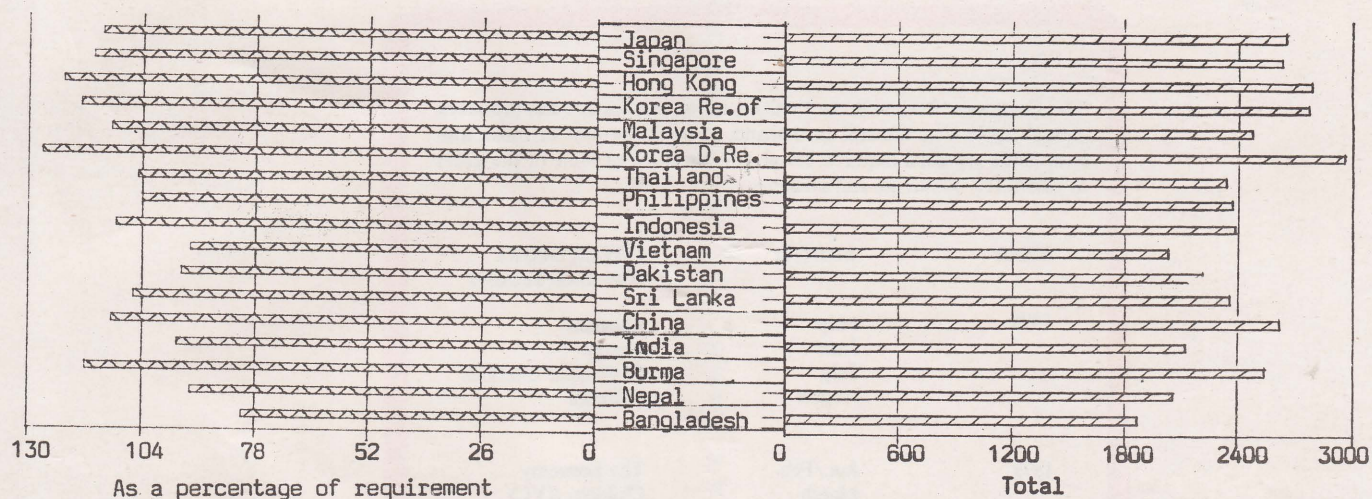
He also argues the case for a better approach towards drought assistance. Tennekoon's dealing of the Thesis, though academic, makes very simple and easy reading, and this should provide both the academician and the administrator with a more enlightened knowledge not only of the Dry Zone farmer but also show the direction which rural development of the Dry Zone should follow.

Before closing this Note, I wish to point out an important area where Dr. Tennekoon would be able to effectively contribute as a post-script to his thesis, and that is the impact of the diversion of Mahaweli waters towards drought hazards into the Dry Zone irrigation system. A timely comparison of the situation before the Mahaweli, and after, would make his thesis much more valuable to the future researcher. It is a known fact that the Mahaweli waters will feed almost every big irrigation tank in the Dry Zone and this would cushion in no small way the drought hazard which had been agonizing the Dry Zone farmer from time immemorial.

While commending Dr. Tennekoon for his excellent write-up, I would recommend that this should form the basis for new thinking and planning in order to bring greater benefits to the Dry Zone farmer.

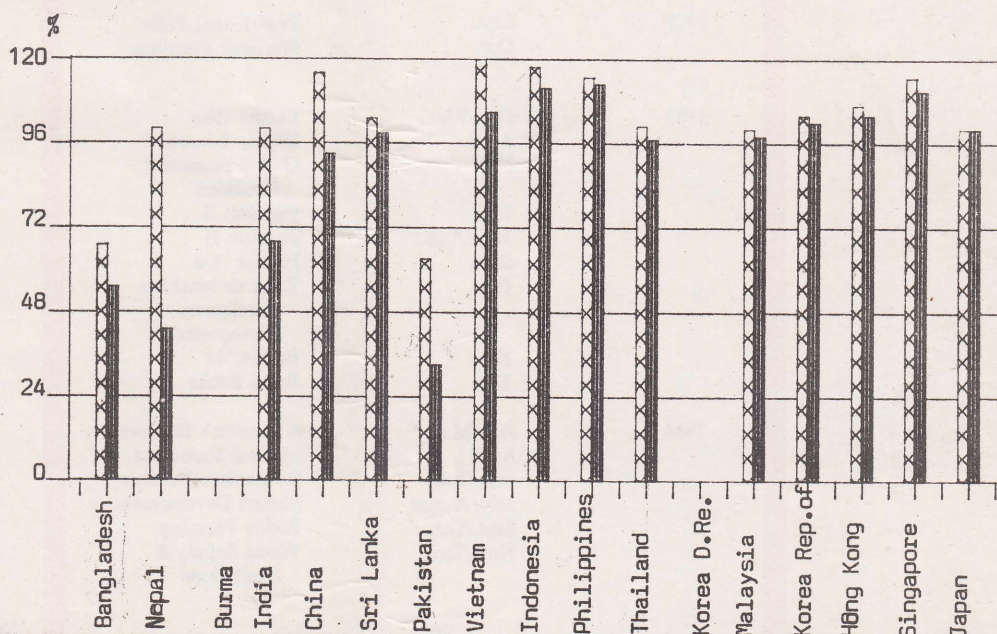
I.K.Weerawardena
Additional Secretary
Ministry of Mahaweli Development, and
Chairman/River Valleys Development Board,

DAILY CALORIE SUPPLY, PER CAPITA



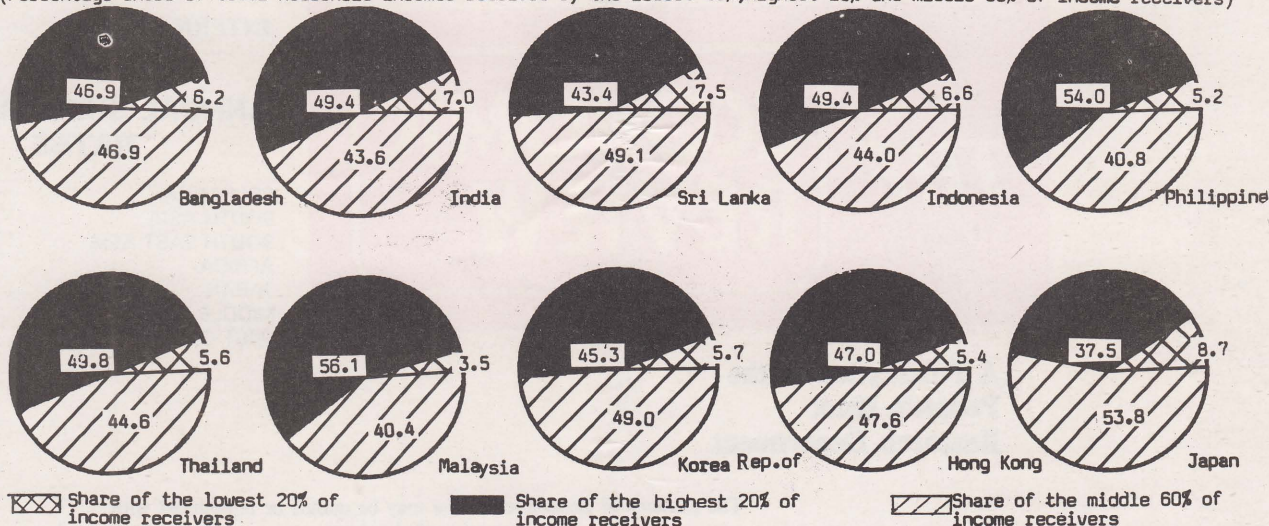
NUMBER ENROLLED IN PRIMARY SCHOOL AS A % OF AGE GROUP

Male
Female



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	Dec.	National Elections
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