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SRI LANKA COUNTRY REPORT

Nation

NATIONAL SCIENCE COUNCIL OF SRI LANKA
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PART I

GENERAL FEATURES

1.1 Geopolitical setting

Sri Lanka is a tropical island situated between 5° 54′ and 9° 52′ north latitude and 79° 39′ and 81° 53′ east longitude. Its climate is equable and oceanic. It has an area of 65 600 square km. From the sea coast the land rises to an elevation of 2 500 m in the south-central part of the island, but 3/4 of the country consists of a broad peneplain, close to sea level. This peneplain is most extensive in the northern and eastern regions. At sea level the mean monthly temperature ranges from 25° to 30° c. At higher altitudes there is a drop in the mean temperature at the rate of approximately 1°C for 150 m rise in elevation. Being near the equator, there is little seasonal variation in day length. The rainfall has a seasonal distribution. The south-west quadrant of the island receives rainfall throughout most of the year with a peak during the period of south-west monsoon from June to August. In the rest of the island rainfall occurs mainly during the period of the north-east monsoon (October-December), and dry weather prevails in the period, June to September. This region is the so called "Dry-Zone" which, in centuries past, was dotted by thousands of man-made reservoirs which provided water for irrigating rice cultivation.

Water has an important role to play in the economy of Sri Lanka. Besides being the main factor sustaining agriculture, the mainstay of the economy, it provides 90 per cent of the electricity generated in the country.

The other main natural resources of the country that are exploited at present include gems, graphite, limestone, kaolin, rock phosphate and mineral sands. Exploration for

oil has not been successful so far. In the sphere of forestry, though Sri Lanka timbers were at one time well-known in overseas markets, this resource has dwindled sharply in the past few decades.

The population of Sri Lanka is estimated at 14.5 million (mid year, 1979). Colombo, Sri Lanka's capital city, has an estimated resident population of 0.6 million.[11]

The country is provided with a good network of public roads (26 790 km in 1978). The railway has a much more restricted coverage (1 453 km). There is one major international airport close to Colombo and a few minor domestic airports in some of the other towns. The main seaports are in Colombo, Galle and Trincomalee.

Sri Lanka has a recorded history dating back to the pre-Christian era. Western domination started with the conquest of the maritime districts by the Portuguese in 1505. They ruled for 1 1/2 centuries and were replaced by the Dutch East India Company in 1654. The Dutch rule, also confined to the maritime areas, ended with the British invasion in 1796. Sri Lanka became a British colony in 1802. In 1948 Sri Lanka became an independent member of the British Commonwealth. In 1972 Sri Lanka was declared a free and independent republic but it continued to be a member of the Commonwealth. The present constitution of Sri Lanka was adopted by Parliament in 1978.

According to the 1978 constitution of the Democratic Socialist Republic of Sri Lanka, sovereignty rests with the people and is exercised through Parliament.[17] Parliament consists of elected representatives. Franchise is universal and has been so for 50 years. All persons over 18 years of age who are citizens of the country are eligible to be

registered as voters. The constitution guarantees fundamental rights to all Sri Lankans. These rights are, inter alia, the freedom of thought, speech and religious belief. All citizens are equal before the law.

The President of the Republic who is elected by the people is the head of state and of the Cabinet of ministers and the Commander-in-chief of the armed services. The Prime Minister and the other ministers are appointed by the President from the members of Parliament. The President and the members of Parliament hold office for a maximum period of six years after which a general election is mandatory.

The President and the Cabinet of ministers are responsible for the direction and control of the government. The President presides at meetings of the Cabinet. The subjects and functions of the government are assigned to different ministers by the President who may himself retain some subjects and functions. Each ministry has a secretary who is appointed by the President. A ministry comprises one or more departments, boards and other statutory bodies. Matters connected with the appointment, transfer and disciplinary control of public servants rests with the Cabinet of Ministers. Some of these powers are delegated to the Public Service Commission.

1.2 Socio-cultural and economic setting

Sri Lankans comprise a number of ethnic groups. The main races are Sinhalese (71.9 per cent) and Tamil (20.5). The main religions are Buddhism (67.4 per cent), Hinduism (17.6), Christianity (7.7) and Islam (7.1).

Sinhala is the official language; but both Sinhala and Tamil have been recognized as national languages by the constitution, and both languages are used in the administration in the northern and eastern parts of the country.

Agriculture is the mainstay of the economy. It accounts for one third of the Gross Domestic Product and one half of employment.[13] Tea, rubber and coconut are the main plantation crops, and they account for 75 per cent of the export earnings (in 1979).[3] Rice is the staple food of Sri Lankans. At present local production of rice meets 85 to 90 per cent of the demand, and it is expected to reach the level of self sufficiency within the next few years.

In the decade of the seventies, the economy of Sri Lanka was marked by two distinct phases. Up to 1977, the growth of the economy was stifled by severe import controls, chronic shortages of foreign exchange, heavy subsidies on food, and a heavily overvalued currency. As expected, for a country which imports all its oil requirements and most of its industrial goods, the oil crisis severely exacerbated an already ailing economy. The average annual growth rate of the Gross National Product (GNP) in the decade 1968 to 1977 was 3.1 per cent.[10]

In 1977, the new government that took office introduced sweeping economic reforms in an attempt to resuscitate the economy. Imports were liberalized, a realistic and unitary rate of exchange was adopted for the rupee (in place of former dual rate), and the system of general consumer subsidies was gradually dismantled. Simultaneously the government invited foreign industrialists to invest in the newly created industrial processing zones by offering a package of incentives which included a wide range of tax exeptions and duty-free import of machinery and raw materials.[13] The industrial promotion zones are relatively small, well defined areas. Apart from these, in the country at large too, private investments were encouraged through a wide range of incentives.[12,14]

The result of these economic reforms was a sudden increase in the rate of growth of the GNP which shot up to 8.2 per cent in 1978. It was obvious that this rate of growth which was the immediate and spontaneous response of the economy to the new 'open' policy, could not be sustained at that level, and it fell to 6.2 per cent in 1979. This was still higher than the projected growth rate for the period 1978-1983 which is 6.0 per cent.[2,3]

With the increase in economic growth, the GNP per capita showed a marked rise in the period 1977 to 1979. However, the 1979 figure of US $ 217[4] still places Sri Lanka among the poorest countries of the world.

In contrast to the GNP, Sri Lanka's Physical Quality of Life Index (PQLI) which is a widely accepted index of socio-economic development, is almost on par with many developed countries.[10] The parameters used for defining PQLI include infant mortality, life expectancy and literacy. Sri Lanka's high standard in relation to these factors is a reflection of the policy of successive governments to promote socio-economic development on an egalitarian basis and not concentrate on boosting GNP alone.

With the liberalization of the economy in 1977 the volume of imports rose sharply, more so because of the pent-up demand of the earlier period where import levels remained almost stagnant. This, together with two other factors, the rapid escalation in the prices of manufactured goods and crude oil which are imported and the relatively stagnant prices of most of the primary products which are exported, resulted in a growing trade deficit.[3] Fortunately, large scale capital inflow from the International Monetary Fund and other sources help to sustain Sri Lanka's development effort at a high level. The

economic policy of the present government appears to have inspired confidence in Sri Lanka among developed countries and this has resulted in increased aid from these countries. In the three year period ending June 1980, the government had concluded aid agreements to the value of Rs.22 829 million. Over 1/3 of this in the form of outright grants. In the 1981 budget announced by the Minister of Finance in November, 1980, [5] the estimated expenditure was Rs. 28 071 million. Over 1/4 of this (Rs.8 100 million) is expected to be met from foreign sources, mainly as concessionary loans and outright grants. The major part of the aid received goes into development projects, for example, the Mahaweli irrigation/power scheme, agriculture and rural development projects, and water and sewerage projects.

1.3 Development scene

The programme of development set out by the government aims at providing the basic needs and improving the living standards of the people, particularly in the poorest sections of the community. This involves increasing employment, providing adequate housing, extending water and sanitary services, improving health and education, and increasing the economic levels of the rural population. In its strategy for development the government focuses special attention on three lead projects while at the same time giving the needed impetus to the other sectors of the economy. These three lead projects are the creation of Industrial Promotion Zones, housing and urban development, and the accelerated Mahaweli irrigation and power development scheme.

The aim of setting up Industrial Promotion Zones was to attract export oriented industries, with both local and foreign capital, into specially demarcated geographical areas, by offering attractive incentives. By the middle

of 1980 a total of 111 projects involving an investment of Rs. 3 000 million were approved.[15] The total employment on the projects at present (1980) is approximately 8 000.

In the sphere of housing, the rate of house construction had been far slower than the increase in demand, and this prompted the government to give high priority to public investments in housing. Work on 21 000 units was started in 1978 and 1979. In addition, 15 000 were under construction on aided self-help schemes. These projects, though they will improve appreciably the urban and sub-urban housing situation, are still barely adequate to cope with the problem. A more ambitious programme had been proposed but it had to be scaled down because of economic constraints.[13]

With regard to water and sewarage, the government is shortly to embark on a major scheme to provide an improved sewarage and water service to Colombo and its suburbs. In 1979, 22 water supply schemes were completed and a further 40 were under construction. The government aims at providing safe pipe-borne water to 70 per cent of the population by 1990.[13]

The accelerated Mahaweli irrigation and power scheme which involves extremely heavy investments had to be scaled down because of economic constraints and limitations of implementation capacity. On the present programme 120 000 acres (48 600 ha) of new land will be irrigated, and 410 MW of installed capacity of electricity will be added to the present all-island capacity of 381 MW by 1984.[13]

In the sphere of agriculture, the increases in the annual yields of paddy could be considered satisfactory. In 1977, 80.4 million bushels (1.66 million tonnes) of paddy were produced. This increased to 90.6 million bushels (1.87 million tonnes) in 1978. As a result of reduced fertiliser inputs

and adverse weather conditions the crop increased only marginally in 1979 (91.8 million bushels), but preliminary estimates for 1980 indicate that the 100 million bushel mark has been exceeded. The yield per unit area increased from 50.7 bushels per acre (2.59 t/ha) in 1978 to 53 bushels per acre in 1979.[1,2,3]

Paddy, covering 30 per cent of Sri Lanka's cultivated land area and extending to nearly all parts of the country, is perhaps the most important single crop influencing the overall performance of the economy. The paddy sub-sector alone accounts for the employment of 860 000 persons which is nearly thrice the employment in the whole of the manufacturing industries sector (374 000 persons).[12]

Although paddy production presents an optimistic picture, the agriculture sector as a whole has shown slow growth in 1979 - 2 per cent as compared with 10.4 and 5.4 per cent in 1977 and 1978 respectively.[13] The three main plantation crops showed an uneven performance. Tea production increased only marginally, coconut production increased eight per cent, while rubber production declined. The increase in the case of coconut should not give room for optimism as it has to be viewed against a backdrop of a steady and appreciable decline in production in the period 1972 to 1977.[3,4]

In the industrial sector, the economic reforms of 1977 had a sharp and immediate impact. In 1978 the growth rate (in real terms) of this sector was 11 per cent. This fell to 4 per cent in 1979. It would, of course, have been unrealistic to have expected the growth rate to be maintained at the 1978 level. This is because the 1978 rate reflected the immediate impact which the economic reforms had on an industry which had previously been operating at a greatly reduced capacity due to shortages of raw materials, equipment and spares. As expected, the increased production levels were more evident in the private sector than in the state industries.[3,4]

Earnings from industrial exports nearly doubled, from Rs. 1.9 billion in 1978 to Rs. 3.7 billion in 1979.[4] This was almost entirely due to a considerable increase in the earnings from the export of textiles, garments and petroleum products.

Besides the incentives that are given for the setting up of industries in the Industrial Promotion Zones there are generous tax concessions and other incentives given for a wide range of industries, particularly for small and medium scale labour-intensive industries set up in rural areas. Tax concessions are also extended to housing projects, processing industries, rural and urban development projects, and the construction of new hotels for tourism.[14]

PART II

SCIENCE AND TECHNOLOGY FRAMEWORK

2.1 Development Policy Framework

Prior to 1977, economic development depended very heavily on public sector investments. In the industrial sector, a number of corporations were set up, and many private industries were taken over by the Government. During this period, private sector industries were severely hit by foreign exchange restrictions that curtailed imports of raw materials, equipment and spares, and many industries were running with obsolescent machinery and at low levels of efficiency. In the plantation sub-sector, the implementation of land reform measures resulted in the redistribution of land, and in the process, a high proportion of the tea and rubber lands came to be vested in the state.

The new government that came into power in 1977 adopted a fundamentally different approach in tackling the problems of under-development. In the economic revival that the government set out to achieve, a prominent role was given to private industry. The removal of import restrictions enabled private entrepreneurs to import machinery, spares and raw materials, and so to boost capacity utilization. The removal of import restrictions also resulted in industrial goods and good items, rarely seen before, being freely available on shop shelves. Faced with competition from imported goods and the decision of the Government not to subsidise corporations that sustain losses due to inefficient operation, the public sector corporations have had to improve their efficiency and the quality of their goods. Many corporations have responded positively to this challenge and have increased production and efficiency.

The setting up of the Industrial Promotion Zones in a few selected areas was intended to bring about a rapid trans-

formation of the industrial sector by attracting foreign capital, transferring technology, providing employment, and increasing exports. In the country as a whole, the government, while attempting to improve the efficiency of corporations and other business undertakings run by the state, was averse to setting up more public corporations. Instead, the almost stagnant private sector was encouraged to expand, using both local and foreign capital. Many fiscal and other incentives were provided for the setting up of a wide range of industries such as agro-industries, fisheries, hotels and tourism, housing, textile and garment manufacture, etc. Proposals for private investments from foreign sources are examined by a Foreign Investment Advisory Committee chaired by the head of the treasury and composed of the secretaries of key ministries.[12,14]

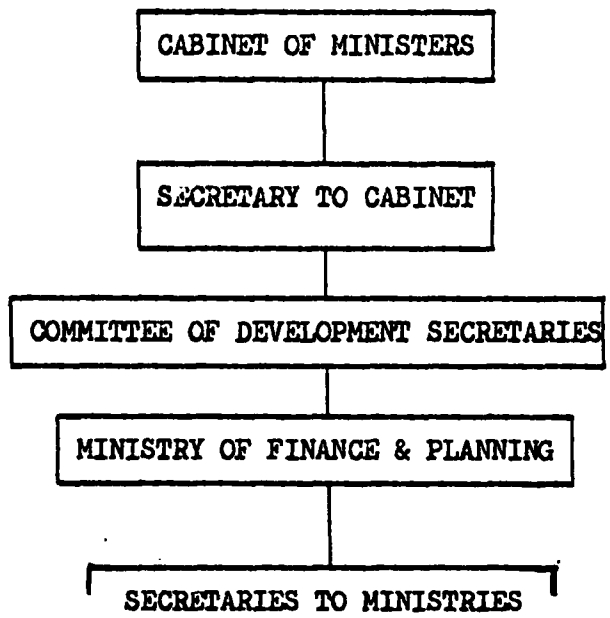
In the sphere of agriculture, paddy cultivation is carried out by private farmers. However, state intervention is necessary to sustain this sub-sector. Heavy government investments are made on irrigation schemes which provide water for rice cultivation. Fertilizers are supplied by the government at a subsidised price; extension services and seed material are provided through the Department of Agriculture; the paddy is purchased at a guaranted price and milled by the Paddy Marketing Board; and credit facilities and crop insurance are provided by a number of state institutions.

Public sector development projects like the Mahaweli scheme, housing construction projects, agriculture research and development, petroleum refining, and electricity generation are carried out by the ministries to which these functions are assigned.

The monitoring of public sector programmes is done by the Ministry of Plan Implementation which is directly under the President. For the effective coordination of programmes that affect different ministries, the government has set up a Committee of Development Secretaries. The convenor

for this Committee is the Secretary, Ministry of Finance and Planning, and the Chairman is the Secretary to the Cabinet of Ministers. The secretaries of the ministries involved in major development activities are members of this Committee. The Secretary to the Cabinet serves as Chairman of the Committee so that he could function effectively as a liaison between the secretaries to the ministries and the Cabinet. Besides attending to inter-ministerial coordination of the implementation programmes of the government, the Committee also plays a role in matters of national policy.

DEVELOPMENT POLICY FRAMEWORK



2.2 Development policy and science and technology policy

Broadly, there has been little difference in the long-term development goals of successive governments in the past 20 years or so. Concisely stated, the basic objective of these governments has been to achieve socio-economic development by providing the basic needs of the people, namely, health, education, employment, and a better quality of life. However, as would be clear from the foregoing part of this paper, the strategies adopted to achieve the goals of development have been different.

The formulation and implementation of development policy are at present undertaken by the ministries in charge of the different sectors and sub-sectors. Coordination of the different elements of development policy is carried out by the Ministry of Finance and Planning and the Committee of Development Secretaries.

In regard to science and technology, the Sri Lanka Association for the Advancement of Science, the largest professional body of scientists in Sri Lanka, had, for many years, urged successive governments to define and enunciate a national policy. The National Science Council (NSC) after its formation in 1968, lent its support to this move. Finally, in 1978, His Excellency the President of Sri Lanka, in his inaugural address to the annual sessions of the Sri Lanka Association for the Advancement of Science, made a statement which spelt out the broad guidelines for scientific and technological development in Sri Lanka.[7] Since then, the NSC has submitted proposals to the government on different aspects of implementation.

As a general rule policy matters relating to any area of science and technology are, as in the case of development policy, dealt with by the ministry concerned. In recent years, however, the National Science Council has been called upon to advise the government on many important matters related to science.

Some of the key areas of S & T and the ministries responsible for the formulation of both development and S & T policies in the respective areas are given below.

Main S & T policy areas	Ministry
Paddy, subsidiary food crops and minor export crops	Agricultural Research & Development
Tea and rubber	Plantation Industries
Coconut	Coconut Industries
Industry	Industries & Scientific Affairs
Health	Health

Electricity	Power and Energy
Fisheries	Fisheries
Forestry	Land & Land Development
Animal husbandry	Rural Industrial Development
Water services & drainage	Local Government, Housing & Construction
Technical education, higher education and research	Higher Education

When a ministry initiates a project proposal in one of its areas of activity it will do so using the technical expertise available in the appropriate institution(s) under it. If the project is a major one and it affects development policy or S & T policy it will have to be put up to the Cabinet for approval. In such cases, the Ministry of Finance and Planning and the Committee of Development Secretaries study the proposals and submit their views to the Cabinet when the project is put up for approval.

2.3 Policy making machinery for science and technology

The Ministry of Industries and Scientific Affairs has under it a number of corporations and statutory bodies among which there are six organizations dealing with major scientific activities of national importance. These are the National Science Council, the Ceylon Institute of Scientific and Industrial Research, the Industrial Development Board, the Bureau of Ceylon Standards, the Atomic Energy Authority and the National Engineering Research and Development Centre.

According to the National Science Council law, the Council is expected inter alia to advise the Minister in charge of scientific affairs on the formulation of science policy and the application of science and technology to development. Since there are many other ministries that deal with science and technology, besides the Ministry of Industries and Scientific Affairs, matters of national

policy pertaining to science and technology are not routinely referred to the NSC but are dealt with by the appropriate institutions in the ministries concerned. For example, policy matters related to technical education would be dealt with by the University Grants Commission under the Ministry of Higher Education; any proposal for the expansion of a livestock breeding programme would be put up by the Department of Animal Production and Health and the National Livestock Development Board, both under the Ministry of Rural Industrial Development; and any changes in the Mahaweli multi-purpose scheme would be a matter for the Ministry of Mahaweli Development. However, where controversial issues arise, or when more than one ministry is involved, or when a subject does not clearly fall within the functions of any one ministry, the National Science Council may be called upon to examine and report on the subject.

Some of the recent activities of the NSC in the area of science policy are the preparation of a draft paper embodying national science policy guidelines, and the preparation of reports on a number of subjects, namely, science education in rural schools, post-graduate training of scientists, salaries and leave privileges of scientists, the feasibility of obtaining electric power from the ocean thermal gradient, and the experimental rural energy centre in south Sri Lanka. In another case, the Secretary-General of the NSC served as the Convenor and Chairman of a committee examining a proposal to establish an Agricultural Research Council covering the fields of agriculture, forestry, fisheries and livestock. The NSC's most recent assignment is to report on the controversy regarding the use of atomic energy for electric power generation. The NSC, besides advising the government on matters referred to it, may, on its own, examine and report on any issues of S & T that it considers to be of national importance.

The NSC is a statutory body appointed by the Ministry of Industries and Scientific Affairs. The members of the Council function for three years except for the Secretary-General who is the executive head and an ex-officio member of the Council. Meetings of the Council are presided over by a Chairman who is appointed by the Minister from among the members. The Secretary-General is appointed for a specified period by the Minister on the recommendation of the Council.

The NSC carries out its role as a scientific advisory body to government through committees of experts. Scientists and technologists with the required expertise are selected by the Council to serve as members of these committees. The committees report to the Council.

From the foregoing, it would be seen that, although one of the functions assigned to the NSC is science and technology policy formulation, in practice it deals with such matters only in specific instances. It's reports on such specific issues will normally be submitted to the Ministry of Industries and Scientific Affairs. If the matter in question affects another ministry, the Ministry of Industries and Scientific Affairs will forward the report to that ministry direct or through the President.

Recently a proposal has been made to create a new Authority that will replace the NSC and to place it directly under the President so that its advisory role could encompass the full range of science and technology. Among the functions to be specially assigned to the Authority would be to advise the President on natural resources development and energy.

I - First level - POLICY MAKING

ORGAN	FUNCTION	LINKAGES		
		Upstream	Downstream	Major collateral linkages
Ministry of Finance and Planning	Examining and reporting on S&T development projects;preparation of the national budget	Cabinet of Ministers	-	Ministries
Committee of Development Secretaries	Interministerial coordination and liaison with the Cabinet	"	-	"

II - Second level - PROMOTION AND FINANCING

ORGANIZATION	LINKAGES	
	Upstream	Downstream
Ministries whose functions include areas of S & T	Ministry of Finance and Planning Ministry of Plan Implementation Committee of Development Secretaries	Departments, statutory boards and other state institutions

III - Third level - PERFORMANCE OF SCIENTIFIC AND TECHNOLOGICAL ACTIVITIES

ESTABLISHMENT	FUNCTION	LINKAGES	
		Upstream linkages	Other
Ceylon Institute of Scientific & Industrial Research (CISIR)	Scientific & industrial research, training, advisory and testing services	Ministry of Industries & Scientific Affairs	Board of directors, CISIR
National Engineering Research & Development Centre (NERDC)	Promotion of development and transfer of technology	- do -	Board of directors, NERDC
Bureau of Ceylon Standards (BCS)	Preparation of codes of practice and specifications, and testing of products	- do -	Board of directors, BCS
Industrial Development Board (IDB)	Development of technology in the private and public industrial sector	- do -	Board of directors, IDB
National Science Council (NSC)	Advising the government disseminating S & T information and funding research	- do -	Board of directors, NSC
Atomic Energy Authority (AEA)	Utilization of atomic energy for economic development	- do -	Board of directors, AEA
Central Agricultural Research Institute and a number of research stations	Research and development in agricultural crops - breeding, cultivation, management, marketing etc.	Ministry of Agricultural Development & Research	
Tea, Rubber and Coconut Research Institutes	Research on tea, rubber and coconut	Ministry of Plantation Industries and Ministry of Coconut Industries	Respective boards of directors
Department of Geological Survey	Geological mapping and research and development in relation to Sri Lankan mineral resources	Ministry of Industries and Scientific Affairs	

ESTABLISHMENT	FUNCTION	LINKAGES	
		Upstream linkages	Other
Forest Department	Forestry development and research	Ministry of Land & Land Development	
Fisheries Surveys and Research Division of the Ministry of Fisheries	Research and development in fisheries	Ministry of Fisheries	
Central Engineering Consultancy Bureau (CECB)	Consultancy in disigning, construction and supervision of hydro-development projects	Ministry of Mahaweli Development	Board of Directors (CECB)
State Engineering Corporation(SEC)	Engineering - consultancy and construction	Ministry of Local Government, Housing & Construction	Board of Directors (SEC)
Medical Research Institute (MRI)	Research and diagnostic work and the preparation of vaccine	Ministry of Health	
Universities (8)	Graduate and post-graduate education, research	Ministry of Higher Education	University Grants Commission
Technical Colleges (20)	Basic and middle level technical training	- do -	
Research and development sections of technical departments, boards, corporations and other state institutions e.g. Sugar Corporation, Steel Corporation, Department of Minor Export Crops, etc. (over 50)	Matters connected with research and development in the respective areas	Head of the respective departments, boards, etc.	

PART III

SCIENTIFIC AND TECHNICAL POTENTIAL

3.1 Institutional network

In Sri Lanka the institutions which perform scientific and technological activities can be broadly discussed under the following headings:

(a) S & T education and training
(b) Research and development, and associated S & T services

Scientific and technical education and training

The structure of the institutions of higher education have gone through several changes during the last decade. In January 1978, the several campuses of the then University of Sri Lanka were given university status with a large measure of autonomy. While general policy matters and financial allocations are under the newly created University Grants Commission, internal organization and academic policy planning come within the purview of the university administration. There are at present six universities and two university colleges. The seventh university is also in the process of being established.

In decentralizing and establishing new institutions for higher education, the government has given consideration to the need to spread out such organizations on a country-wide basis, partly to serve the needs of students in different regions and partly to facilitate the national programme for regional development.

Except for the University of Moratuwa in the Western province, which is basically an institution for engineering sciences, the other universities and colleges cater to a range of disciplines in the Arts and Sciences. At present medical studies are concentrated in the University of Colombo

in the Western Province, and the University of Peradeniya in the Central Province. Post-graduate degree programmes are available in almost all universities, but in the fields of agriculture and medicine, post-graduate studies and examinations are conducted by two institutes established specially for this purpose. The expected intake of students for universities and university colleges during the 1980-81 academic year is as follows:

(a)	Medical and Veterinary	- 490
(b)	Engineering	- 450
(c)	Agriculture	- 155
(d)	Natural Sciences	- 360

The establishment of an External Examinations Agency has now enabled a large number of students who fail to enter the universities to prepare for degree examinations as external candidates.

Training at professional levels leading to government approved degrees and diplomas, are provided by the Institute of Engineers Sri Lanka and the Institute of Chemistry Sri Lanka.

R & D and associated scientific and technical services

In Sri Lanka research and experimental development in the fields of science and technology are performed by a number of separate organizations. There is no apex organization to co-ordinate,control and monitor these activities. Nevertheless the existing structure has functioned reasonably well. The distribution of S & T functional areas in the state sector is given in Section 2.2 of this report.

Historically, the foundations of organised scientific research were laid in Sri Lanka during the period of the British rule - the emphasis then being on public health,

fisheries and agriculture. The establishment of a Department of National Museums in 1873, the Bacteriological Institute in 1900 and the Ceylon Agricultural Society in 1904 was a reflection of this policy.

The Bacteriological Institute was later transformed into the Medical Research Institute, and the Ceylon Agricultural Society provided the nucleus for the establishment of the Department of Agriculture.

The beginnings of industrial research can be traced back to the creation of an Industrial Research Laboratory in 1941 and the Rubber Service Laboratory in 1948. The resources of these two institutions were later transferred to the Ceylon Institute of Scientific and Industrial Research (CISIR) in 1955.

Learned societies and professional bodies have played a vital role in the development of S & T activities in the country. Founded in 1945 the Sri Lanka Association for the Advancement of Science (SLAAS) is the largest and the most representative body of scientists in the country. The Association holds an annual session to provide a forum for scientists to present and discuss the results of their original research. One of the major achievements of the SLAAS was the response of the government to its persistant call for the establishment of a National Science Council. Established by an act of parliament in 1968, the National Science Council has matured into a major institution for the promotion of S & T activities in Sri Lanka. It's main objectives and functions have been discussed in Section 2.3 of this report.

The main feature of the major R & D institutions in Sri Lanka are as follows:

The Central Agricultural Research Institute (CARI) is the main research and experimental development organ of the Department of Agriculture and is situated in Peradeniya - approximately 100 km from Colombo. The department runs several other research stations in various parts of the country,which are so located to deal with problems associated with the different agro-climatic regions of Sri Lanka.

The Department of Agriculture is headed by the Director of Agriculture, and its research aspects are handled by the Deputy Director (Research). Each of the main research stations are also headed by a deputy director.

The CARI has eight divisions each with a Head of Division, who is effectively the project leader, and several research officers. The research programmes of the Institute are generally linked to the national agricultural development programme of the Department of Agriculture. However, many of the research projects are initiated and formulated by the research officers. Research findings are disseminated through the Extension Services Division of the Department, which is itself headed by a deputy director. This division has a network of regional offices with several agricultural instructors attached to each regional office. The department is also assisted in its extension services by the Agricultural Information Division which prepares and distributes information packages to users.

Under the Department of Agriculture is also a Veterinary Research Institute which is headed by an Assistant Director. The research and extension services of this Institute are carried out by research officers and veterinary surgeons.

The growing interest and importance of the plantation sector during the first quarter of this century, resulted in the creation of separate research institutes for tea, rubber and coconut. Each of the institutes is headed by a director and deputy director (Research). The main functions of the Institutions are to study all aspects of crop husbandry with the objective of maximizing productions.

Organizational aspects of the three institutes are comparable, there being several functional divisions, each managed by a head of section and assisted by several research officers. Research programmes are generally problem oriented, but research interests of individual officers are also largely satisfied.

Each research institute is managed by a Board of Management with the Chairman functioning as a working or non-working director.

The 3 crop research institutions being statutory bodies enjoy a reasonable measure of autonomy with respect to most matters. All three institutions receive government grants in addition to cess-collections from exports of the products of the crops they serve. These institutions have their own extension services to transfer the know-how to growers. Each institution disseminates its findings through their respective quarterly journals and other bulletins.

The Medical Research Institute (MRI) established in Colombo functions basically as a service unit to the Department of Health. It has 14 medical officers, 13 research officers and 85 laboratory technicians. The institute is headed by a director and its organization is typical of a government department. Some divisions function mainly to carry out routine examinations which

invariably lead to problem-oriented research projects. Formulation and selection of research programmes is solely by individual research staff.

The Ayurvedic Research Institute established by the Government in 1962 has as its main objective to carry out research and development on the indigenous system of medicine. A part-time director functions as the chief executive of this institute. The major divisions of chemical research, drug research and literary research are without staff and hence no major progress has been reported.

The Department of Irrigation has as its main objective, the development of water resources for irrigated agriculture. The research wing of the department has 6 divisions and is headed by a deputy director. The Land Use Division has as its head a specialist scientific officer, who is assisted by soil chemists, soil surveyors, cartographers and other supporting staff. The research projects are specifically related to national programmes leading to the development of irrigated agriculture.

R & D activities in relation to the development of the industrial sector are mainly carried out by the S & T organizations of the Ministry of Industries and Scientific Affairs. The major S & T institutions in this Ministry are:

(a) The Geological Survey Department
(b) Ceylon Institute of Scientific and Industrial Research (CISIR)
(c) National Science Council (NSC)
(d) National Engineering Research and Development (NERD) Centre
(e) Atomic Energy Authority (AEA)
(f) Bureau of Ceylon Standards (BCS) and the
(g) Industrial Development Board (IDB)

The Geological Survey Department has as its main function the study and exploration of the mineral resources of the country. The Department is headed by a director, deputy director and a technical staff of 10 geologists, two chemists and a geophysicist.

Apart from normal geological surveys it has in recent years started an exploration programme on raw materials for nuclear energy. It is also engaged in the study of heavy mineral potential and copper - magnetite deposits in the North Eastern regions of Sri Lanka, and a study of the coral and dolomitic limestone deposits in the country.

The Ceylon Institute of Scientific and Industrial Research was set up to provide the industry with expertise and services for the development of industrial process, testing and quality control, it has 16 research divisions and is headed by a director who is assisted by the Deputy Director for research. There are 69 research officers and about 90 supporting staff. The Governing Board of the Institute is appointed by the Minister. A Research Planning Council composed of heads of technical sections, as well as outside specialists in science, engineering, and industry, advises the Board on all matters pertaining to planning of scientific research. Formulation of research projects is mainly by individual research officers. The findings of research are generally put out in the form of reports. A serious drawback is the lack of a technical journal for the Institute to publicize its important research findings.

The work of the National Science Council is discussed in Section 2.3 of this report. The chief executive of the Council is the Secretary-General who is assisted by the Deputy Secretary-General, an Assistant Secretary-General and seven scientific officers.

The NERD Centre has as its main function the promotion, development and commercial utilization of indigenous inventions. It supports pilot plant and development work, and provides a consultancy service on engineering and technological matters. It is managed by a board of directors, whose Chairman functions as a working director. It has eight divisions each with a head of section. The Centre selects its R & D projects of national interest from those referred to it by government institutions, and private sector organizations.

The Atomic Energy Authority (AEA) the Atomic Energy Authority was established in 1969. Its main function is to develop the necessary resources for the utilization of atomic energy for economic development. It also maintains a national radiation protection service to enforce atomic energy regulations.

The authority comprises of a working chairman and 06 members, who comprise the Board of Management, and a technical staff of scientific officers.

The Bureau of Ceylon Standards was established in 1964 with the responsibility to prepare and implement standard specifications of both industrial and consumer products. It also administers its own certification marks scheme and export inspection programmes. The Bureau is headed by a director, who is assisted by five assistant directors, 8 senior standard officers and 44 other officers serving the sections dealing with standards, testing, textile technology and statistics.

The Industrial Development Board can be considered as one of the major extension services wings of the Ministry of Industries and Scientific Affairs on matters pertaining to small and medium scale industries. It has scientists

and engineers as well as development and extension officers numbering about 50. It has an executive chairman and a general manager.

The research activities of universities are largely geared to the training of young scientists to scientific methodology. Hence the emphasis is not always linked to practical applications. The financial resources of universities for scientific research are highly inadequate, and hence the assistance of outside agencies are sought by the academic staff to sponsor research. The National Science Council has been the major organization supporting scientific research in universities. However, in recent years collaborative research projects with foreign universities supported by international funding organizations have largely met the demands of the university researchers. Within the country links established by the engineering and chemistry departments of universities with industry have had fruitful results.

The Government Analysts Department provides analytical, investigative and advisory services to other government departments and state corporations. Its services include scientific analysis and issue of reports on productions sent by courts of justice, police and local administrative bodies for administration of the criminal procedure code.

The Forest Department's research activities have not been very extensive. Research has mainly been in silviculture, entomology and timber utilization.

Sri Lanka has three botanic gardens administered by the Department of Agriculture. These three gardens are

situated in three agro-climatic regions and are supervised by the Superintendent of Gardens. Primarily established for the purpose of investigating into the flora of the country and introduction of economic crops such as tea, rubber, cocoa and cinchona, these gardens have become centres of botanical research and floricultural development. All these gardens have representative collections of tropical and temperate plants from different parts of the world. The Royal Botanic Gardens established in 1821 to receive exotic plants, enjoys world-wide fame for its wealth of tropical vegetation.

Conservation of wild life in Sri Lanka is an important aspect of state policy. The enforcement of the fauna and flora protection ordinance is the responsibility of the Department of Wild Life Conservation. A total of 6197.69 square kilometers (2,392.93 sq. miles) consisting of a little over 9 per cent of the total land area of the country has been proclaimed as protected.

The National Zoological Garden of Sri Lanka located 10 km South of Colombo is maintained by the State. It covers an extent of 21.04 hectares (52 acres) and is considered to have the best collection of fauna in Asia.

The activities on marine and inland fisheries is within the purview of the Ministry of Fisheries. The recently established research stations for fisheries have been handicapped by a shortage of research personnel. The Ministry of Fisheries is now collaborating with the Biology Departments of the universities in carrying out its research activities in inland fisheries.

The Department of National Museums run one major museum in the capital city and three other provincial museums. The Colombo museum established in 1877, consists of sections

on ethnology, anthropology, geology, entomology, zoology and botany. The research carried out by these sections are published in the official journal of the Department.

In Sri Lanka, the major components of S & T information activities are located in the network of libraries attached to R & D institutions. Majority of these libraries specialize in specific areas and cater to the persons working within these institutions. Other information centres such as the public libraries in urban areas and the libraries associated with foreign missions, also contribute significantly to the S & T information system. The university libraries have comprehensive collections, especially that of the University of Peradeniya which is legal depository.

The creation of the Sri Lanka Scientific and Technical Information Centre (SLSTIC) at the National Science Council in 1975 provided a strong base to serve as the clearing-house for S & T information activities. The Industrial Development Board with its specialized library and documentation centre, provides the Industrial Information Service (IFS) to industrialists and institutions. This is possibly the only information unit in the country which prepares and distributes packaged information in technology.

3.2 Human resources

The first extensive survey of scientific and technical personnel in the country was carried out by the National Science Council during 1977-78. The results of this survey,[18] which did not include technicians, are summarised in Table 2. A previous survey carried out in 1973 was not amenable to an analytical study and is therefore not shown in the Table. However, it was noted that the

total number of professionally and academically qualified S & T personnel had dropped from 6845 in 1973 to 6488 in 1977. This is also reflected in the national coefficient of scientists and engineers (ie. S & T personnel per 10,000 population), which fell from 5.2 in 1973 to 4.6 in 1977. One reason attributed to this trend is the emigration of professionals to developed countries.

When the total stock of S & T personnel is considered, approximately 20 per cent are found to be in the Agricultural Sector, while industries account for 22 per cent.

Excluding secondary school teachers which number 2076 the break-down of the remaining S & T personnel according to major fields is as follows:

Natural Science	- 1095
Engineering & Technology	- 2420
Medical Science	- 23
Agricultural Science	- 869
Social Science	- 5

This indicates that while 55 per cent were engaged in the engineering field only 19 per cent were in the field of agriculture. It was also observed that 0.6 per cent of the S & T personnel were females, with the male to female ratio at 14 : 1.

Although the total number of scientific and technical personnel engaged in R & D during the survey period numbered 969, when computed on the basis of Full Time Equivalent (FTE) it was only 604. Of the latter 35.3 per cent were on natural sciences, 32.9 per cent on engineering and technology, 29.3 per cent on agricultural sciences and 2.5 per cent on medical science.

Table 2 - Scientific and Technological Manpower

Country: Sri Lanka

Year	Population (millions)	Scientists & Engineers							Technicians	
		Total stock (thousands)	of which working in R & D **						Total stock (thousands)	of which working ** in R & D (in units)
			Total number (HUNDREDS)	Breakdown by field of educational training (hundreds)						
				Natural Sciences	Engineering & technology	Agricultural Sciences	Medical Sciences	Social Sciences		
1966	11.439	N.A.	-	-	-	-	-	-	N.A.	-
1973	-	6.845	-	-	-	-	-	-	-	-
1977 - 1978	13.942 - 14.184	6.488	6.04	2.13	1.99	1.77	0.15	0.02	-	-
1979	14.490	N.A.	-	-	-	-	-	-	-	-
1985*										
1990*										

* Projected

** In full time equivalent (FTE).

N.A. Not available

The survey also revealed that horizontal job mobility was low, with 46 per cent of the respondents being in their first job, 34 per cent in their second job and 14 per cent in their third job. This was probably a reflection of the non-availability of employment opportunities during the period prior to the survey. More than 50 per cent of the respondents considered that their university and other training were essential for their jobs, while 45 per cent thought that this training was moderately useful. Only one per cent of the respondents said that this training served no useful purpose. In relation to job satisfaction 24 per cent claimed that they were extremely satisfied, while 65 per cent appeared to be moderately satisfied and 11 per cent dissatisfied.

A study carried out in 1976 had shown that the migration of professionally skilled personnel to Britain from 1968 - 1974 had been 1013, of which medical personnel numbered 430 and engineers 260.[6] This same survey estimated the "net social" gain to Britain from the migration of engineers and doctors to be nearly 56 million pounds sterling during that period.

A Cabinet appointed Committee in 1974 to study and make recommendations on this problem of brain drain, found that over a 38-month period from May 1971 to June 1974, 1705 persons had left the country for employment abroad.[16] This amounted to 18 per cent of the total number of professional and technical personnel available in the country in 1971. This committee identified two main causes for migration, viz, the lack of opportunity for the development of professional competence, and dissatisfaction with working conditions, particularly the remuneration levels.

Some of the principal measures adopted then by Sri Lanka to restrict migration were :

(a) the Compulsory Public Service Act of 1961 which required professionals to serve the country for 5 years after graduation,

(b) the Passport (Regulations) and Exit Permit Act of 1971 which required any one leaving the country for employment to enter into an agreement to remit a portion of the earnings, and

(c) the requirement to enter into service bonds, where persons sent abroad for training or further education were required to serve the government for a specific period after their return.

The Cabinet Committee in its deliberations considered the negative effects of these measures and recommended among others the following measures,

i. to review the Compulsory Service Act of 1971,

ii. to reduce the period of obligatory service for study/training abroad to a maximum of 10 years, with the option to encash a part or the entire period of obligatory service,

iii. to allow professionals in the public service to take upto 5 years of no-pay leave during their careers to take up assignments abroad,

iv. to provide relief measures on income tax for earnings in foreign currency,

v. to abolish the requirement of foreign exchange remittances, included in the Passport and Exit Permit Act.

In spite of these far reaching recommendation of the Cabinet Committee, the migratory trend of professionals increased, possibly more due to economic reasons rather than for the relaxation of restrictive measures.

In the latter part of the decade the migratory pattern changed on account of the new openings in the African and West Asian countries. While most of those proceeding to developed countries had plans to take up permanent residence abroad, those leaving for developing countries had entered into fixed - term contracts which made their stay temporary. In terms of skills too the migratory pattern differed, there being a larger proportion of doctors emigrating to developed countries as against a higher proportion of accountants and engineers moving out to developing countries.[8]

During the four-year period from 1976 to 1979 the total flow of labour to the Middle Eastern countries has been computed at 23,674 of which the professionals numbered 428 or 1.8 per cent of the total. The middle levels made up 7.3 per cent, while the balance consisted of skilled and unskilled labour.[4]

This serious depletion in the stock of economically active technical, skilled and semi-skilled personnel has been viewed with grave concern, especially on account of the governments commitments to the massive development programme comprising of the irrigation cum hydro-power-accelerated Mahaweli Project, the Investment Promotion Zone, the Urban Development and Housing Construction Programme.

Against this grim outlook is the prospect of new employment opportunities, which is however observed with caution. On the other hand the phenomenal increase in foreign currency transfers by migrant labour, has been viewed with relief.

The Central Bank of Ceylon records that credit transfers had increased from Rs.190 million in 1977, to Rs. 610 million in 1978 and Rs.935 million in 1979. The net transfer for these three years had however, been Rs.122 million, Rs. 342 million and Rs.754 million respectively. It has also been estimated that approximately 70 per cent of these inward remittances were received from Sri Lankans employed in the Middle Eastern countries.

3.3 Financial resources

Budgetary allocation of funds for scientific research in the state sector is generally based on estimated expenditure. However, in the case of the plantation research institutes, financial support is available from two sources. A cess collection on the export value of products of the crop served by the Institute, and an outright grant from the government. These institutes also draw incomes from the sale of the produce of their estates. However, technical services and know-how are provided free of charge to the users.

Financial allocation for government departments and other statutory bodies performing R & D functions are through the annual votes which are included in the estimates of the respective Ministries. Hence these estimates are generally subject to scrutiny and approval of the ministry concerned as well as the Ministry of Finance and Planning.

As pointed out elsewhere, financial resources available for university researchers through normal university channels, are grossly inadequate. However, the needs of university researchers now largely met by organizations such as the National Science Council, and inter-

Table 3 - R & D expenditure

Country : Sri Lanka

Currency: Rupee

Table 3A: Breakdown by source and sector of performance

Year : 1975 Unit (e.g. thousands, millions, crores, etc.) thousands

Source / Sector of performance	National		Foreign	Total
	Government funds	Other (Productive & special funds)*		
Productive	17023	19947	-	36970
Higher Education	1382	-	-	1382
General service	5735	1010	-	6745
Total	24140	20957	1010	45097

* Specify which major type of funds (e.g. private funds, productive enterprise funds, special funds, foundations, etc...)

Table 3B : Trends

Year	Population (millions)	GNP (in : millions)**	Total R & D (in : thousands)**	Exchange rate 1 US $=rupee
1966	11.439		13,009	4.7619
1970	12.516	13,444	21,517	5.9124
1975	13.496	26,364	45,097	7.0833
1979	14.490	52,147	-	-
1985*			-	
1990*			-	

* Projected

** Specify which currency unit (e.g. thousands, millions, etc.)

national bodies such as the International Foundation for Science (IFS), Swedish Agency for Research Cooperation in Developing Countries (SAREC), and the World Health Organization (WHO).

The R & D expenditure during the year 1975 is shown in Table 3A in relation to source of funds and sector of performance.[9] Out of a total expenditure of Rupees 45.097 million, 53.5 per cent has come from government funds while the balance comprise of funds from productive enterprise and special funds.

In relation to expenditure 82 per cent has gone to the productive sector, 15 per cent to the general service sector and only 3 per cent to the higher education sector- (Table 3B).

In terms of current rupee value, the expenditure on R & D had increased from rupees 13 million in 1966 to rupees 45.1 million in 1975, showing a mean annual growth rate of 15.8 per cent. But in terms of the constant rupee, the increase has been from rupees 13.2 million in 1966 to rupees 22.9 in 1975. During this same period the per capita expenditure on R & D had increased 3 fold from rupees 1.14 in 1966 to rupees 3.32 in 1975.

During the period 1966 - 75, Agricultural Science continued to receive the major component of research funding, although the percentage of the national expenditure on agriculture did not increase proportionately.

The National R & D coefficient which is the total expenditure on R & D expressed as a percentage of the Gross National Product increased from 0.169 in 1966 to 0.206 (at current factor cost) in 1975. It was estimated that

the extra expenditure on R & D required in 1975 to reach the 1.0 per cent level for the National R & D Co-efficient (at current factor cost) was rupees 174.25 million.

3.4 Surveying of the S & T potential

The main institution in Sri Lanka which surveys and monitors the scientific and technical effort in the country is the National Science Council. The Council's work in this field is guided by a statutory working committee on Science Policy Research.

The last survey on S & T manpower was carried out during 1977-78.[18] This was in fact the most comprehensive survey ever carried out in this field in Sri Lanka. A tested questionnaire, coded for computer analysis was used in this survey. The issue of the questionnaire was followed by personal visits by the survey staff, to ensure a high response. Once the completed questionnaire was received, the material was edited, and coded data were extracted for computer analysis. This survey covered all sectors of the economy, but excluded the secondary schools and colleges. The classification and terminology used were based on UNESCO recommendations.

The first comprehensive survey on R & D expenditure was carried out by the National Science Council during 1976 - 1977 and covered the 10-year period from 1966-1975.[9] This survey was again carried out by staff members of the Council visiting each institution separately to extract, collect and collate available data. The classification and terminology used were as recommended by UNESCO.

The survey results are generally published by the Council, and these also form the inputs for the UNESCO surveys.

The Sri Lanka Scientific and Technical Information Centre (SLSTIC) to the National Science Council surveys, monitors and analyses the S & T information needs of the country. It co-ordinates the activities of the S & T libraries and documentation centres in Sri Lanka, and through this network keeps track of all S & T publications and documents produced in the country.

The Social Science Research Centre to the National Science Council monitors the activities in Social Sciences. It has recently completed a survey of social scientists in the country.

Apart from the National Science Council, the Department of Census and Statistics, the Ministry of Plan Implementation and the Central Bank of Sri Lanka, survey and monitor technical manpower requirements through sample surveys, computations, etc.

PART IV

POLICY ISSUES IN SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT

4.1 Major developments

Two major developments in the late 1960's and early 1970's which enhanced and catalysed scientific activity in the country were,

(a) the creation of the National Science Council by the government in response to the agitation of the scientific community, and

(b) the decision of the Ministry in charge of scientific affairs to sponsor R & D on its own, independent of such activities in other ministries.

In 1975, this Ministry's research sponsorship policy was delegated to the National Science Council, which facilitated administration of awards through liberalized management procedures. Although the Council's contribution to the Gross National Expenditure on R & D was small, its impact was substantial in the higher education sector, where opportunities opened up for young scientists to obtain research-based post-graduate degrees. This programme of the National Science Council thus not only increased the research activities in the country, but also helped to increase the S & T capacity of the country. Further, the establishment of a major information unit (SLSTIC) in the National Science Council in 1975, to service the needs of researchers, and providing country-wide coordination of S & T information activities, a new thrust was made into the provision of S & T services.

In recent years the most meaningful step taken by the State is the promulgation of the National Science and Technology Policy by the Executive Head of State in December, 1978. Since then, the National Science Council as well as the Sri Lanka Association for the Advancement of Science have been preparing plans for the implementation of the policy issues.

In the field of higher education major strides were made with the creation of a Ministry of Higher Education. The decentralization of university education and increasing the number of universities and university colleges to step-up the output of medical, science and engineering graduates, was a major move to increase the S & T capacity of the country. The manpower training programmes of the Post-graduate Institute of Agriculture and the Post-graduate Institute of Medicine were directed to increase the pool of specialists in these fields.

In the Government sector the formation of the Sri Lanka Engineering Service in 1971 and the Sri Lanka Scientific Service in 1976 have been significant steps to improve the working conditions of the State sector scientists and technologists. This also brought the scientists and technologists on par with the decision-making administrative hierachy in the country.

More recently, with the hope of curtailing or reversing the migratory trends of academically qualified personnel, the government stepped in to provide many incentives which included special allowances, right of private consultancy practice, abolition of the Compulsory Service Act and permission to import motor vehicles for private use. The impact of these concessions are yet to be evaluated.

4.2 Achievements and problems

It is recognized that the biggest single factor responsible for retarding the development of the S & T capacity in Sri Lanka is the migration of academically and technically qualified personnel. Sri Lanka is not the only country faced with this problem. In fact most of the developing countries are plagued by this malaise.

A brief review of the situation in Sri Lanka is given in Section 3.2 of this report. The positive and negative effects of brain drain is being widely discussed and at present the main thrust has been to devise means of increasing the trained manpower resources of the country.

The Government of Sri Lanka has recognized the gravity of the problem and attempted to reverse the process through what may be called an open policy supported by a range of incentives. However, the attraction of very high wages payable in developed and newly rich countries, continue to lure away the professionel and skilled sectors of the economy.

The present Government is also strongly committed to the guarantee of fundamental freedoms, and has accordingly reassured that it will not attempt to impose any restrictive measures to counter brain drain. In the alternative, it has, as one solution decided to increase the educational and training facilities in the country with the ultimate goal of maintaining the equilibrium despite depletion through migration. To this end it has increased considerably the intake of students to universities. Two of the new universities, have been given facilities to commence medical faculties. At the secondary school level increased teacher training courses coupled with the equiping of laboratories in the rural sectors, an effort is being made to increase the S & T bases in the country.

The scope of training at the middle and lower levels has been considerably widened during the past two years with the vitalizing of the National Apprenticeship Board. At present it offers training facilities in -

(a) 123 trades for the category of craft apprenticeship,
(b) 10 fields for technician level apprentices,
(c) 11 fields for special engineering apprentices, and
(d) 11 fields for under-graduate engineering apprentices.

In the fields of information and documentation import restrictions prior to 1977 adversely affected the purchase and acquisition of scientific literature. Although financial allocations for the acquisition of scientific literature had increased over the years, these were not proportional to the increase in prices of these items; and the widening gap naturally resulted in a sharp drop in the inflow of literature.

However, during the past few years due to liberalization of imports, many items of equipment such as calculators, photo-copiers and even computers became freely available. The popularity of these, and specially of photo-copiers for information dissemination, is an indication of the new in-roads on the development of S & T services in the country.

One of the major constraints in the application of science and technology for development in the past is that the wealth of scientific expertise available in the country has not been fully utilized in the decision making process. However, the declaration of a National Science and Technology Policy by the present government in 1978, has given much hope to a change of attitude. In fact some aspects in the implementation of this Policy has already received the consideration of the government. Many matters on science policy are also now referred to the National Science Council for its advice and recommendations. More recently State approval has been

received for the creation of an Institute of Theoretical Studies which will be placed directly under the Head of State. There is thus a new awakening on the need to develop a strong S & T base in the country to promote development.

4.3 Objectives and priorities

The policy objectives which have been deduced and formulated through the experiences of the past, are very precisely stated in the seven-point National Science and Technology Policy promulgated by His Excellency the President of the Republic of Sri Lanka in December 1978.[7] The main facets for the development and use of scientific and technological capabilities, were stated as follows by His Excellency:

"What then are the fields in which scientists and technologists can help the Government and, vice versa, Government help them ? I will adopt fully the following objectives as the National Science And Technology Policy of Sri Lanka.

1. To use as an integral part of the developmental strategy of country and to involve scientists in the formulation of policy and in decision-making at the highest levels.

2. To foster scientific activity in all its aspects and in its widest possible scope, and to maintain a vigorous drive towards self-reliance in national scientific and technological capability.

3. To provide equal and adequate opportunities for all to acquire a basic education in science.

4. To ensure that our institutions of education and research will produce scientists and technologists of the highest calibre.

5. To provide our scientists and technologists with good working conditions, adequate remuneration, due recognition for their efforts and access to scientific knowledge and activity in other parts of the world.

6. To make available as widely as possible within the country, the fruits of scientific and technological activity.

7. To cultivate among our people, an appreciation of the value of science and scientific method as an indispensable part of a modern society."

The Statement is a clear indication of the government's appreciation of the role of science and technology in achieving the development objectives of the country, and the aspirations of its people.

4.4 Scientific and technological cooperation

The need for S & T cooperation, at the national, regional and international level is fully recognized by the government. However, collaborative and cooperative efforts in S & T at the national level have been slow to start. At present the main cooperation programmes have been between the universities and the industrial sector. Inter-institutional collaborative programme are basically related to problem-oriented R & D projects.

At the regional level many programmes have been initiated, of which one is the bilateral agreement on cooperation in S & T between the governments of Sri Lanka and India. Under this agreement counterpart institutions in the two countries are linked on joint programmes which involve exchange of information, exchange of technical personnel for training, transfer of know-how, joint R & D programmes etc.

Apart from such bilateral agreements, Sri Lanka is also

a collaborative partner on several projects supported by UNESCO, WHO, FAO,UNEP and other international organizations such as the Commonwealth Science Council (CSC), the Association on Science Cooperation in Asia (ASCA), International Council of Scientific Unions (ICSU) and its Committee on Science and Technology in Developing Countries (COSTED). The inter-country collaborative programmes of Commonwealth Science Council have received the strong support of the government mainly for the following reasons: It is one of the few international organizations, which relies on the expertise available within the country, to propose, formulate and implement R & D programmes. CSC programmes are also popular since it helps to link-up through a network, scientists and technologists directly involved in the implementation of collaborative programmes.

At the international level, the inter-regional programmes of the various UN Agencies and other international organizations have been supported by Sri Lanka.

Apart from the above, at a less formal level the role of foreign funding agencies such as SAREC and IFS, in funding R & D, and in assisting inter-university collaborative projects, have received the approval of the government.

PART V

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