ECONOMIC REVIEW

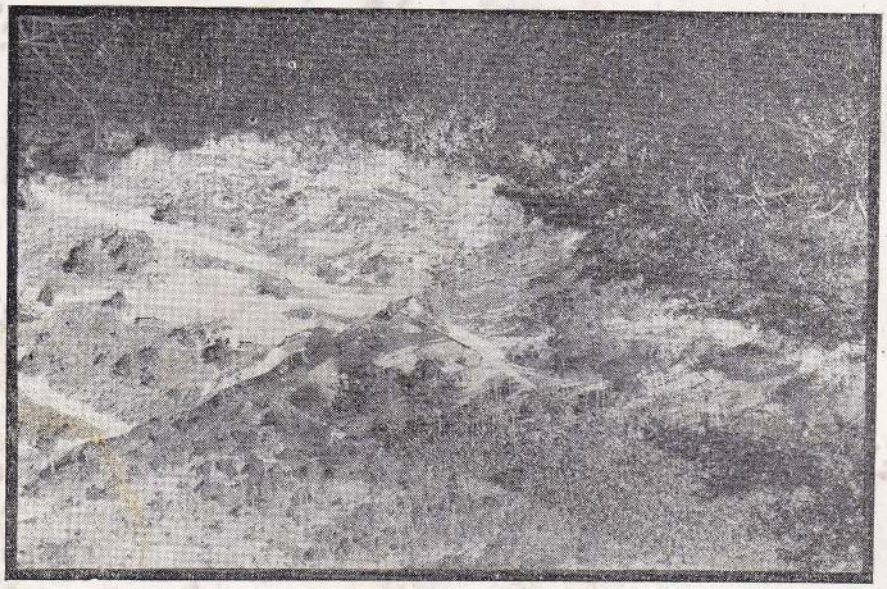
Nov/Dec 1978

THE MAHAWELI PROJECT

A People's Bank Publication

The Building of a Dam and Hydro-power Project on the Mahaweli

The two points across the river where the dam will come up.



The area in Teldeniya that will be submerged.

Pile driving in progress at the site of the Victoria reservoir.

The focus of the Accelerated Mahaweli Development Programme will be the construction of five major reservoirs, which are due to provide both for the regulation of a greater part of the water resources of the Mahaweli Ganga and the base for the development of the balance irrigable areas in this project. Perhaps the most significant of these five, at this stage is the Victoria reservoir where work is now in progress.

This reservoir will submerge the entire Teldeniya town and adjacent villages; while a new town is being located at Digana to provide for various government buildings and offices, including schools, hospitals etc. which would be submerged. The township will also provide land to affected families who wish to be resettled in the area itself and new buildings are now being put up to house personnel associated with constructional activities. When they leave, these buildings will be made available to those families who were dehoused.

The dam for this reservoir is located between a confluence of the Hulu Ganga and the Mahaweli Ganga and the Victoria Falls. The Dam being constructed is a Double Arch one as smaller quantities of excavation and concrete could be used, resulting in lower capital costs and a shorter construction programme. The tunnel intake will be situated on the Right Bank of the Mahaweli Ganga. Two intakes will be provided, both with six metre diameter tunnels. Both intakes will be constructed in the initial stage together with a short length of the second tunnel for later additional power development.

The tunnel will be approximately 5,200 metres long and concrete-lined. The power station will be located on the Right Bank of the Mahaweli, and will consist initially of three sets of 60 MW each. At a later stage, when power is required for peaking purposes, the second tunnel could be constructed in order that an additional three sets of 60 MW each may be installed. The Victoria Reservoir will have a storage capacity of 500 million cubic metres (approximately 400,000 acre feet).

The Mahaweli settlers look on in hope.

(*Picture*: Courtesy Mass Media Division, Mahaweli Development Board)

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FEATURES

SPECIAL REPORT

COLUMNS

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.

THE ECONOMIC REVIEW is a community service project of the People's Bank. Its contents, however, are the result of editorial considerations only and do not necessarily reflect Bank policies or the official viewpoint. Signed feature articles also are the personal views of the authors and do not represent the institutions to which they are attached. Similar contributions as well as comments and viewpoints are welcome.

THE ECONOMIC REVIEW is published monthly and is available both on subscription and on direct sale.

Readers Please Note

We have combined two issues (November and December 1978) in order to catch up on our backlog in printing which had arisen through circumstances beyond our control. We assure all our subscribers, however, that the validity of their annual subscriptions would extend over 12 separate issues.

NEXT ISSUE

- The Child and Development—an International Year for some children!
- Sri Lanka's economy—How it fared in 1978.
- Myths and Realities of Education in Sri Lanka.

COVER

The Mahaweli Ganga Multipurpose Development Project—an impression by Ar[illegible] Upasena Goonewardena.

Diary of Events

Oct.

1 A minimum price of 70 cts. per pound for the purchase, by factories, of green leaf tea from small holders was introduced.

Postal rates on overseas aerogrammes went up from Rs. 1.25 to Rs. 1.75.

3 Import duties were modified on a wide range of commodities and some new sub-categories introduced.

4 The National Water Supply and Drainage Board has signed an agreement with the Engineering Science Incorporate Consultants of US for a sewerage project, covering areas from the north of Colombo to the south of Galle, stated a press report. The approximate total cost of the first phase of the Project will be about Rs. 58.45 million with a foreign component of Rs. 27.15 million. Phase II is estimated to cost Rs. 204.20 million with a foreign component of Rs. 40.88 million.

12 The US dollar and pound sterling hit record lows for the second consecutive day on the West German currency market; the US Dollar traded at 1.8585 marks and the pound at 3.719.

13 The President of the World Bank Mr. Robert S. McNamara, on a brief official visit to Sri Lanka, observed some of the projects in the Mahaweli Ganga Scheme.

18 A Master Plan for a Rs. 151.5 million Sri Lanka - West German fertiliser project was presented to the Minister of Agriculture Development and Research by the Ambassador for the Federal Republic of Germany in Colombo.

20 The Ceylon Electricity Board announced that, effective from December 1, 1978, tariffs and charges for the supply of electricity will be increased.

The State Mortgage and Investment Bank, with an initial capital of Rs. 200 million, was established for the granting of loans for the purchase of land, buildings and construction of houses.

31 A Government Gazette Extraordinary announced a series of concessions to enterprises operating in Sri Lanka under the Greater Colombo Economic Commission Law No. 4 of 1978, including tax holidays and exemptions covering royalties, dividends, import and export duties and harbour dues, and the exchange control regulations pertaining to foreign transactions and remittances.

Nov.

1 The National Milk Board raised its purchasing and selling prices of milk; the increase in purchasing prices will range from 38 cts. to 1.29 per litre; while the increase in retail consumer prices of liquid milk will range from 32 cts. to 88 cts. per litre.

Annual licence duties on private and hiring cars, applicable for the licensing year 1979, were increased from 50 to 300 percent, depending on the first date of registration and the gross weight of the vehicle.

The rates for local telephone calls were revised with effect from November 1, 1978. For instance, local calls were up 20 percent from 25 cts. to 30 cts. The new rates are estimated to yield an additional revenue of Rs. 15 million in 1979.

6 Tea exporting and importing countries met in Brussels to begin negotiations to draft a new international tea agreement.

8 The Government raised restrictions placed on a number of items including sugar, fertiliser and corrugated sheets. These items had hitherto been the reserve of the government sector. Other items transferred to the free market, where the private sector too could trade in, included safety matches; plywood (for export packing); and engines and cylinder blocks for motor vehicles.

Sri Lanka will purchase kerosene oil and diesel from China and, according to official sources, oil may replace rice in the rice-rubber trade pact between the two countries, states a report in the *Asian Wall Street Journal*.

10 The inland postal rates were revised with effect from November 10, 1978. For instance, letters (per ounce) were up from 15 cts. to 25 cts. and postcards from 10 cts. to 15 cts. The new rates are expected to yield an additional revenue of Rs. 31 million for the year 1979.

14 Heavy cuts in Iran's crude oil exports, affected by strikes since September, can have a major impact on world crude oil supplies, according to forecasts in the London *Financial Times*.

15 The Government's second Budget, which covers the fiscal year 1979, was presented in Parliament by the Minister of Finance and Planning. Revenue has been estimated at Rs. 11,429 million and recurrent expenditure at Rs. 10,534 million with an estimated current account surplus of Rs. 895 million.

16 Sri Lanka exported 8,700 metric tonnes of rice consigned to the West African Republic of Mali valued at Rs. 27.8 million.

24 A U.N. report on shipping in India, Pakistan and Bangladesh has revealed that the multinational conference lines serving these countries are indulging in outright exploitation of its users. It has commented on freight hikes, the mode of negotiations adopted for such hikes, and the service conditions including the age of the vessels employed on these routes, according to a report in the Bombay *Economic Times*.

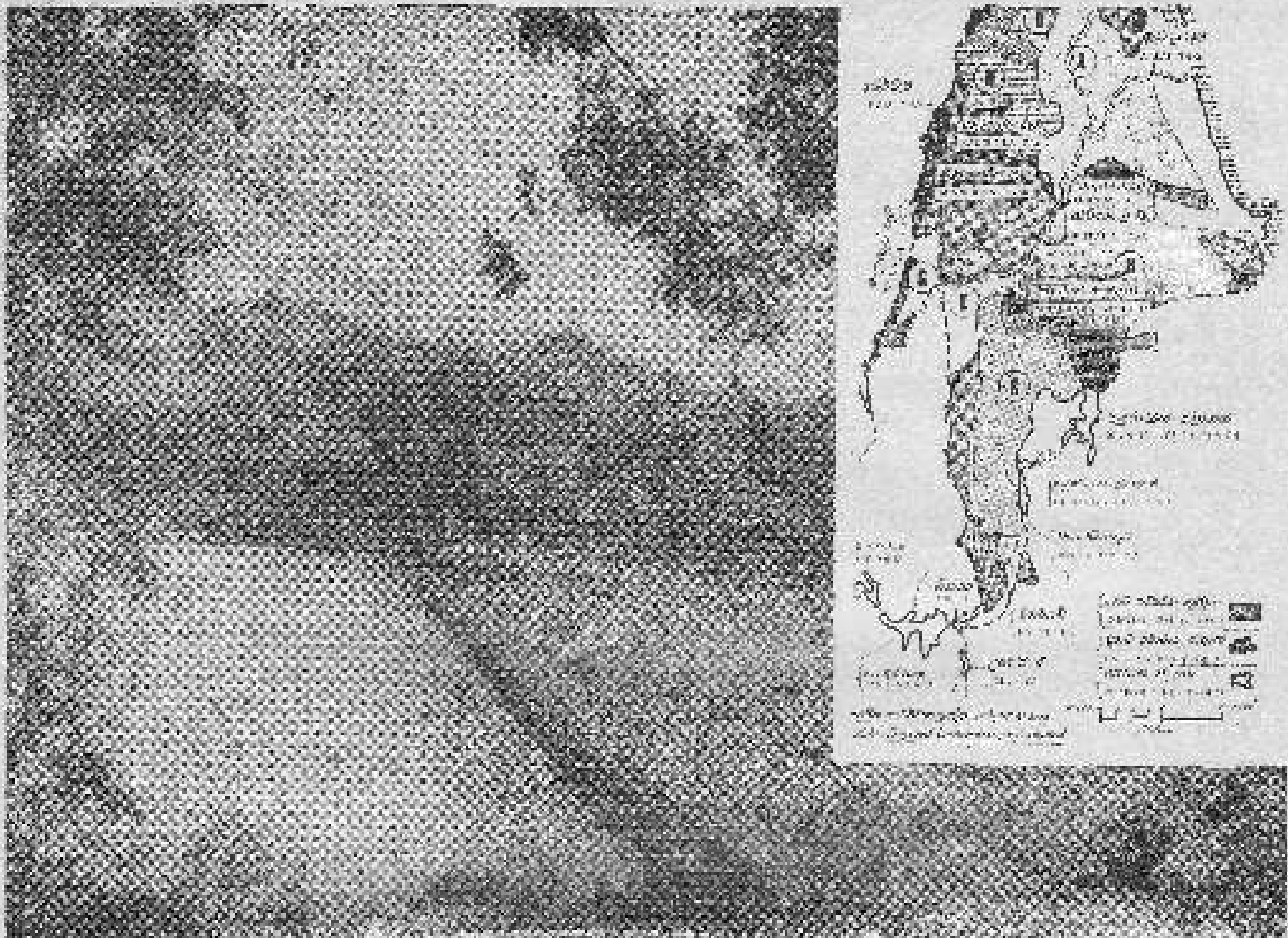
25 France is devising a strategy to deal with the economic competitive threat posed by rapidly industrialising countries including many in Asia, reports the *Asian Wall Street Journal*. The measures include the stepping up of export efforts and creation of big trading firms to oversee foreign trade developments.

28 China has departed from another long standing policy by indicating its willingness to allow direct foreign investment in the country provided China holds 51 percent of the equity in any joint venture, states an *Asian Wall Street Journal* report.

Parliament enacted the Sri Lanka Credit Export Law which enables the setting up of a Corporation to offer insurance cover against commercial or non-commercial risks associated with the non-receipt or delayed receipt of export proceeds. This Corporation is also empowered to offer direct financial assistance for promotion of exports and re-finance those institutions granting credit for such purposes.

The Consumer Protection Law passed by Parliament provides for the regulation of internal trade, for the protection of the consumer and for the establishment of fair trade practices. This law repealed the Licensing of Traders Act No. 62 of 1961 and amended the National Price Commission Law No. 42 of 1975.

30 The U.S. trade deficit widened by more than $ 400 m. in October to $ 2.15 bn. disappointing for the time being the Carter Administration's hopes of improvement of one of the fundamental factors that have contributed to the dollars weakness, states a report in the London *Financial Times*.



The Minipe anicut pictured here will once again play a historic role in the diversion of the Mahaweli waters. The ancient Minipe anicut was first built by King Dhatusena around 459 A.D. This anicut helped, however, in the diversion of the waters essentially to the left bank of the Mahaweli Ganga. Now the new reservoir at Victoria will regulate the flow of Mahaweli waters from the source upto the Minipe anicut and from this point the waters will also be distributed to the right bank of the Mahaweli and taken right upto the Ulhitiya Oya reservoir and then on to the Maduru Oya, irrigating the areas coming under Systems C and B in the present plan (see map inset). (Pic. L. Samarawickrama)

The Mahaweli Project

The Mahaweli Ganga Multi-purpose Development Project is the largest development project to be undertaken in Sri Lanka. With the Government's proposal to telescope the earlier time-table of 30 years to 6 years, the project now becomes far more important and more complex. Therefore, its success depends on a clear discussion of the issues involved, issues that could get clouded under the cross-fire of both those who uncritically adulate official pronouncements and those who unthinkingly attack any official pronouncement. This issue on the Mahaweli Project is aimed at presenting the basic data on the project as well as some of the major viewpoints expressed on the subject which are arranged in the following sequence. First we record official data and pronouncements on the project with a view to giving a total picture of the anticipated programme. We must, however, caution that official figures even at the highest level have kept changing and sometimes been contradictory. The fact is that there are still many unknown factors on which the progress of the project is dependent. The figures we give are what we have judged to be the currently accepted figures.

The subsequent pages present discussions on the project and include existing research studies and other essays commenting on some of the underlying themes in the project. It needs to be emphasised, however, that our treatment is not exhaustive and that our selection has been guided as much by the availability of studies and considered comments as by the importance of the various subjects.

A major part of the Mahaweli Ganga Multipurpose Development Project is due to be completed by 1983. By this date a total of 1.5 million people are expected to be gainfully settled on the lands coming under this Development Project; five major dams and related works are due to be built; and 90,000 acres of existing land and 320,000 acres of new land should receive water for cultivation, while five major new reservoirs should generate 381 megawatts of power and 1,291 gwh of energy—all at a total estimated cost of Rs. 11,000 million. The magnitude of this undertaking can be visualised from some of the figures in the Master Plan of the project.

The Mahaweli Ganga basin covers a total area of about 4,000 sq. miles of the country's 25,000 sq. miles and has been estimated to discharge nearly 6.4 million acre-feet of water into the sea. This volume of water represents approximately one fifth of the total discharge of all the Island's rivers into the sea. The Master Plan prepared during the period 1965-1968 proposed to utilise 4.3 million ac. ft. of the flow of the Mahaweli Ganga in an area of 900,000 acres in the dry zone of the country, while 0.9 million ac. ft. of water available in these areas were also to be utilised.

The Mahaweli Development MasterPlan which is a multi-purpose scheme in its basic concept was originally intended not merely to irrigate 900,000 acres of land but also develop 15 multi-purpose projects, 4 trans-basin diversion canals and several power stations with a total capacity of 500 megawatts, and settle over half a million people who would earn their livelihood in the area—all at a total cost of Rs. 27,000 million (in 1977 prices). According to original plans the project was divided into three phases, each including several projects for step-way implementation over a 30 year period. But the 30 years over which the work on this project was to be spread out will be considerably reduced and the entire plan telescoped by the Goverment in order to complete an Accelerated Programme within the next five years.

The need for acceleration

The significance of the task ahead becomes even more challenging when we realise that large parts of this project are covered by completely undeveloped lands and so in certain respects starts from nothing and yet aims at building a comprehensive society that will be of considerable importance for the economy as a whole and the entire nation. Furthermore, all that comprises the Accelerated Programme is to be achieved within the span of less than a generation.

The question of why an Accelerated Mahaweli Programme was answered thus by the Minister in charge of the subject at a recent seminar: "It is because of the employment potential, high propensity to create hydro-electric power, high propensity to irrigate thousands and thousands of acres of land and in the interim period to provide employment in various fields to large numbers of unemployed youth that we decided that we cannot wait to implement the Mahaweli Ganga Scheme over the 30-year period". Other reasons that contributed to this decision were the realization that the population of this country was bound to increase to about 23 million by the turn of the century and the fact that small countries like Sri Lanka were victims of international whirlwinds of inflation, he said.

The more pressing problems facing the economy by 1977 had resulted in the urgent need for the country to harness all possible resources, within the shortest possible time. By the end of 1977 nearly 40 percent of the country's import bill was being spent on food imports which has proved to be a heavy burden on Sri Lanka's balance of payments situation and the entire development process. The country has been depending very heavily on agricultural products from abroad such as rice, wheat, flour, sugar, milk and milk products —and the total range of foreign exchange resources for the import of these commodities annually has amounted to nearly Rs. 3,000 million. Equally pressing has been the problem of unemployment which by the end of 1977 was estimated to have exceeded 20 percent of the normal workforce. The total number unemployed has exceeded one million and the annual addition to the workforce is estimated to be in the region of 150,000. Solutions to these problems had to be found urgently.

Authorities have also warned that Sri Lanka's resources of hydropower and energy estimated as available and usable could be sufficient to meet power and energy demands for only another 12 to 15 years. In this context, it was pointed out, in its entirety now the development of the Mahaweli could play a very important role because the power and energy obtainable from the Mahaweli accounts for about 60 percent of the total that could be developed in Sri Lanka. Moreover, the requirements of new and existing industries and the country's rural electrification programme and overall rural development would need more intensive development of power and energy sources, particularly as only 10 percent of our rural areas are electrified at present.

The raipdly rising rate of inflation also made it clear that the further back the completion of the project was taken the higher would be the ultimate costs. One estimate revealed that the delay in implementation resulted in a doubling of costs of construction over an eight-year period. The Master Plan which was estimated, by the authorities, to cost Rs. 6,000 million in 1968 will cost over Rs. 25,000 million at current costs or over 400 percent more, mainly because of the steep inflation after 1973. It seem evident therefore, that the implementation of this project could not be spread out over a full 30 years, which would in fact have taken us beyond the turn of this century.

With the completion of the first project comprising the Polgolla Diversion Complex, which includes a diversion dam, a tunnel five miles long and power station of 40 mw. as well as the Bowatenna Complex with a reservoir, and a tunnel five miles long; 130,000 acres of existing lands and 90,000 acres of new land are being developed. This leaves a balance of 116,000 acres of existing lands and 564,000 acres of new lands still to be developed, from the 900,000 acres provided for in the Master Plan.

After a review of the financial resources needed and the technical

personnel and construction capacities available it was decided to confine development in the first stage of five to six years, to the construction of five major reservoirs with a total installed capacity of about 100 megawatts and the development of 320,000 acres of new lands. This scheme will also benefit about 36,000 acres of existing lands for double cropping. The construction of these five major reservoirs will provide for the regulation of a major part of the water resources of the Mahaweli Ganga and is expected to provide the base for the development of the balance irrigable area in the succeeding five year period.

Enormity of the task

The Accelerated Programme thus envisages the development of a total of 340,000 acres of land in the Mahaweli Basin below Mahiyangana and in the Maduru Oya basin. In addition, a further extent of 56,000 acres are now being developed in the Kalawewa basin. This development will require 335 miles of main canal, 2,560 miles of distributary canals and 200 miles of road. This will mean that in the course of these developments the infrastructure facilities will require the setting up of about 330 townships, 1,900 village centres and 8,000 hamlets. In order to supply regulated water for irrigated cultivation five major reservoirs, viz: Kotmale Reservoir at Kotmale, Victoria Reservoir at Veldeniya, Randenigala Reservoir near Rantembe, Uhilya-Batkinda Reservoir at Uhilya and Maduru Oya Reservoir near Pimburattewa are to be constructed.

The construction of the reservoirs are to be undertaken under aid schemes, and the finances, according to the Chairman of the Mahaweli Development Board, will be "extended by friendly countries on bilateral aid with the concurrence and blessings of the World Bank".

While these reservoirs will be constructed by foreign agencies using machine-intensive methods in order to achieve the targets set for completion, much of the downstream works of providing the irrigation and infrastructure facilities such as roads, canals and buildings are to be undertaken by local groups using more labour-intensive methods designed to provide more employment to appropriate skills. The hope of the Mahaweli Development authorities is to create an opportunity for every strata of society to participate in the development of this project.

The original plan of development of the Mahaweli Basin and adjacent areas proposed to utilize 4.7 million ac. ft. of the flow of the Mahaweli Ganga for agricultural development to an area of 900,000 acres, as indicated in the map above. In view of the large extent of land involved and the large investment cost of the proposals, the overall plan was divided into three phases, each phase consisting of several projects with the lands to be benefited being grouped under 14 irrigation systems designated A to M.

The implementation period was to be spread out over 30 years. Now the 30-year plan has been telescoped into a 6 year plan where it is intended to build the basic infrastructure of the original plan. As a consequence some of the areas in the original plan are left out as indicated in the map below.

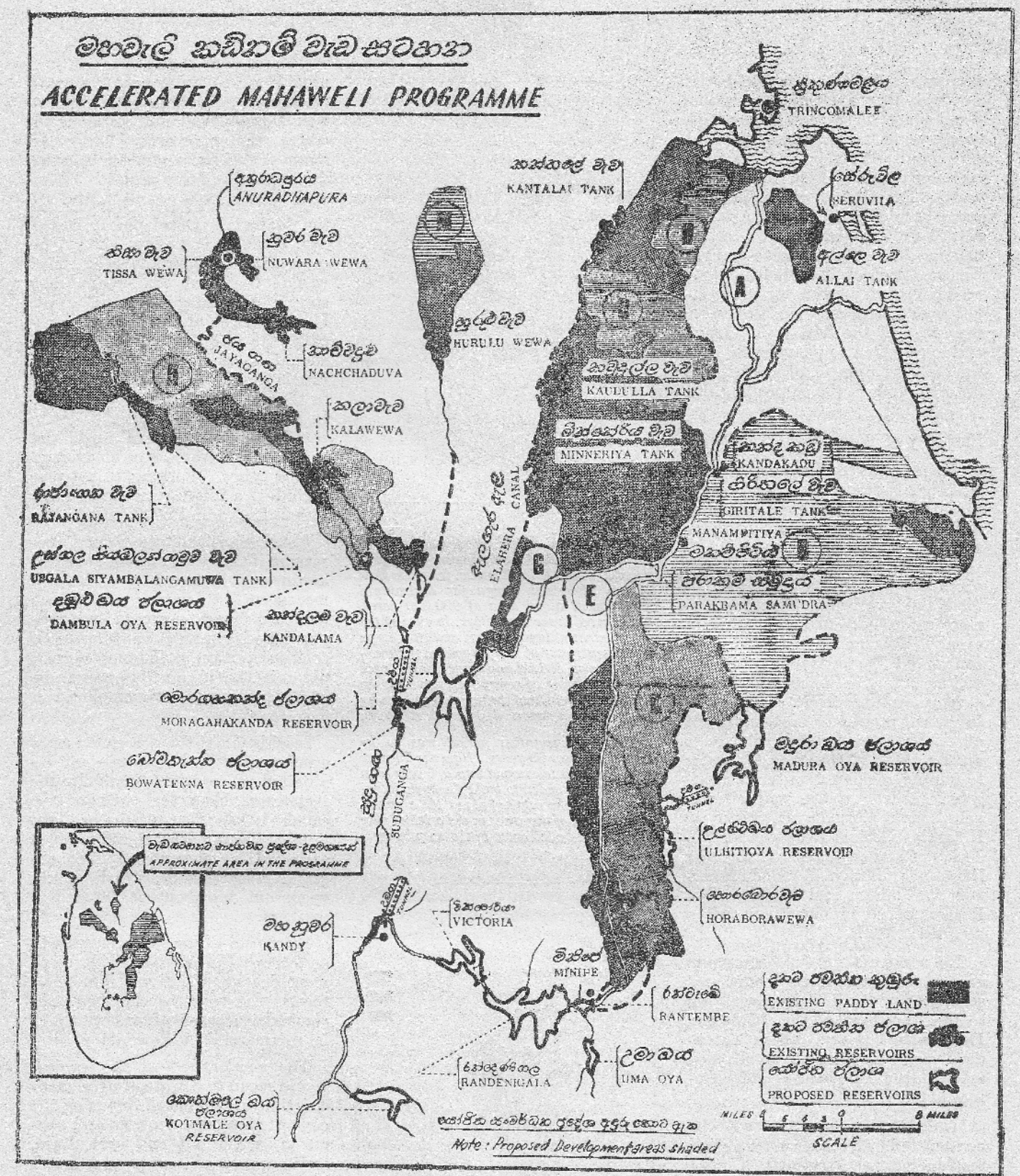
In the view of the Chairman of the Mahaweli Development Board Mr. D. D. G. P. Laduwahetty "the quantities of work to be executed within the next six years may stagger the imagination of most. If one were to analyse it systematically, the first item of construction should be the roads and the main canals which will help to gain access to the presently undeveloped areas. In forming the 225 miles of main canals, the quantity of earth and rock to be excavated is on an average 40,000 cubes. Working in a 4-year period of a 250 day year, the daily output has to be 10,000 cubes.

In order to facilitate normal operations if the earth, which varies in hardness, is loosened by mechanical means such as rippers, the output has been found to exceed one cube per man-day, except in the case of rock excavation. The employment potential therefore will appear to be 10,000 persons directly employed in this operation".

In addition, to this a proportionate number of skilled workmen will be required to construct the hydraulic structures, blast the rock in the canals, transport materials etc. This number has not been found to have exceeded 30 percent of those engaged in earthwork, which should work out to about 3,000 skilled workers.

By virtue of its sheer magnitude and scope the Mahaweli Development Scheme will therefore need to receive the most searching and all-round development efforts that could be contrived in the country.

The acceleration of the project would mean that instead of sequencing the programme of financing the construction, maintenance and operation, settlement and agriculture, hydro power generation, administration, community development and infrastructural services, the government has decided that the major aspects should be carried out simultaneously. This implies that a very large concentration of resources such as men, money and materials need



System C — The main river from Minipe to Kalinga forms the left boundary of this system. The proposed Minipe right bank channel and the proposed Ulhitiya reservoir form the right boundary. The Mahaweli waters will irrigate 73,000 acres in this system through the Minipe Right Bank channel and the Ulhitiya reservoir.

System B — The right and left bank channels of the Maduru Oya Project form two boundaries of this system. The main river from Kalinga to Kandekadu forms the third boundary. The right bank of the Kandekadu channels forms the fourth boundary. Land to be irrigated is 125,000 acres.

System A — This area is the actual delta of the Mahaweli. The left and right bank channels of the Kandekadu anicut will form the boundaries of this system. 100,000 acres will be irrigated in System A.

System D — The ancient Elahera channel going up from Minneriya to Kantalai forms one boundary. Another boundary is from the Parakrama Samudra to Kandekadu and beyond that to the Kandekadu left bank channel. 130,000 acres will be irrigated in System D.

to be made available over the short-period of six years to meet the requirements of this project and a vast complex of activities. But the timing of finances and resources availability are still not fully within the control of the authorities, and therefore attempts to rationalise the sequencing of these projects within any of the broad areas do not seem to be possible. Many problems are bound to rise in this context, relative to the accelerated project and probably more so to the nature of the settlement and colonization within this project. It appears therefore that an important aspect of the planning and implementation of this project is to leave room for continuous adjustments. At the same time a consistent monitoring and review is vital as apart from the constructional activities and the tangible, undesirable social outcome would have to be corrected before they became institutionalised.

IRRIGATION AND DRAINAGE SYSTEMS

The Accelerated Programme is expected to supply water to a vast region along the course of the river, mainly to the Mahaweli plain stretching from Mahiyangana to Trincomalee. This region is described in the Mahaweli Development Plan as the Systems, A, B, C and D and is indicated on the map on page 6. Several big irrigation engineering works comprising five major dams and related works will supply the Mahaweli water to the 320,000 acres of new land and 90,000 acres of existing paddy land coming within this region and a major portion of the estimated Rs. 11 billion required for the accelerated project will be utilized for equipment and materials for this purpose. Irrigation and the drainage systems are fundamental to the project although there are a wider range of objectives.

The "Master Plan" for the development of the resources of the Mahaweli Ganga Basin was formulated with the following criteria in view :

(1) Utilising all the available water resources of the Mahaweli Basin for irrigation and hydro-power production;

(2) Utilising all available land resources within the basin for irrigation development;

(3) Trans-basin diversion of excess available waters of the Mahaweli Basin to the adjacent basin for irrigation;

(4) Utilising the water resources of the adjacent river basins to supplement the diverted flow from the Mahaweli Basin to maximise irrigation development in those basins.

The Director of Irrigation, Mr. A. Maheswaran argues that the UNDP/FAO team estimated in their report in 1968 the mean annual yield of the Mahaweli Ganga at the lowest point of diversion at Kandekadu, to be 5,400,000 acre feet. They pointed out that by the construction of reservoirs and diversion structures it would be possible to obtain a regulated flow of 4,300,000 acre feet. The intermediate catchments as well as return-flows in the service area would in addition contribute about 1,300,000 acre feet, making a total water availability of 5,600,000 acre feet per annum.

The design of an adequate network of irrigation and drainage canals for such a large extent of land causes many problems. The irrigation systems, which are already serving an extent of 246,000 acres of land now under cultivation, have to be incorporated in the new network of channels.

Discussing the irrigation aspects of the Mahaweli Ganga Development, in a recent paper, the Director of Irrigation drew attention to the various factors that would need attention in order to provide efficient water drainage and distribution systems. Here he stated, that, the climatic and soil conditions in Sri Lanka are favourable for the cultivation of a variety of crops under irrigation. Upto recent times, paddy was the sole crop grown under irrigation. Sugarcane cultivation on a plantation scale was introduced in the 1968-1969 period at Kantalai and Gal Oya irrigation systems. Cultivation of subsidiary food crops like onions, chillies, etc. were practised in the well-irrigation schemes in the North of Ceylon for a long time and later introduced in "lift" irrigation schemes in other parts of the country. Experience, gained so far, has shown that it is possible to grow a series of crops, almost throughout the year, in most parts of the dry zone.

The soils in the Mahaweli project area can generally be classified, according to their drainage characteristics, into three general classes; namely well drained, moderately drained and poorly drained. The first two classes are generally known as "upland soils" while the third class, which occurs in the low parts of the valleys is called "lowland soils".

The well-drained soils are well suited for the cultivation of "dry" food crops. Paddy cultivation can also be done but large quantities of water will be required. It is generally accepted that paddy will be cultivated on these well-drained soils during the Maha season under "non-puddled" conditions.

The moderately-drained soils can be utilised for paddy in the Maha season and other upland crops in the Yala season. As continuous puddling can alter the texture of these soils, even here, it has been recommended that puddling should not be resorted to.

The poorly drained clayey soils are ideally suited for paddy cultivation in the traditional manner. Even here, it would be possible to grow high value upland crops during the Yala season if adequate surface drainage is provided.

In addition to paddy the other crops contemplated are cotton, soya beans, varieties of pulses, vegetables and groundnut. The crops to be grown in any season will further be determined by the national demand, market conditions and the capacity of the farmer to grow any particular variety of crop.

The water requirement for a crop will vary with the season, type of crop, soil characteristics and finally on the application and efficiency of the farmer. The gross water duty for a crop of paddy has been found to vary from about 3 acre feet to about 8 acre feet. The duty for other crops have been of the order of 3 to 4 acre feet. Methods for determining the irrigation potential of this Project and canal capacities have been worked out. For instance, the canal capacities are determined by the water needed by crops that have the heaviest demand in times of peak water requirements. This is because of the fact that the farmer should be able to switch his crop from one to

the other depending on market forces. As paddy has the maximum demand for water, all canals are designed to permit paddy cultivation.

Among the commonest methods by which irrigation water can be applied to the farms are flood irrigation, infiltration (furrow); sprinkler irrigation; and trickle or drip irrigation. In order to economise on the use of water and also on the cost of a canal system, a rotational system of irrigation is being planned by the authorities. The smallest channel, called the field channel will carry a constant discharge of one cusec. Each such field channel will irrigate about 40 to 50 acres. Irrigation issues will be to two farms at a time. When the required quantity of water has been delivered to the two farms, the farm outlets will be closed and the next two farms will be irrigated in rotation until all the farms under the field channel receive their supplies. The distributary channel will be designed to serve all the field channels (under it) at the same time. The main channel will have a constant supply, during any particular period, in order to be able to supply all distributary channels. During low irrigation demands the supply along the main channels would either be stored in strategically placed service reservoirs or in the alternative the supply could be reduced.

In implementing the irrigation proceduros outlined above the Director of Irrigation has cautioned that several factors would have to be closely watched. Proper land preparation will ensure an efficient use of water. Therefore, the land preparation techniques adopted and the resultant variations in water demand will have to be kept under constant surveillance. Further, the cropping patterns adopted by the farmer are a cause of concern. A reluctance on the part of the farmer to grow crops other than paddy has been noticed. If paddy is grown in all areas, for both seasons, it would not be possible to meet the demand for water adequately in all years, according to the Director of Irrigation. Also, the water table could rise at times to dangerous levels. A continuous monitoring of the water table will therefore be necessary so that adequate drainage systems could be provided.

Farm water management therefore, means not only the issue of water; there is also the soil coming in and then the plant. Thus, in fact, there are three disciplines involved: engineering, soil studies and control, and plant growing and nurture. Typical of the entire Mahaweli Project itself, water management will need to have an inter-disciplinary approach.

EQUIPMENT AND MATERIALS

This programme of massive irrigation, hydro-power, agricultural and infrastructural development will require an investment estimated at Rs. 11 billion, the major portion of which is due to be spent on equipment and materials. The extent of these requirements are described by the Chief Engineer, (Hydro-power) of the Central Engineering Consultancy Bureau, Mr. G. G. Jayawardane and he lists the following as the major projects which are to be given priority in the Accelerated Development Programme.

1. Maduru Oya Dam, Irrigation and Power Tunnel, Power Station and Link Tunnel;
2. New Minipe anicut, Right Bank Transbasin Canal and Ulhitiya Reservoir;
3. Kandakadu Anicut;
4. Victoria Dam, Power Tunnel and Power Station;
5. Randenigala Dam and Power Station;
6. Kotmale Dam, Power Tunnel and Power Station;
7. Moragahakanda Dam and Power Station and
8. Irrigation facilities and settlement in areas A, B, C and D.

Most of these works are expected to be completed within a period of five years; but as they all are classified as major projects requiring a construction period ranging from three to six years, the equipment and material requirements for the projects will run concurrently.

Several engineering works, both big and small, will be carried out before the Mahaweli waters are supplied to the 410,000 acres coming within the Accelerated Programme areas, where about 140,000 new settler-families will get two and a half acres of irrigated paddy land each. Adequate precautions would therefore have to be taken to ensure that better techniques of water distribution and on-farm irrigation and water management are observed. The preliminary work on the projects will consist of surveys and geological and material investigations for engineering design and the provisions of access roads, camps, and construction power required for the major construction works. With the present available data the preliminary works for the projects are approximately estimated as follows:

Major roads	..	100 miles
Minor roads	..	35 miles
Permanent quarters		175,000 sq. ft.
Camps	...	200,000 sq. ft.
H. T. Power lines	..	50 miles
L. T. Power lines	..	30 miles
Telephone lines	...	55 miles

Most or these works are expected to be executed during the next two years, and carried out by the State Corporations and the private contractors. The works will be distributed in the various project areas.

The equipment requirements for the preliminary works will be bulldozers, motorgraders, metal crushers, concrete mixers, road rollers, farm tractors and trailers, lorries and light equipment including spare tools. It is anticipated that these equipment will be available with the liberalised import scheme.

The material requirements for the preliminary works will be factory products such as cement, reinforcement, bitumen, blasting powder, drill steels, petroleum products, light steel sections together with the numerous fittings and materials that go into building construction and locally available materials such as crushed metal aggregate, sand, timber, bricks, blockwork and tiles, etc. Electricity distribution will require aluminium conductors, insulators, hardware and transmission posts of timber, concrete and steel.

The construction of the preliminary works and the supply of materials will be carried out mainly by local contractors. The Engineering Bureau maintains that considerable savings on materials could be effected by using prestressed concrete items and exploited timber from development areas. Due to the very nature of the works, its distribution in the project areas and the short mobilisation periods required by local contractors, shortages of equipment and materials that will delay

the construction of the preliminary works is not anticipated.

The main and branch channels, and the distribution system will form the irrigation system while land development will require clearing of land, land preparation and settlement. Settlement will also involve the provision of basic social infrastructure facilities like community centres, schools, medical institutions, post offices, police stations and roads, water service and communication facilities.

The equipment and material requirements are expected to be similar to those of the preliminary works except that the magnitude of the requirements will be much larger. The work will be distributed over the development areas and the construction period would be extended upto five years. The construction works

A CRITIQUE

A recent critique of the Mahaweli Project, particularly the Master Plan has been put out as a booklet by a former public servant, Gamini Iriyagolle, who had the responsibility for negotiations with an IBRD Mission in 1969 on the agricultural development aspects of the Mahaweli. Iriyagolle's tract contains several deficiencies with the flow of arguments sometimes, fragmented and the presentation lacking coherence and clarity. However, in this booklet certain strong features emerge which require serious examination. The thrust of his argument and some relevant extracts are presented below:

In Iriyagolle's view the Master Plan is only an outline (i.e. preliminary) set of proposals and a decision to implement this "outline" must await the necessary studies and not vice versa. According to him "nobody was or still is in a position to know what has to be done or the economic, social and political implications, or the costs or benefits". Many of the assumptions in the Master Plan, he maintains are incorrect, but most disturbing he says appears to be based on this set of proposals. His conclusion is that "far from constructing dams, bridges, canals and houses now, the government should first wish with dust with those advisers who put it on the disastrous path in the first instance . . . and are misleading the principal decision-makers".

In his publication he quotes a report submitted in November 1978, by the Dutch consultants NEDECO, which warns that "if such an undertaking (as the Mahaweli Programme) is not properly planned in all its details on the basis of lessons learned from past mistakes, a disastrous situation may arise". He also attempts to disprove the possibilities, as envisaged in the Master Plan, that a net area of 900,000 acres spread over 40 percent of the land area in the country, could be irrigated by the Mahaweli waters. He maintains that the effect of withdrawal of large amounts of flow from the Mahaweli and its tributaries on the ecology of the basins of those rivers has also to be studied.

He adds: "If the arguments against the large-scale irrigation of the dry zone and withdrawal of flow in the Mahaweli and tributaries are sound, the project in its present form must be abandoned. The alternative would be to have several medium-scale projects, better water management and use of ground water". He points out, for instance, that the assumptions of the UNDP/FAO study of the irrigation requirements of the various crops are incorrect. "The requirements assumed are absurdly low . . it can be proved beyond doubt that the irrigation duties assumed for the proposed cropping patterns on new lands are too low". He goes on to argue, with detailed figures which he provides, that the total extent of new land that could be irrigated and developed would be 334,100 acres and not 654,000 acres as "envisaged" in the Master Plan and still proclaimed in all pronouncements of the subject. His view is that the maximum that ultimately could be irrigated in existing and new lands will be a total of 600,100 acres only and not 900,000 as believed or made out to be. He also indicates that the general assumption has been that all water available would be used for irrigation of crops and that the requirements for domestic water supply and the various services including industry in the newly developed areas have been ignored.

An IBRD mission report submitted in March 1978, which also strikes a cautionary note and comments on the likely implications of the Mahaweli Project is thus quoted in his conclusion by Iriyagolle ". . . . if careful planning is not done, other parts of the economy would be starved of resources, and the flow of benefits from Mahaweli would be insufficient to justify the heavy investment or to service the debt that would be incurred. Before major construction work begins on the new projects, there is a lot of feasibility and detailed engineering work to be done once irrigation water supplies become available, the complete command area cannot be supplied nor will commensurate increases in output be realized, unless a series of further agricultural policy actions is taken . . ."

". . . The Government will also need to ensure that it does not pre-empt resources that could be much more productively used elsewhere. There are, for instance, numerous minor irrigation tanks in the dry zone which, with modest investment, could contribute substantially to output in the medium term. These smaller schemes have much lower unit costs (Rs. 7,000/- to 10,000/- per acre as against Rs. 25,000/- to 30,000/- for Mahaweli), a relatively low import content (15% as against 40% for Mahaweli) and much greater labour intensity".

"Government also needs to be aware of a number of concerns that relate to an ambitious project of this kind. If the employment potential of the project is one of its primary attractions, immediate attention will need to be given to the choice of techniques. A tight implementation schedule would greatly reduce the flexibility of the Mahaweli Board in the choice of labour-intensive techniques . . . Government must also guard against inadequate technical investigations or superficial leading to non-optimal project selection designs, cost overruns, and poor construction standards. Construction costs could be inflated by a much greater dependence on imported inputs . . . technical resources will be spread thinly over so many projects that tending to cause delays across the board and significantly postponing realization of benefits."

"Water management is by far the most challenging obstacle to output increases. Given the impracticability of volumetric pricing in most irrigation schemes, the simplest way to enforce efficiency in water use is through physical rationing. This is likely to be popular with beneficiaries at the top end who tend to be politically powerful vis-a-vis the field staff of the Irrigation Department and who are culturally used to practically unlimited supplies. Further there are few safeguards against tampering with the water distribution system . . . It is not uncommon to see an irrigation scheme completed less than a decade ago put forward as a candidate for major rehabilitation . . ."

and the supply of materials will be carried out largely by local contractors and organisations. It is probable, that most of the equipment required for jungle clearing, excavation and transport would be obtained under foreign loans and grants.

The main construction works consist of the construction of the headworks such as dams, spillways, main canals, tunnels and power-houses. Quantities of major items of work in the various projects as estimated at the present state of development of designs by the Central Engineering Consultancy Bureau is summarised in the table on page 10.

Large quantities of cement, reinforcement and building materials

QUANTITIES OF MAJOR ITEMS OF WORK IN HEADWORKS

Item of Work	*Maduru Oya Project*	*Victoria Project*	*Randenigala Project*	*Kotmale Project*	*Moragahakanda Project*
Earth Excavation (cu. yd.)	700,000	173,000	383,000	417,000	1,030,000
Rock Excavation (cu. yd.)	240,000	475,000	160,000	1,285,500	698,000
Earth Fill .. (cu. yd.)	5,258,000	29,000	75,000	2,853,000	1,120,000
Rock Fill — (cu. yd.)	350,700	8,000	74,000	6,190,000	975,000
Concrete .. (cu. yd.)	102,250	617,000	1,220,000	191,000	552,000
Cement .. .. (ton)	24,500	103,000	164,000	30,000	91,500
Steel (ton)	850	2,300	1,800	8,000	730

will be required for the major works and several corporations and factories will have to plan production of the additional requirements for this purpose to ensure no shortages. The harvesting and processing of the large volumes of metal aggregate, sand and material required for the graded zones in dams will be critical activities in the construction of the headworks. It is on proper material investigation, selection and appropriate equipment, realistic planning and efficient organisation of the works however, that will depend a successful execution of these programmes.

Even to service the personnel engaged on the various preliminary works, main construction works and land development, an infrastructure will have to be established to provide food, clothing, housing, consumer goods, transport, schooling, health facilities and entertainment. These services are expected to be provided by government departments, corporations, local contractors and individuals. The equipment requirements will be mainly transport equipment and light commercial equipment.

The main construction equipment and other equipment to be installed in the permanent works is expected to be financed by foreign loans and grants. While the main equipment will be imported there will be opportunities for the local firms to fabricate and manufacture the medium and small size equipment required for the various projects. Opportunities will also exist for the local contractors to supply large quantities of local materials required on construction works.

A great deal of planning and coordination, with the corporations and factories producing cement, reinforcement and other building materials to ensure the production of materials required by the projects in addition to the island's normal requirements, will become necessary as these projects get underway.

There are several other aspects, apart from the irrigation and construction aspect, which play an important role in the Mahaweli Project. There are the aspects of agricultural development, human settlements, infrastructure facilities skilled manpower requirements, finances and environmental considerations.

AGRICULTURE

Several specialised studies have been carried out in recent years which show that a great variety of crops can be grown in the Mahaweli Development area, though paddy cultivation will be the most important. The Agronomist, Mahaweli Development Board Mr. N. Vignarajah maintains, in a recent paper on the subject, that "rice will continue to be the dominant crop" and the settlers will take up to rice cultivation readily. This will be due to the big demand for the produce, and be cause of the settler's familiarity with the culture of the crop. Also, the supporting services for rice production, storage and marketing are already well-developed.

It is expected that the per capital consumption of rice will increase mainly due to the reduction in both imports and consumption of wheat flour. Thus there should be no qualms about overproduction. However, rice could be exported if we have a surplus. It is not difficult to breed varieties suitable for export."

He warns, however, that adequate measures must be taken to ensure that rice is grown in appropriate soils so that water would be economically used, production of other crops is not adversely affected and the problems of salinity, alkalinity and poor drainage do not mar the overall productivity of the land.

The choice of crops and estimates of the extents of land that will be brought under these crops have been regarded as of crucial importance. These two aspects are being determined mainly by the demand for the produce from these crops to meet local needs. The Mahaweli Board's Agronomist lists the following seven factors which have been considered in choosing crops.

1. Economic consideration, mainly-national demand, import substitution and export potential;
2. Agronomic factors such as soils, drainage, status of soils and water consumption;
3. Climatic factors, particularly rainfall regime;
4. Response to intensive cultivation and ability to provide high returns;
5. Adaptability by farmers;
6. Insect pests and diseases and
7. Nutritional and social factors.

Tentative estimates of production and acreages of major crops that could be accommodated in the scheme to meet projected demand in 1995 are given in the following table:

Crop	*Production (103 m. tons)*	*Acreage (103 m. acres)*
1. Paddy	747	511
2. Sugar	289	116
3. Pulses	55	121
4. Cotton	46	75
5. Chillies	nil	nil
6. Onions	nil	nil

Source : W. H. K. Kuijpers, Economist, NEDECO.

Among the other major crops selected for cultivation, as indicated in the above table, are pulses such as cowpea and greengram, vegetables both traditional Dry Zone and Up-country variety; sugarcane; chillie and onions; ground nuts; fruit crops such as citrus, banana and papaw; soya beans; sesame (gingelly) and tobacco. The emphasis to be paid to the various crops will depend on the popularity of each. Factors such as a greater demand or higher

prices or increased production through new varieties could result in greater increases in production; while a fall in demand or lower prices or pest attacks to crop could lead to a reduction in acreage and production. Many agro-industries based on these crops have also been identified.

Subsidiary food crops

There is still a wide gap however, between the stage of planning and final achievement and it is generally recognised that the main reason for this is, with the exception of rice, that there are gaps in the supporting services in the sphere of agriculture in this country. Research and extension services would need to be reorganised to cater to the new priorities while proper marketing facilities will also be crucial for the farmers in this area. It is apparent that in order to ensure that every farmer can get the best results on his land, earn a good income for his family round the year and also increase national agricultural output, he will have to be provided with all his requirements. Credit facilities, seed, fertilizers, pesticides, additional labour, buffaloes and machinery (such as two-wheeled tractors) will have to be available on a much larger scale and reach the farmer more efficiently than ever before.

Numerous other problems have been listed as regards agriculture in the Mahaweli area. There is, for instance, the strong tendency for farmers to grow some rice irrespective of the season and other considerations, since they had to give up their rice ration books on receiving an allotment of land. Also they generally lack experience and aptitude in growing other field crops. Furthermore, if such a farmer's plot happens to be in the upper levels then it would flood-irrigate and this could cause serious problems to the cultivation of crops such as chillies at lower levels.

A survey carried out by the University in three blocks of the Mahaweli area showed that although theoretically 113 in a sample of 218 people should have cultivated subsidiary food crops, approximately 86 per cent had instead cultivated paddy. He points out that this can have tremendous implications for water management and is going to be a fairly big problem. The reasons, he added why farmers were reluctant to cultivate subsidiary food crops in these areas were fairly obvious, particularly because paddy is far easier to cultivate but more important if a farmer cultivates subsidiary food crops the marketing system has to be very efficient, and the present system was not.

There was also the problem of protection which would have to be considered very carefully. Farmers felt that no one was going to steal their paddy crops, even if their fields were located a mile away from their homesteads. On the other hand, subsidiary food crops would have to be protected which means farmers would have to maintain two households. This problem also has implications for the new settlement planning scheme.

An interesting example regarding problems of marketing was quoted by a scientist at a recent seminar where he related how good Kentucky wonder beans which fetched about Rs. 1/50 per pound in the Colombo market, could not be sold for even 35 cents in the project areas. Two reasons for this situation were that no proper marketing system was available and the existing road and transport systems were far from adequate. Consequently good prices are not paid and farmers are reluctant to grow these crops as the choice of crops depended on what they wanted to grow and how much it paid. Studies have also shown that pricing policies affect cultivation in many other ways. For instance, import policy sometimes results in the lowering of the price of locally produced subsidiary food crops, while the guaranteed price of rice has continued to serve as an attraction for rice cultivation.

Water management

Poor water management has also been a regular problem among our farmers. It generally results in the excess use of water and makes it difficult for the cultivation of other crops. In some of the Mahaweli areas already settled it has been found that the lack of proper land levelling and an efficient irrigation distribution system for control and issue of water were resulting in poor water management. Studies have found that in the major settlement projects in the Dry Zone the actual annual use of water per acre is nearly twice that of the estimated requirements. The most serious constraint to proper water management in Sri Lanka was the inefficient use of water in our traditional agricultural practices. These studies have also found that each settlement project area was not fully utilized as planned, and also there was a lack of a real involvement of settlers and settlement organisations.

SETTLEMENT

This raises the wider issue of the need for an efficient human settlement plan and adjustments in the Project's plan to encourage settlers to reach the highest possible levels of productivity and at the same time enable them to reap the maximum benefits. It is now agreed that settlement plans that will be adopted in the project area would be quite different from those of the old colonisation schemes. In the old settlement schemes such as Gal Oya and Walawe the layout of settlers had not provided for the growth of social life in well-knit communities. In these schemes families were either placed on a 'ribbon' type development arrangement along the irrigation channel or they were scattered within the command area. Settlers lived on highland allotments arranged in long rows as it were, making social contact difficult. Also access to their paddy allotments was not easy. This type of ribbon development has only added to the cost of providing various services such as water supply, electricity, transport and road maintenance, in addition to slowing down the growth of community life and mutual self-help.

The Mahaweli scheme has now adopted the principle of "cluster" settlements which means a grouping together of well-planned hamlets into a village. Several villages in turn will be linked to a township. About 100 settlers and their families will live in each hamlet on half acre allotments of highland. Their paddy lands too are expected to be within easy reach. Four or five hamlets of 100 families each will form a village or cluster. In areas where there are existing hamlets, they are expected to be incorporated

into the 'cluster' with the necessary adjustments on both sides.

According to plans, every hamlet will have a primary school, a co-operative and other minor civic amenities. The village centre, will be within three or four miles of any homestead. Here more advanced facilities will be made available, such as a junior secondary school, a branch co-operative, a public health centre and a sub-post office. It is expected that the settlers will, by their own efforts, set up other facilities such as a shopping centre, a weekly fair (pola) and a community centre with a playground and reading rooms. At the township, there will be a secondary school, a primary co-operative rural bank, central dispensary and maternity home, post office, farmers training centre, paddy store and so on. Locations will be set apart for shopping centres, cinemas, markets, medical institutions etc. so that these facilities can be provided at a gradual pace through private enterprise or public investment. These town centres are expected to have facilities to serve each group of 2,500 to 3,000 families or approximately 15,000 to 20,000 persons.

Problem areas

Settlement planning in colonization schemes has always been a very sensitive issue and in this Project particularly, where colonization on a scale never before attempted is due to take place, effective settlement planning will have to be a vital consideration. The Mahaweli Board maintains that the settlement policy planned has been evolved after detailed study and while it has been enriched by past experience in colonization, care has been taken to avoid the mistakes of the past.

Many problems, however, have cropped up in the areas already settled. For instance, in the System H area where there are many existing settlements such as purana villages, lands under the Lands Development Ordinance and the old colonisation schemes it has not been an easy task to resettle the farmers already living in the area and to integrate the new settlers being brought in from outside. Modifications are going on where necessary to fit plans to these realities in the settlement areas.

Some fundamental problems have been raised by Dr. Percy Silva of the Department of Geography, of the Peradeniya University, who with two of his colleagues Dr. Jayantha Perera and Mr. Wilson carried out a study, in three blocks, on the socio-economic aspects of settlement patterns of the H area of the Mahaweli project. This study was carried out during the Yala season of 1977 and Maha season of 77/78. As Dr. Silva told a recent seminar the purpose of this exercise was to identify certain problems, that have cropped up for the Board, in the implementation of their programmes and policies; as well as to farmers who had to make use of the facilities that have been provided.

"I would like to divide these problems into these two broad categories. Problems which the Mahaweli Board has to face and the problems that have been faced by the farmers in the area. The first problem that the Board has had to face or will have to face in the future is that of trying to persuade all those who have been allocated land to occupy the homesteads. Theoretically speaking, every individual who has been given 2½ acres of land has also been provided with ½ acre of homestead. But our studies have shown that upto the end of Maha 77/78 only about 70 percent of the population have begun to reside on their land. About 30 percent are either on their paddy fields or still in their old villages, purana villages. The question is, how do we persuade these people to move into their homesteads. In the case of the paddy fields, the location is fairly alright, because most of the people who live in their paddy fields would like to remain close to their plots. But in the case of the purana villagers, the problem is a little more difficult because most of the purana villagers feel that the facilities enjoyed in their purana villages are far superior to what they would have to enjoy if they were to build their houses in the homestead. Now, this is going to be the first problem. How do you persuade all the purana villagers who have been allocated land to come into the settlement area?"

"The second problem is that all the land that has been given over to the peasants has not been cultivated. Theoretically, as I said earlier, each man is given 2½ acres of land. But our studies have shown that only 38 percent or approximately 40 percent of the population in our sample have cultivated the entire 2½ acres. Now this is a big problem. We give reasons for this. Some are technical, in the sense that some people say that they haven't been able to get an adequate amount of water and some people say that there are other physical problems like alkalinity in water. So, therefore, they are not in a position to cultivate their plots. Besides these there are also other problems such as inability of the farmer, a man who has got the allotment, to work on his own because very often two or three people in the family have been given land so that the father finds it difficult to cultivate the entire 2½ acres. In some cases people find it difficult to get the cash. Whatever the reasons are, less than 50 percent of the people cultivate 2½ acres of land though the entire allotment of land has been given over to them.

The third interesting problem concerns the question of subsidiary crops. Now, if we take our sample of 218 people. Of them 115 were recommended subsidiary crops for Yala, so theoretically for 1977 Maha 115 of the 218 people should have cultivated subsidiary crops. But of the people to whom subsidiary crops were recommended approximately 85 percent cultivated paddy. Now this has tremendous implications for water management and in Maha, 41 out of a sample of 128 were recommended subsidiary crops even for Maha. Out of this 83 percent cultivated only paddy and another 7 percent paddy along with some subsidiary crops. This is going to be a fairly big problem. The question is why are these people who have land reluctant to cultivate subsidiary crops. It is fairly obvious that farmers are used to irrigate agriculture and paddy is a crop which is very easy to cultivate. You just spend some time in cultivating the land, then you have a long slack period that you can attend to other things and you are busy again with the harvesting season. But that was not the only reason. The second reason is the question of marketing. Because, if you cultivate subsidiary crops, the marketing system has to be very efficient and people feel that the marketing system that has developed upto date is not very efficient and they did not wish to take this risk of cultivating subsidiary crops.

There is another important problem and that is the problem of protection, which has to be considered very carefully because people always argue that when the farmer is not there no one is going to steal their paddy crop. Their crop can be located ½ a mile or a mile away from the homestead and still they needn't worry about it. On the other hand, if you grow some subsidiary crops like chillies or pumpkins and various other crops, it has to be protected like a chena in which case they have to maintain two homesteads. This has implications for settlement planning and should be given consideration if we are to encourage people to grow subsidiary crops. Should we have a different settlement plan in those areas in which subsidiary crops are being encouraged? Now the next problem which again the Board has had to face is the question of the cropping calendar. Now our studies have shown that the terms Yala and Maha may not be very meaningful, in the Mahaweli Settlement area, because if you take the ploughing period the first man in our sample last

Yala started ploughing in the fourth week of May. The last man in the sample finished his ploughing in the first week of August. Now let us take Maha. The first man in the sample last Maha 77/78 started ploughing in the first week of October and the last man finished his ploughing in the first week of January. This too has tremendous implications for water management. But apart from that, it also affects a farmer in different ways, because if he doesn't start ploughing in time he is not in a position to harvest his crop. Lots of farmers have complained that because they were not in a position to start ploughing at the correct time they couldn't harvest their crop and even when they harvested their crop they couldn't thresh it because of the rains, because they were coming into the next rainy season. These are problems that the Board has to face".

The Mahaweli authorities have therefore their plans to maintain the optimum issue of the settlers on these lands. The main basis is to be 2½ acres of irrigable land and a ¼ acre plot for a homestead. They would all therefore, start on a base of equality. But the experience of land colonization in the country over the years has shown that the situation has never remained the same as when the settlers originally moved into their lands. In some cases the original allotments have got smaller and smaller while in other cases they were becoming larger and larger. In the smaller plots some have become mere sub-cultivators of the larger holdings. In other cases they become landless labourers of their own no more holdings and work as landless labourers under a new landlordism which has been emerging.

A research study, for instance has shown that in one of the earlier colonization schemes, Tabbowa, that there were two traders controlling 35 acres of paddy although on paper the schemes allow only a paddy acreage of 5 acres. This same research, found in this sample that there were 14 landless labourers who nominally had plots of land but who in fact were not holding any land. Again in another scheme Rajanguna he found 33 acres of consolidated land, 22 landless Labourers and the pattern repeated. This situation is common also in several other major land settlement schemes. It is also known that people who get into this type of land consolidation are predominantly the traders and other middle men, moneylenders, owners and even government officials. The original aim of giving settlers an equal share of land is thus being mitigated and forces are emerging that skew the system.

There are other factors too which are contributing to this phenomenon. Foremost amongst the new schemes are the introduction of the new technology and associated inputs such as credit, seeds, fertilizer, tractor and extension services. Studies carried out both in Sri Lanka and other parts of the world have shown that the new technology also tends to skew this system in favour of those who have more. An additional injection of massive external inputs such as mentioned would if not controlled also result in a skewing of the system.

Although the Mahaweli settlements in the H area are only a few seasons old these factors are already in operation. Thus studies have indicated the emergence of hidden tenancy in the Mahaweli region as well as the parallel emergence of sub-cultivators. Those who have had tractor loans and bought tractors are similarly showing tendencies to landlordism. If this tendency is allowed to gain ground the original egalitarian principle could be reversed and over about a decade there would possibly not be a 2½ acre situation but perhaps a 15-acre situation or 20 acre situation for some and a no-acre situation for some others.

In viewing some of the problems of settlement we observed how certain settlers had to be persuaded to occupy their homestead blocks. The problem does have deeper implications. A leading Regional Planner, Mr. Lorsan Guneratne, told a recent seminar for inquire that at Kaluwewa many settlers were not even living in the lands identified for their homesteads and investments in infrastructure at such "planned" locations have been utterly wasteful. He argued that the planners had failed to anticipate the real needs, but rather attempted to impose preconceived notions of their own through their plans which have been "expensive and unrealistic exercise on paper, and burdensome on the people". Lorsan Guneratne's views on these aspects of regional development are reproduced here :

REGIONAL DEVELOPMENT

"Regional planning, being planning work related to specific areas of land, has an inherent concern with the spatial aspects. That is to say - It is not good enough for a Regional Planner to talk in aggregate terms about the number and size of primary schools, or health clinics or fertilizer stores required for the development of a region. He must simultaneously be concerned at least about where these are to be located and how they will be linked to and impact upon the settlement and transportation systems. Therefore, Regional Planning becomes very much an activity which is concerned with infrastructure, and spatial location. It cuts across and attempts to integrate 'sectoral' activities. It indeed encompasses the concept of 'integrated area development' which is popular today amongst planners concerned with rural development. But, Regional Planning is not only related to rural areas. The idea of a rural urban continuum is also very much a part of it.

The Mahaweli Project is a massive undertaking by our Sri Lankan standards, and a large one by any standards. The engineering and agronomic aspects alone are very complex and necessitate a high degree of technical competence. Farming is also extremely complicated. And, in all these complexities we can very easily lose sight of the main objectives of the entire exercise. The design and construction of dams, and the channelling of water to irrigate fields are of paramount importance. But, these are not ends in themselves.

The Mahaweli Project is in fact a substantial part of our national development strategy of: (a) the local substitution of imports (especially food) and perhaps also to a lesser extent the promotion of non-traditional exports, which are all attempts to help overcome the national balance-of-payments problem; and (b) the distribution of income intended to achieve equity and social justice. The project area is in the Dry Zone which, in comparison with the Wet Zone, is underpopulated and under-served with infrastructure. Therefore the ultimate objectives of the project cannot be achieved without the settlement and/or resettlement of people on the land in the project area along with

the provision of adequate infrastructure in an economically viable, socially harmonious and ecologically balanced manner. These latter aspects fall generally within the scope of Regional Development activities and are part and parcel of the Regional Planning 'brief'.

Given that the need for Regional Planning in the Mahaweli Development Project is recognised, what are some of the major problems that may be encountered? It may be best to start by looking at our past experience with work on the Mahaweli project, as well as Dry Zone development work in general. There is the very obvious fact that the areas earmarked for development are at present very sparsely served by infrastructure. If infrastructure is to serve most of the people of a region, and, if it is to serve them efficiently and in a manner convenient to them, well-recognised theories suggest that infrastructure should be provided in an ordered hierarchy of multi-sectoral packages. The task of the Regional Planner in this regard will be to anticipate such a system as would be called for in some detail, and plan for its provision. The underlying Regional Planning concept is not new to our Dry Zone development work. The concept was present at Walawe. It was embodied in a crude form in a Land Development Circular in 1969. It was in fact explicitly proposed in the 1972 Mahaweli Feasibility studies for Project I, Stage II (MDB Sogreah Report, Vol. VII). True there has been some progress over the years. But, even as it happened in the last case, the 'packages' and 'hierarchical levels' as identified were most unrealistic and uneconomic (predictably so even in 1972 for any professional Regional Planner of moderate competence). Consequently some serious problems are already surfacing in the Mahaweli Stage II area, and more problems are likely to emerge with time.

Furthermore, it is apparent that the spatial aspects of Regional Planning in Dry Zone settlement work has been very poorly dealt with in the past. Locations selected for the development of urban areas where urban-type services were thought to be necessary for the settlers have remained bare for the most part, while towns are struggling to materialise in more suitable locations elsewhere. At Kalawewa many settlers are not even living in the lands identified for their homesteads. Needless to say investment in infrastructure at such 'planned' locations are utterly wasteful. But, who is at fault here, the settlers or the planners? It is evident that in most such instances the planners have been in error. They have failed to anticipate the real needs, but attempted instead to impose some preconceived notions of their own through their plans. Where plans have been sound, these have had very little statutory basis for implementation. Thus almost all such plans have been expensive and unrealistic exercises on paper, and in one way or other, a burden on our people.

The problems identified thus far are mainly technical, organisational or legislative matters. These can be overcome without too much difficulty. However, some of the more difficult but nonetheless important problems to be faced for truly effective Regional Development, have to do with the settlers themselves. How best can new settlers be selected? How may they relate to the inhabitants of the purana villages? How and to what extent should the purana villages be integrated in the plans? How can we promote and encourage the participation of the settlers in development activities? These are some of the questions that need to be answered, and they are essentially socio-political in character. Official and technical personnel generally fight shy of such issues. No doubt these call for political decisions, but planners must not abdicate their own responsibilities. They should identify and present policy issues in a clear, orderly and timely manner for decision by relevant political authorities.

A massive development exercise such as the Mahaweli Project may give rise to a major problem of 'squatters'. Throughout the Third World, development work has attracted squatters and officialdom has almost universally responded by attempts to 'eradicate' them. There is evidence in the older colonization areas that the schemes of land inheritance imposed by the government, and also the manner in which agricultural and other forms of credit are given, are at variance with the traditional systems that persist amongst our rural folk, and that many complicated problems are surfacing as a result. Similar problems may occur on a greatly magnified scale in the Mahaweli development region even within one generation. These issues should also be given due recognition and become subjects of in-depth and on-going studies, so that realistic and humane policies may be defined, adjusted and re-defined if necessary from time to time, if found to be necessary.

We need to study our experiences, avoid our past mistakes and reinforce and improve upon our good policies. The Mahaweli settlement work already done at Kalawewa is disappointing. The lands still to be settled are more than a ten-fold increase in extent, approaching nearly a million acres of land. We simply cannot afford to repeat the errors. We are now committed, and far too much is at stake."

TRADING PATTERNS

The settlement of persons in the Mahaweli Project areas are largely for agricultural production. This agricultural produce will hopefully provide a surplus after meeting the immediate consumption requirements of the farmer. For this purpose an efficient marketing system can be of crucial importance and a People's Bank sponsored research study has helped surface some of the initial problems that have arisen in this regard. It also brings into focus other aspects of trade such as the supply of goods to farmers.

A visiting researcher, Dr. Jan Lundqvist of the University of Bergen in Norway together with researchers from the People's Bank carried out this study recently on the trading patterns in the Mahaweli area. It was conducted in Region three of the H area of the Mahaweli Project during September and October 1978 when construction and inauguration of the first township in the area, Galnewa, was on and shows that the structure of trade (i.e. location and type of shops, turnover etc.) has been drastically affected by the change of the settlement pattern, communications and economic patterns of the area.

The basic political economy of the already developed Mahaweli region

that emerges from this study emphasises the importance of unplanned developments which run counter to the models of planners. As the report states:

"The purana villages are no longer of central importance and the roads which used to link the villages and outside areas have now been supplemented by new roads passing through newly created townships and villages. There seems to have been no efforts to link the existing road patterns to the new communication network, though some of the old villages have been included in the new structure. The socio-economic situation has changed and the existing structure has broken down with people from "outside" coming into the area (in principle on a equal basis) and new agricultural practices being introduced. Through these new practices a new economic rhythm is being introduced.

In addition to the agricultural economy there are also a considerable number of salaried personnel, working for the Mahaweli Development Board and banks and other service institutions coming into the area. The purchasing power injected in the region and the variety of items demanded by them are bound to increase significantly. The impact of the new system has not matured fully and only intermediary structures are now in existence. It may therefore be premature to predict the potential economic capacity of the region, and likewise it is not possible to estimate the amount of economic surplus which will be spent within the region and how much will be "leaking out". It has, however, been found in the case of most developing countries that on a regional as a whole basis which the leakage takes place does not gain anything in terms of economic return or in terms of increased influence.

The "enclave" formation manifested in a backward region implies, on the other hand, a relative decrease in the influence of political and social power structure within the region, since such transfers come from the Government, powerful corporations or organizations. To what extent the transfer affects the economic return of the region as a whole depends on the magnitude of the transfer and the changes in the set of the economy related to it. With a massive transfer of resources, like in the case of Mahaweli multi-purpose project, it seems obvious that the existing social and political structure within the region(s) will be disrupted and the economy will grow and change. Under these circumstances, it would seem logical that the existing production system within the pursua villages would stagnate and that growth and diversification into new agricultural systems and new branches would flourish."

"There are several situations which could lead to problems, that are highlighted in the report. For instance:

"It was found that there were certain persons involved in official decision-making in the area who had been given land and embarked on constructing and other economic activities. This was a clear case of a conflict of interests and the use of official position for what would be private gain".

"Both positive and negative feelings towards the MDB are expressed by the settlers. In general, it is the farmers who have lost land who are critical while the farmers who have been given land are positive, which is natural. It is also natural that people were more preoccupied with certain aspects of the project like the provision of water, the functioning of co-operatives, transport facilities, medical problems and similar aspects rather than having an overall view".

"Concern is often expressed about the water situation. Farmers in different places have mentioned that is it difficult to get water to the fields because the channels are located lower than some fields".

This study shows what a significant economic and social role the village boutiques and paddy marketing could play in the life of these communities. Summing up on this aspect the report reveals that "In region Three II areas of the Mahaweli Project, trade is the most important sector, next to agriculture, among the settlers in terms of employment and income. About one hundred village boutiques serve about 3,500 families. The following features characterize the majority of village boutiques.

- They are, with only one exception, family enterprises, without hired labour to run the boutique.
- They (92%) are located in the home of the owner.
- They sell a limited amount of daily required consumer goods.
- They (90%) sell on credit, without taking any form of security.
- They (97%) obtain their goods (wholesale) on cash and not on credit.
- They (7%) buy of barter paddy from the farmers.
- They (92%) do business on a strictly individual basis.
- They are not organized in any any trade association and only a couple of them have developed some connections with the wholesalers.
- They (78%) have prior experience only as farmers; besides shop-keeping and the present boutique is their first one. They are first generation traders.
- The boutiques are open on all days, usually until about eight p.m.
- The shopkeepers are largely Sinhala (91%).
- Prices and profits are arbitrarily decided. Profit rates vary from 2 percent upto almost 300%.
- The boutiques have grown particularly along the main road passing Galnowa township.
- Very few shop keepers could elaborate on their plans for the future.
- The boutiques serve as social meeting points where people (i.e. men) meet, eat, drink and exchange information.
- They are not financed by bank loans taken for trade purposes.
- None of the shop keepers expressed problems due to competition with neighbouring boutiques.

Four nearby towns, Kekirawa, Hppawela, Galgamuwa and Galewela, together with the Negoma fair on Tuesdays and vendors supply the items sold in the boutiques. There seem to be very few special relations between the wholesale suppliers and the shopkeepers. Anuradhapura and other large towns, so far, play an insignificant role in supplying items.

Besides the supply of consumer goods, the boutiques serve other important functions in the region. By bartering rice for purchasing paddy even in amounts of one measure, they provide the settlers with ready cash and/or urgently required consumer goods at almost any time of the day and all the year round. The Co-operative and private traders coming from outside areas to buy paddy are not able to compete on these terms. To some extent the boutiques also provide the services of a bank. Instead of selling all surplus production of paddy at once after harvesting to the co-operative and putting the money into a bank, the farmers keep a certain amount of paddy at home which they can sell or barter and thereby solve the problem of their daily requirement of cash. This system is convenient for the farmer but costly. In this type of trade the farmers are paid as low as Rs. 25/- to Rs. 80/- per bushel as compared to Rs. 90/- which is the fixed price of the co-operative. They are also deprived of any interest they could earn on the money.

Farmers are in this respect not left with a free choice as to whom they could sell their paddy to. The co-operatives and P.M.U. do not have the capacity to receive all the paddy marketed. Last Maha, the co-op bought only about 80,000 bushels directly from the farmers in region three, out of a total marketed amount of at least 200,000 bushels. The balance is bought by private traders coming from outside the region and by village boutiques. Through this organization of marketing, both the farmers and the region as a whole lose a considerable amount of money. A rough estimate shows that the farmers lose around Rs. 1 million or more and the region Rs. 650,000/- (the difference is taken care of by shopkeepers in

the region). In comparison the total cost of cultivation and harvesting in some Rs. 6 million and the cultivation loans for last Maha were Rs. 1.7 million while the amount of unpaid cultivation loans was about Rs. 300,000/-.

In summary, therefore, the one hundred holdings play an important, pioneering and social role. From a social point of view they seem to be efficient, and by and large well accepted by the settlers. From an economic point of view they are less efficient: they are not adequately organized which means that transport costs and wholesale prices are higher than they have to be. They have not been able to compete in the sales of more expensive non-daily required goods. They do not sell agricultural implements or other farm inputs and they do not sell construction equipment or material.

Trade in Galnewa Township

Shops in Galnewa are just about to be established (mid-October). According to the present trade pattern of the area, it appears that the planned number of shops will have great difficulties to be viable enterprises. The cost of running these are much higher as compared to the village boutiques and they face far more severe competition. For the settlers this would result in a lowering of prices and perhaps a better service.

For the future development of Galnewa, it seems important to identify its role as a centre in a regional system where, on the one hand, we have all the village boutiques and on the other hand we have nearby established towns like Kekirawa and Eppawela. It would seem that not only the supply of goods but also purchasing of agricultural produce is important for Galnewa to develop its own identity and to grow.

INFRASTRUCTURE

The vital importance of basic infrastructural facilities is fundamental to the success of the entire project. If as happened in the past these facilities are allowed to develop on their own it would be a long process and would take some time before the full benefits of this scheme are obtained. A typical example is that of schooling. In many underdeveloped areas the people are not bringing in their children because there are no facilities for them. Their families are living elsewhere and therefore there are either no schools or very small schools some times with one teacher. More teachers are not brought in because there are few children and this works in a vicious circle. If this pattern is allowed to continue in the Mahaweli areas there is the possibility of absentee landlords with people having their families somewhere else, coming here to cultivate and treating this like a chena.

The Mahaweli Board's programme has thus planned for these facilities including a transport network (see box), agricultural processing and storing facilities and other basic amenities. As an example of the need for close attention to these services was given by a scientist, Dr. U. D. Ventura at a round seminar when he dealt with some of the health problems associated with this project.

Dr. Ventura argued that since the objective of the Mahaweli basin's development is to give a better quality life to a larger number of people and since the performance of the project itself as well as its outcome are dependent upon human beings, the health of the human beings involved is very crucial to the success of the project. He said, the Mahaweli area, at present is perhaps one of the least developed from a health point of view with totally inadequate curative services and poor preventive and primary health care services. The health problem to be faced was that of controlling the old patterns of disease and also the new patterns of disease which are likely to occur when new lands are opened up. The immediate health problem would be that the already inadequate health services are going to be further strained due to the large influx of construction workers. Also the new settlers would have to face occupational health problems arising from the construction and agricultural pursuits whilst the displaced Purana villagers would have to face psychological problems arising out of the changes in their environmental conditions. The primary requirements for maintaining good health, in his opinion, were the provision of proper housing, sanitation e.g. water supply and sewerage. These are really technological problems and he stressed that these aspects should be given due consideration at the planning stage.

He concluded: "In the light of such a big project, involving so many people, and the existing health hazards, and the possible future health hazards, the degree of planning and thinking that has gone into the initial stages upto date I think is not quite adequate. Considering the fact that we are normally very good planners but poor implementors, there is always a big gap between the two. I think, much more needs to be done before we can be satisfied with the study of health in the Mahaweli project".

ENVIRONMENTAL CONSIDERATIONS

All forms of regional or physical planning would have to give close consideration to the environmental aspects in the Mahaweli area. The main consideration in this regard would have to be the conservation of soil and water and this could be most effectively achieved by maintaining an adequate natural forest cover. At a recent seminar a leading University scientist, Professor B. A. Aboywickrema, indicated that maintaining a natural forest cover was not practically possible because of other demands on these lands. He pointed out, however, that it was necessary to preserve the forest as far as possible and also to embark upon a programme of re-afforestation to restore the environment. In the natural environment the basic unit, the ecosystem, are integrated systems and are self-sustaining and self-regulating. To this instance he showed that the purana villages which existed in the Mahaweli area were also of this class of systems, but by present standards the productivity in them was low. In the course of development, therefore these systems had to be suitably modified to increase their productivity. In doing so, it was necessary not to put the system into a state of instability by exceeding the limits of resilience of the system. New systems of management had to be devised to organise the physical environment, the fauna and flora, health and recreation, socio-economic and cultural aspects of the environment. Moreover these environments would need to be continuously

A Railway for the Mahaweli

A. Denis Fernando

The Sri Lanka Railway network has been at a standstill since the British packed up their bags and went away. In such a context it sounds almost heretical to suggest that a railway line should be opened up to link Welawe, Lower Uva, the Gal Oya Valley, the Mahaweli to each other and the metropolitan centre.

One of the chief constraints to the development of the two major schemes namely the Gal Oya Valley and Walawe, has been due to the lack of a good communication system. The roads are the only means of access. As a result the farmer has to pay more for the fertiliser and other inputs he needs and also accept a lower price for his produce, which has to be transported to outlying areas at higher cost. This main deficiency has resulted in very low productivity and abysmally low standards of living for the majority of the farming population.

If one considers the reason as to why substantial returns have not been yielded from all these areas it could be fairly and squarely pinpointed to inefficient and inadequate transport for the movement of both inputs and outputs to and from the areas mentioned.

Today in the context of the accelerated programme of the Mahaweli new areas will be opened in the areas falling within Systems A, B, C and D. This area comprises in physical terms the area East of the Mahaweli Ganga from near Mahiyangana to Kandaketiya and thereafter both banks of the Mahaweli Ganga from a point near Kandaketiya (or Bemmulla) right up to the mouth of the river. This area constitutes nearly 340,000 acres of new lands that will be brought under irrigation and around 90,000 acres of existing paddy lands.

Even here we have called for the development of only highways and no consideration has been given for the development of railways. The question that will again be asked is whether the proposed system of roads would be in a position, economically to compete with the transport needs in these areas (both new and later), unless we want to repeat what happened in Gal Oya and Walawe.

The development of railways to serve the above mentioned areas can be easily so done, with no serious engineering problem. What I propose is that the present Kelani Valley line that is to be broadgauged be extended to Kuruwanta, then it could be extended to Walawe, then to Telulla to Siyambalanduwa to Ingiriyagala to Padiyatalawa, thence thro' the gap between the Uhiriyan and the Maduru Oya Reservoir and then to Welikanda and thereafter along the Right Bank of the Mahaweli into Kandaketiya and to Kadiravelli. This in short should be the Master Plan.

The Master Plan envisages a railway link firstly for the areas covered by the Accelerated Mahaweli Programme and later to the Gal Oya Valley, the Lower Uva area, the Walawe Basin and the Sabaragamuwa area. These areas comprise the Development Frontier which does not have railway facilities at present.

I have recommended that the proposed railway to link up the above mentioned areas be taken up as a matter of urgent public necessity. The Master Plan which I have drawn up envisages a total of 263 miles of new railway and was proposed to be taken up in three stages.

Stage I

a) Welikanda to Padiyatalawa (HG)
b) Welikanda to Kadiravelli (HH)

Stage II

a) Colombo to Kuruwanta (broadgauge conversion) (AB)
b) Kuruwanta to Walawe (BC)

Stage III

a) Padiyatalawa to Ingiriyagala (GF)
b) Ingiriyagala to Siyambalanduwa (FE)
c) Walawe to Telulla (CD)
d) Telulla to Siyambalanduwa (DE)

My preliminary survey indicates a total of Rs. 780 million exclusive of rolling stock and acquisitions. The cost of the different stages was worked out at a round figure of Rs. 3 million per mile and the cost was as follows:—

Stage I	62 miles	Rs. 186 m.
Stage II	94 miles	Rs. 282 m.
Stage III	104 miles	Rs. 312 m.
Total	260 miles	Rs. 780 m.

Stage I of the proposed railway mainly affects the development of the Mahaweli area and its immediate implementation would reduce by 80 percent the cost of transporting construction materials to the different sites of the project.

One of the preliminary considerations in figuring Stage I is that the railway would be the only all-weather access to the Accelerated Mahaweli areas. The present road access, between Polonnaruwa and Manampitiya is subject to floods and would hinder the free flow of men and materials to the work sites.

Another important consideration is that the single bridge across the Mahaweli at Manampitiya is the sole access (except the 17 kely pin-head road from Kandy to Mahiyangana) for transport of men and materials. This single bridge will necessarily cause a bottleneck in the transport of goods and services to and from the area of construction. A time and motion study on the bridge would favour maximising the use of the bridge for railway transport. This bridge now serves both the railway and the main motor highway.

The third consideration is that a large quantity of timber has to be transported out of the project areas and even here the bridge will play an important role. All these considerations point to the immediate need to extend the existing railway to cater to increasing traffic, to transport materials to the areas in Systems A, B and C and also to remove the merchantable timber from these areas for further processing, in other areas.

The cost of Stage I on the revised estimate is nearly 214 million rupees. The benefits would accrue immediately in the transport of materials to the construction sites on this route which will be reduced to around 20 percent of the road haulage costs. Further the capital investment cost on rail stock per unit of pay load is also appreciably less compared to road haulage, saving further on capital costs.

This railway would pay for itself within a few years, if we consider the difference in cost of road per mile rail against road (as there would now be available for unsatisfied). In addition to the social and economic benefits that have been listed we have to consider the fact that this railway would serve the poorest of the poor of the country who live in these regions.

The poorest of the poor of our country live in these areas and their poverty is mainly due to the transport barrier. The railway would then bring the inputs required for production at reasonable cost and at the same time also enable the farmer to obtain a reasonable price for the food that is produced. It enables more traders to come into the development scheme and offer a competitive price for the farmers produce. It would not only be an incentive for the peasant and the colonist to produce more but also assist in reducing the high cost of living in the country to a great extent, and bring about a general economic and social upliftment of the nation.

monitored as development goes on in order to maintain a check on detrimental developments in the environment such as in soil conditions, insect and plant behaviour. Professor Abeywickrema stated that:

"The success of this scheme would depend on a regular supply of water. Now, in the Mahaweli, the upper catchment area, the most important tributary of the Mahaweli lies in the central hill country at an elevation of 4,000 to 8,000 feet. Some of these areas receive a rainfall of over 200 inches per annum. The upper catchment above Polgolla covers only about 11 percent of the total catchment area, but it contributes to over 30 percent of the total run-off. Now most of this area has steep slopes with high erosion patterns, and effective soil and water conservation in this region is an essential requirement for the development of the project area. If there is high erosion, there will be silting of the water reservoirs leaving aside the other evils of soil erosion. The reservoirs will be silted in no time. Secondly, the rapid run-off will make the water disappear in no time after the rains and the dry weather flow will be reduced and this has to be guarded against.

Maintaining the natural forest cover is the most effective. Unfortunately this is not possible because the upper catchment area happens to be the most productive and economically important region in the island. Already about 80 percent of this is under cultivation or under some use. Only about 8 percent is now under forest and about 10 or 20 under grassland. But the forest area is said to have been 23 percent just a little over 20 years ago in 1956 and, according to the Conservator of Forests, from 23.2 in 1956 it has now come down to about 8 percent and now this is a serious thing. Fortunately for us during the last few months there has been a ban on the deforestation of this area.

Here we are going to have agriculture under irrigation on a very large scale. Practically all this area was under cultivation and it is now under secondary jungle or unproductive scrub. Very little will be gained by keeping it in this form. Proper development of the land should provide new opportunities for both agriculture, as well as reforestation. This is really a very good opportunity to introduce rational land management which was non-existent earlier. Agriculture development should aim at optimum use on a sustained yield basis. This is to secure maximum yield you can, not for a year or a few years, but for all times on a rational basis.

Even with the most careful planning in our operations with a project of this magnitude unforeseen changes can occur. The opening up of 900,000 acres for intensive cultivation and providing water round the year to an area which was seasonally dry, can bring about many changes in the environment. First of all you can have changes in soils. It is not only the irrigation right through the year, but the agricultural inputs: fertilizer, pesticides and so on that will be introduced. These can bring about changes. Then you can have changes in insect and pest behaviour and these affect man. Then you can have introduction of new pests and weeds; because with the long period of drought certain plants and animals which were not there earlier may come there now. So we have to guard against some of these. Now because of these factors it is necessary to continuously monitor the environmental conditions in all the development areas. Such monitoring can provide us with early warnings of any untoward side-effects and if we find that something is happening then it is expected that we can take remedial measures to correct them.

Two aspects of these side-effects which I would like to mention is the possible salinisation and the effect of the over extensive deforestation. As you know, all the water contains a certain amount of minerals and when it is supplied to a dry area, to an area which is dry or seasonally dry, evaporation causes the water to escape, leaving a certain amount of salts and if this accumulates it can make the area too saline or alkaline and make it completely unsuitable for agriculture. Now fortunately for us, this area has very high rainfall during the rainy season. In the Kalawewa area you get 50 to 60 inches of rainfall in the year, most of which comes during a few months. Even if a little accumulates during the course of the dry season under natural conditions, if drainage conditions are alright, this gets washed off with the rains. We have had irrigated-agriculture for many centuries and a good part of the area is still unsaline. This is because in natural conditions with good drainage there is very little additional accumulation. There is no progressive accumulation. Another fortunate thing we are having is as far as alkalinity development is concerned. Now this is mainly due to sodium, but the effect of sodium can be neutralised or counteracted by magnesium and calcium. Our waters are rich in these and because of the high content of calcium magnesium, it can stand a certain amount of sodium in the water and inspite of this, if drainage is poor and water-logging does take place, the soils can be alkalised.

We were told that even before the project started with roughly about 10 percent of the area or so about 33,000 acres in the total area was found to be saline or alkaline. This would have developed there as a result of poor drainage. This is something that the cultivator by himself in his small allotment cannot tackle and the planner will have to see that the whole area is properly drained and if so did that we can avert any problem regarding this.

The next thing I wanted to mention is that in this area, deforestation or removal of all forests over very large areas could have adverse effects on the soil. You see if you take even here on a hot dry day the soil temperature without any plant cover, grass or vegetation can be almost 20 or 25 degrees higher than under the shade of a tree. Now in the Mahaweli area, I think, the same order would be there.

The exposure to very high temperature and removal of forest cover would also increase the desiccating effect of winds. So the heating and the exposure to winds could cause changes in the soil and degradation of the soils. It is true that this area was cultivated either under paddy or under chena cultivation for many many centuries, but we have to remember that in our chena cultivation, the tree vegetation was not completely removed. It is only a recent thing, the removal of trees completely. In the old chena cultivation, the undergrowth and similar shrubs were cut down and the larger trees all remained. They gave a certain amount of shelter to the chena and when the chena was abandoned after about 25 years, the undergrowth developed and the forest trees that were already there gave protection to the soil. Now, if we completely remove our trees over a very large area there could be an unfavourable reaction on the environment specially, the soil. We will have to guard against this and then we will have to have in addition to this, forest belts at intervals which would to some extent break the force of winds and so on for general environmental protection to a certain amount of wild life protection, for food.

In order to develop the vast area coming under the Mahaweli Project it would obviously be necessary to clear large extents of forests in the dry zone. But a careful planning would have to be carried out to demarcate what areas could be cleared and what areas will have to be conserved or re-forested. Foresters are of the view that this is probably the first time in the history of a major irrigation-cum hydro-power project that the total value of forestry, as one of the necessary inputs to maximise and maintain gains from the entire project, has been recognised and incorporated into the complex build-up. This appears to be a radical change from the past when forestry as a key factor in maintaining a favourable environment was not given due consideration.

According to the Conservator of Forests Mr. W. R. H. Perera, forest cover could produce a forest "floor" which acting as a mighty sponge, helps in protecting the soil and also provides controlled excess run off, captures a large part of the rain water and gradually releases this as a stable dry weather flow of good quality. Forest cover was therefore the natural and best form of protection for streams. Mr. Perera gives us an illustration the case of the Humus Plains where the soil level had dropped many inches as a result of paddy cultivation, thereby reducing the soil capacity to absorb and retain water mainly because adequate soil conservation measures have not been taken. He maintains that this would happen in

all other catchments if such forests were to be replaced by indiscriminate cultivation. Also an improved micro-climate will be more readily perceived by human population whose timber and fuel wood requirements too have to be met as a matter of basic necessity.

It is not generally known that 300,000 acres have been set apart also for in the original plan for environmental reasons. The Mahaweli Board adds that the Government also ready to set apart, if necessary the entire Wasgamuwa Reserve and half of the Somawathiya Reserve which were to be cleared for human settlement in the original plans.

FINANCIAL IMPLICATIONS

The Mahaweli Project, the largest multi-purpose river basin development ever undertaken in Sri Lanka, is based on a Master Plan prepared jointly by a UNDP/FAO team and Sri Lankan engineers in 1965/68. The team estimated in 1967 that the final cost of the Mahaweli project would be about Rs. 6,078 million or US $ 1,278 million at the prevailing rate of exchange (1 US $ = Rs. 4,76). Domestic inflation, currency devaluation, fuel price increases and the general rise in import costs have pushed up the rupee costs of the project by about 350–400 percent in the subsequent ten years. The Mahaweli Board estimated the total capital cost of the project at current (1977) prices to be about Rs. 27,000 million which is equivalent to about US $ 1,740 million at the current rate of exchange (1 US $ = Rs. 15,50). The breakdown of the costs estimated in 1977, according to projects, is given in the table below.

The original plan as we now included all these projects for step-wise implementation over a thirty year period. The initial construction began in 1978 at Polgolla on the Mahaweli Ganga and Bowatenna on the Amban Ganga including a 40 Megawatt hydro power plant at Polgolla. These works were constructed with financial assistance from the World Bank together with assistance from the Asian Development Bank for a second 40 megawatt hydro power plant at Bowatenna. These head works provided an improved water supply to about 130,000 acres of existing irrigated land and an irrigation supply to 80,000 acres of new land. Work on the development of irrigation systems, construction of new settlements on these lands and agricultural extension and support services have been undertaken with assistance from the World Bank in collaboration with Canada, the Netherlands and U.K.

When the Government decided on the desirability of accelerating the programme an Implementation Strategy Study was undertaken by the Netherlands Finance Consultants (NEDECO) where the UNDP/FAO Master Plan was reviewed and the implications of various alternative phasings of the 12 major projects were examined and a specific action plan recommended, taking into account the financial and economic, technical, institution and manpower aspects.

The Accelerated Mahaweli Programme thus has its major focus on the irrigation and settlement of systems A, B, C, and D (in addition to the settlement in system H) covering five major projects included in these works would be the irrigation systems, land development, social infrastructure, settlement, agricultural extension and support services for the benefitted areas in System C (74,000 ac) and B (118,000 ac) in the right bank of the Mahaweli Basin, System A (100,000 ac) in the Maduru Oya Basin and System D (46,000 ac) in the left bank of the Mahaweli Basin (see map). The cost of these projects, including land development, social infrastructure and settlement, has been estimated at Rs. 9 billion (US $ 600 M) at 1978 prices, or Rs. 12 billion (US $ 800 M) at estimated current prices, of which about 50 percent will be for foreign expenditures. These five projects are expected to be substantially completed by the end of 1983. Based upon preliminary estimates of available resources, both domestic and foreign, the Government has tentatively earmarked about Rs. 8,0 billion in 1978 prices, or Rs. 11.0 billion in current prices for these projects over the next 5-6 years.

This works out to an average annual capital expenditure of Rs. 2,200 million which is the equivalent of about 50 percent of the total capital expenditure of the government in 1978. These cost estimates are at 1978 prices and hence the actual cost would be higher when account is taken of the price increases that are likely to take place in the next five years. The foreign exchange component of this total cost is expected to be financed by various aid donor countries.

The Government of the United Kingdom has agreed to finance the Victoria Project and the development of the 75,000 acres in System C.

The Government of Canada has agreed to finance the development of the Maduru Oya Reservoir, and the irrigable areas of 118,000 acres under it.

The Government of Japan has agreed to finance the Moragahakanda Project, and the development of 40,000 acres under it.

The Government of the Federal Republic of Germany, has agreed to finance the development of Randenigala Reservoir, and the irrigable areas under it.

The Government of Sweden has agreed to the financing of the Kotmale Power Project. Several other countries are expected to finance other projects of the Accelerated Mahaweli Scheme.

Total cost of Mahaweli Development according to its major projects

Project	Estimated Total Cost (Rs. Million)
Victoria Multipurpose project	3,017
Moragahakanda Multipurpose project	1,590
Maduru Oya Reservoir project	1,758
Talleni Multipurpose project	586
Kotmale Multipurpose project	1,542
Kala Ganga Reservoir project	1,192
Rotalawela Reservoir project	477
Pallewela Multipurpose project	1,036
Malwatu Oya Reservoir project	499
Yan Oya Reservoir project	521
Randenigala Multipurpose project and part NCP Canal	5,707
Balance NCP Canal project	4,403
Cost of activities resulting from the project	4,600
Total estimated cost	27,173

If we were to assume that the foreign component in the total cost is around 60 percent and that this amount would be financed by aid forthcoming from various donor countries, it would still be necessary to raise a substantial amount of local resources to cover the balance costs. Local resources equivalent to about Rs. 1,000 million per year have to be set apart annually to finance the local component of the total costs over the next five years. This amount is equivalent to about 20 percent of the total government capital expenditure in 1978 or about 10 percent of the total government revenue in that year. The burden of raising local resources will be reduced to the extent that the government is able to raise foreign aid resources to finance part of the local costs. However, it appears unlikely that entire local costs could be financed by aid and hence the government cannot avoid the question of raising local resources to finance a portion of the Accelerated Mahaweli Project. How these additional resources are going to be raised would be a fundamental question in the fiscal operations of the government in the next five years.

Whatever the source of financing, an important consequence of capital spending of such magnitude, maintained over a period of five years, would be to set in motion a multiplier process of income creation. Such capital expenditure should begin to bear fruit in the form of higher output of agricultural and industrial goods only after some time lag. In the meantime substantial amounts in the form of salaries and wages, profits and other returns will be created which will get translated into a demand for various goods and services. The bulk of the wage incomes are most likely to get spent on wage goods such as food, clothing, shelter and other mass consumer goods. An augmented supply of such wage goods (goods on which wage earners typically spend their income) becomes crucial to restrain the inflationary pressure emanating from the expanded consumer demand.

A part of the increased domestic demand will be met by increased domestic supplies. The Mahaweli project itself will, after a time lag, lead to a substantial expansion in food production. Other sectors of the economy will also be expected to respond in varying degrees to meet this increased domestic demand for goods and services. However, it is also very likely that a part of the increase will get translated into a demand for imports. This would particularly be so in the context of the import liberalisation. This higher demand for imports raised resulting in a corresponding increase in import earnings or import savings (import substitution) could lead to a deterioration in the balance of payments. In the context of the floating exchange rate system that Sri Lanka has adopted, such a situation could lead to a further round of depreciation of the Sri Lanka Rupee vis-a-vis the foreign currencies. It is only by expanding our export earnings or by substantial import savings that such an adverse balance of payments situation can be avoided. The Mahaweli project itself should, however, result in substantial import savings with the increased production of rice, subsidiary food crops and other food crops such as sugar. In the balance of payments problems, therefore, a critical element would be whether the benefits of the project, in terms of import savings, would ensure on the magnitude that they are expected to. The problem of trying to manage the country's balance of payments in the context of spending such large amounts, could be contained to the extent of the import savings achieved.

Fiscal measures

To come back to the budgetary implications. Siphoning off a part of the increased income via taxation or borrowing becomes a very important aspect of the fiscal policy during the next few years. Mopping up a part of the increased incomes by the government will help ease the inflationary pressure in the economy as well as put more resources in the hands of the government to finance the local costs of the Project. One could think of three ways of siphoning off a portion of the expanded incomes. (a) The existing tax system would automatically mop up some incomes but the amount may not be substantial. If not, the government may have to devise a more broad-based tax structure (particularly for indirect taxes) to mop up a portion of the incomes as and when people spend their new incomes. (b) The government may have to think of getting a direct return from the massive investments it has made in the development of irrigation, land and infrastructure, in the form of charges for irrigated water, land taxes and charges for infrastructure facilities. (c) Finally, since the Mahaweli region is bound to become a very important sector in the total economy, the savings generated out of the new incomes created in this sector could become a very important source of government finances.

The timing of these measures, however, would depend on when they become most feasible. But if we consider how the budgetary picture would unfold in the future, with such a large quantum of expenditure being incurred, it is obvious that the government would then have to resort to one or more of these measures.

Institutions such as the National Savings Bank, State-owned commercial banks, and the Insurance Corporation could play an important role in promoting such savings. These institutions (in particular the National Savings Bank and the Insurance Corporation) have traditionally functioned as important lending sources to the government. The resources available to the government could be considerably increased to the extent that these institutions succeed in promoting and tapping the savings of the Mahaweli sector.

It is thus clear that siphoning off a portion of the Mahaweli incomes via taxation, charges for services, and by promoting saving will turn out to be an important aspect of the government's fiscal operations in the next few years.

But there are many factors on which the entire financing of the project, Plan and the overall economic impact of the Project would depend. As one of our leading economists who raised many of these issues at the "Financing of the Mahaweli" at a recent seminar, stated "there are lots of ifs and buts and this is why this is really

the point that makes crucial not merely the financing of the Plan, but the physical work that is involved in the Plan crucial, whether in the requirements in terms of extension services or whether it is requirements in prosecuting the Plan in terms of the skills that are required, and the quickness or the speed with which such things are really translated into action. This becomes rather critical even to the financing of the Plan".

MANPOWER AND SKILLS

The need for integrated planning and utilisation of all physical, financial and human resources is therefore a vital factor. As observed above the financial and economic implications of the Plan will be largely dependent on the available physical and human resources. There is no doubt that a vast reservoir of manpower and skills will be required over the next few years for prosecuting the Plan. It is the intention of the authorities to select settlers regarded as "progressive farmers receptive to new types of crops and new cultivation". Earlier experience has shown, however, that the "progressive" farmers who got the most benefits from the new technology and extension services in their areas were often those who knew the officers dispensing these services and who had access to the power structures of the village. An awareness of this trend when selecting settlers will be helpful.

In order to attract persons for employment in this area, which is sparsely populated, the authorities are considering of forms of compensation to be made to those who pioneer in these undeveloped areas. No specific systems have been formulated yet, but it is the view of the authorities that "the person who contributes most to the development should be better entitled to land or similar benefits in the development areas, (provided he satisfies certain other criteria) than another person who is selected by the presently established land Kachcheri or other selection systems".

In the planning of the development of the Mahaweli area the authorities hope to develop all the skills that will be necessary in this integrated community, primarily from those who have participated in the development programme.

Among those skills that will be most in need will be agriculturally trained personnel. In a recent seminar, a scientist, Professor, Y. D. A. Senanayake in a paper on "The need for more agriculturally trained personnel", drew attention to the possibility of a serious shortfall in trained agriculturalists. He said that it was not only the numbers that should cause concern but also the quality. Accordingly the present training schemes should be evaluated critically and suitably changed to provide the necessary training to suit this demand. A manpower survey conducted in late 1977 identified in about 35 different sources in the agricultural sector, the demand for fully trained personnel in Sri Lanka. The following is a summary of requirements of the total agricultural sector and of the Mahaweli Development Board, as extracted from this survey report.

Professor Senanayake pointed out that the firm demand for B.Sc. level personnel over the next 3 years is 350, whereas the possible output at the present rate is 527. This leaves a shortfall of 323, without including the unfilled needs of new organisations. Two other areas where there are likely to be serious shortfalls are those of Farm School trainees and Rural Agents. The Rural Agents are defined as those individuals who received 2 years agriculture management training after Grade 12 studies. Much of the demand for this category is in colonisation settlements, village expansion, rural youth programmes, co-ordinating of supplies to small farmers (agrarian services) and rural credit (banking). The bulk of the demand is from the Mahaweli areas. In this category a shortfall of the order of 103 individuals per year is anticipated and there is no institution in the country offering training of this type.

More than half the demand for the Farm School Level category is from the Mahaweli Board. The Department of Agriculture has 8 practical Farm Schools with a capacity of 450 trainees per year and the Department has plans to increase this to 12 with a total output of 650. This would still leave a deficit of 150 per year during the 1978-82 period.

Apart from the trained agricultural personnel and other manpower required in the non-functional activities of this project there will also be a need for large resources of man-power to assist in the planned agricultural activities of the Mahaweli areas. A study of the H area of the Mahaweli Project, where settlement has taken place, shows that the general pattern of labour utilisation in paddy cultivation was affected by the size of the family, their age and education. The size of the families in these areas range from 1-10 members and though it was expected that the ration of three acres given to these farmers could be cultivated with family labour, it was found in the Yala and Maha seasons of 1977 that only about 7.5 percent had cultivated with family labour only. One reason why family labour was not available was that the location of the farmers residence made it inconvenient for farmers to utilize the labour of all members of the family units. As a result of the lower availability of family labour many of the farmers had to use Hired labour, particularly during peak periods of land preparation, sowing, harvesting and post-harvesting. It was observed

ANNUAL AVERAGE FOR AGRICULTURALLY TRAINED PERSONNEL OVER THE PERIOD 1978-1982

Type of Personnel	Average Demand per annum *from all sectors*	*from MDB*
Post Graduate—M.Sc., M.Phil., Ph.D.	72	NS
B.Sc., Level Agriculturists	245	38
Diploma Level Agriculturists	515	85
Farm School Level Trainees	804	155
Rural Agents	282	NS

NA – Not Stated

that during the peak period there was a shortage of hired labour and farmers had to bear heavy expenses by way of providing the hired labourers their meals and lodging. This study also reveals that the youth present in this area were generally not prepared to do agricultural work and though most of them were skilled they did not like to go outside their own area for employment and therefore a correct orientation and motivation of settlers is an issue to which the authorities will have to give serious consideration.

On the engineering and construction side too, a possibility of a man-power shortage has been commented on. One of the country's leading engineers, Mr. A. N. S. Kulasinghe, recently expressed the view that we are short of skilled man-power because we have lost our men to other countries for better salaries and for better working conditions, and we are now compelled to import skilled personnel at rates of pay up to fifty times the salary that can be paid to the indigenous or local counterpart. Mr. Kulasinghe emphasised the need to provide the necessary incentives and conducive working conditions to attract the engineers and other technically skilled personnel who would be required for this project, if the skilled man-power factor was not to become a constraint to construction.

An official estimate of the man-power requirements on the project covering specialist engineers, administrators, qualified technicians, skilled and unskilled workers have been listed as follows:

In 1979 as many as 131,003 persons will be required in the workforce for the Accelerated Mahaweli Programme. An additional 26,250 persons will be required in the following year with the total number expected to increase to 157,254 in 1980, when work on the Accelerated Programme is due to reach a peak. According to those estimates the workforce is gradually expected to shrink to about 72,000 persons by 1982 when the Accelerated Programme, it is hoped, will be reaching its final stages. What is significant in these estimates is that in 1979 almost 600 engineers and 2,550 qualified technical personnel will be required while nearly 9,000 skilled workers will also be needed, and in 1980 there will be a demand for still more specialised personnel. The Mahaweli authorities have found that getting unskilled workers and administrative personnel were not very difficult, but specialist engineers and high grade technicians had to be moved in on secondment from other state institutions or brought into the project through the many foreign firms involved in various sections of the overall Mahaweli project. From the local institutions alone 317 engineers, 615 mid-grade technicians, 147 administrative personnel and 811 skilled workers had to be brought in during 1978 to work full time to assist in implementing the Project's planned work programmes. The balance requirements had to be found and this was a problem for all those concerned.

The experience of construction and development of irrigation infrastructure and social infrastructure facilities during 1978, in the area designated "H" in the Kala Oya basin, has shown that there exists a shortage of experienced staff in engineering, accounting and allied fields at all levels. The procedures for recruitment of skilled and semi-skilled personnel such as drivers, mechanics, etc. have also proved to be a constraint.

The Ministry of Plan Implementation reporting on progress of construction work in the "H" areas has pointed out that "the contract rates offered to the contractors do not appear to be attractive enough to attract contractors from Colombo and other towns to carry out work in the development areas".

The other constraints have been found to be difficulties in co-ordination among the various state institutions; inadequate machine capacity of all types with state or private contractors—this is felt most acutely in excavation and crushing, and machinery and equipment for road work; shortages in transport facilities for materials and personnel; intermittent shortages of all types of material, especially cement, roofing materials and explosives; a most acute shortage of timber; and delays experienced in land acquisition due to the protracted procedure required to be adopted for this type of work.

One result is that out of a total provision for capital expenditure by the Mahaweli Development Board, of Rs. 592.4 million in 1978 actual expenditure during the year totalled Rs. 453.5 million. The Minister in charge of Mahaweli Development has hopes that a successful implementation of the Accelerated Programme could change the economic picture of the country from one of heavy dependence on imports of agricultural products to one of self-sufficiency and possibly surplus for export. It has been aptly described by him as "Sri Lanka's most challenging programme".

The challenge lies in overcoming constraints such as those listed above. The authorities will have to give close consideration to these constraining factors if construction and settlement targets are to be maintained in the areas coming within the Accelerated Mahaweli Development Programme.

ESTIMATED MANPOWER REQUIREMENTS FOR PROJECT WORK IN 1979 / 1981

	1979	1981	*Additional in* 1981
Engineers	599	699	100
Middle Grade Technicians ..	2,553	2,806	253
Administrative Personnel ..	1,705	1,762	52
Skilled Workers	8,978	12,926	— 3,948
Unskilled Workers ..	117,168	139,061	—21,893
Total	131,003	157,254	26,251

FOREIGN NEWS REVIEW

UNCTAD'S ONE-SIDED NEGOTIATIONS

Is the Third World slowly being pushed into the realisation that it really has no soft option, and must rely on itself even to provide the horizontal linkages that would strengthen its bargaining power with the North? This question is posed bluntly by Chakravarthi Raghavan, in a review of the UNCTAD Scene, in the TWDA Dossier of December 1978. Raghavan shows how the North, whether of the East or of the West, holds different views from the UN's mandate to UNCTAD on co-operation within the Third World. This he says, was brought home recently when UNCTAD was asked to organise and convene several meetings on Economic Co-operation among Developing Countries (ECDC) during 1979. These meetings were to involve secretariats of groupings of the Third World, multilateral financial institutions of Third World countries, and sub-regional and regional economic groupings and governmental experts of Third World countries. A programme was drawn up and budgetary allocations for the programme was earmarked. UNCTAD's Trade and Development Board, whose approval was sought, had remitted the detailed examination to the Committee on ECDC and at this meeting in October, both Group B (Western European and others) and Group D (Eastern Europe) countries joined in blocking it. They argued that the UN and its agencies were "universal" in scope and could not service or convene such meetings. This really meant that there could be no ECDC or TCDC, or any other, unless the North had an opportunity to be present and participate and shape it to ensure the continued dependence of the South on the North. It appeared therefore that UNCTAD did not have the necessary mandate to convene the preparatory meetings at regional level for the UNCTAD V Sessions in Manila in May 1979; at least UNCTAD funds were not available. The Colombo regional sessions in early January therefore had to be sponsored by a private research organisation with funds from various other sources.

ECDC was endorsed by the UN General Assembly in 1976 and again in 1977 when it called on the UN Secretary-General to co-ordinate activities within the UN system through the ACC. UNCTAD was given the lead role in ECDC and furnished several studies. A UN General Assembly resolution has specifically urged "the specialised agencies and other organisations of the UN system, in accordance with their established procedures and practices, to support measures of economic co-operation among developing countries, including secretariat support services and other suitable arrangements to facilitate the holding of meetings by the developing countries in pursuance of the objectives of economic co-operation among developing countries." But the view of the North seemed different.

Confronted with this resolution the Group B and Group D took refuge in the words "in accordance with their established procedures and practices". Carried to logical conclusions, Raghavan remarks, it meant that UNCTAD should not service or provide facilities for the various group meetings ... of the 77, of Group 'B' or Group 'D' ... tion, take place in UNCTAD or other fora. Also, the North is already represented at the secretarial and membership levels, in the various regional commissions. But the South has no representation in the ECE. Therefore, ECE should no longer be financed or serviced out of UN revenues. In effect the message for is Alice in Wonderland) to the Third World was that it could have NIEO, TCDC, ECDC or any other concept so long as "words shall have the meaning we assign to them".

The message should have got across to the Third World by now, and when the ministers of the Group of 77 meet at Arusha in Tanzania in February 1979 to discuss UNCTAD V, they have the opportunity of reviewing the position or at least working towards a "collective self-reliance". Raghavan concludes "the Group B appeared anxious to get a commitment from the 77 that they should meet again in November (negotiations till death?) and would not raise the issue or force a solution at Manila. The fear of Manila perhaps is for the technicians at the negotiating conferences that their political bosses might yield under pressure and might find unbridged the technical issues for safeguarding the real international power structure".

The *Economic Review* has commented on more than one occasion of the indefinite character of such UNCTAD sessions. Most often we said, the only agreement arrived at seemed to be "that the conference reconvene ..." The 'North' will go along but not towards what the Group of 77 demands. The Third World Nations will ultimately have to go it alone whether it be the Common Fund or the larger issue of a more just and equitable "New Economic Order".

Typical of the attitude North (as we recorded before) was the comment of the London "Economist", after one of the UNCTAD negotiating sessions in 1977, which interpreted the outcome of the meeting to Lewis Carroll: The talks will go on. And everyone will still be absurd, however reluctant ..."

The Group of 77 will have to come out of the Arusha sessions with a greater sense of solidarity and with a clearer and more concrete programme of action for mutual co-operation, and with negotiating and fall-back positions, which if implemented sincerely and firmly, both individually and collectively in various bilateral and multilateral negotiations, could take the Third World a step forward on the road to a New International Economic Order.

The indications are that some token contributions may come in towards the establishment of a Common Fund. The question is how close these contributions would come to the UNCTAD Secretariat's estimate. The Secretariat has estimated the needs of the Fund at $ 6 billion, of which $ 4.5 billion to 5 billion are considered to be adequate to finance stocking arrangements for the 10 "core" commodities. For a start at least half of $ 6 billion would be required of which the initial paid-in capital would be $ 1 billion. Anything short of $ 3 billion will not help to make the Fund a reality and it is up to the Group of 77 to ensure that at least the minimum comes in.

Sri Lanka's Brain Drain

Devanesan Nesiah

The brain drain from the developing countries to those of the more developed has caused much concern in recent years to the countries losing their scarce professional and technical skills. In this analysis of some aspects of the problem in Sri Lanka Devanesan Nesiah argues that the key motive force in the brain drain has been the absence of satisfactory career prospects, inadequate professional recognition and lack of job-satisfaction. A root cause, however, is the imbalance in development in the country of emigration and possibly in the country of immigration as well. But, whatever the motivation, it is evident that the brain drain amounts to a massive transfer of resources from the poor to rich countries. In a comprehensive paper on "The Brain Drain, Internal and External", presented in November this year to an Asian Seminar on "Employers, Selection for Employment, Manpower Development and Education", he viewed the problem in its historical perspective and made a detailed analysis of the magnitude, composition and direction; individual motivation; cost and benefits of the brain drain and the situation in Sri Lanka with suggested policy alternatives. Here we focus on the situation in Sri Lanka and some possible alternatives for policy makers. Mr. Nesiah who is at present Senior Assistant Secretary in the Ministry of Plan Implementation, in charge of the subject of Social Overheads and Population Policy, has had wide experience in the field of employment and manpower planning as Director, Employment in the former Ministry of Planning and Economic Affairs, as Secretary to the Dudley Seers ILO Mission in 1970 and in the districts as Government Agent in Mannar and in Batticaloa.

The situation in Sri Lanka

Manpower Planning in Sri Lanka is still in the embryonic stage. Till recently it was not listed as a subject or function of any Ministry or Department. "Employment and Manpower Planning" was gazetted as a function of the Ministry of Planning and Economic Affairs a few years ago. "Manpower Planning" is now a subject of the Ministry of Plan Implementation, "Employment Planning" a subject of the Ministry of Youth Affairs and Employment, and "Employment, Employment Information and Unemployment" a subject of the Ministry of Labour.

There has been inadequate co-ordination between different public sector institutions engaged in technical education and training programmes, and virtually no co-ordination with private sector institutions. Consequently some skills are overproduced and many skills underproduced; the levels of the skills produced may also not match requirements. The Ministry of Education has been responsible for university education and the programmes of the various technical colleges and other educational institutions. University education and most of technical education are now subjects of the new Ministry of Higher Education. The Labour Department has training courses in certain fields, mostly at the craft level, open to those self-employed or employed in the private sector. Generally, other Ministries, Departments and public corporations have training courses exclusively to meet their own needs. Some of the major private sector institutions also have training programmes largely for their own requirements.

The National Apprenticeship Board (NAB) set up a few years ago under the Ministry of Industries and Scientific Affairs and now functioning under the Ministry of Youth Affairs and Employment has made some progress towards remedying this circumstance. The NAB has done some research into manpower supply and demand and is involved with both public and private sector agencies in some ongoing programmes for the production of skills. Much of the effort to rationalise training programmes has been undermined by the brain drain which has not been taken into account.

In the Universities the sizes of the different faculties are neither according to the manpower needs of the country nor according to the choice of the students. The rapid expansion of secondary education in the 1950s and 1960s had led to the build up of pressure for the expansion of higher education. In the case of the medical, engineering and other science courses, the intake is determined largely by the capacity of teaching facilities e.g. the sizes of the laboratories and the teaching staff. The intake into the engineering degree courses was stepped up sharply in 1972 with the unplanned upgadring of Katubedde Technical College to University status. This has now led to the easing of the shortage of electrical and mechanical engineers. The shortage of civil engineers remains acute on account of the brain drain, but the annual output of civil engineering graduates is to be doubled. The intake of medical undergraduates is limited by the shortage of teaching staff as well as teaching hospitals. Till recently only Colombo and Kandy General Hospitals were recognised as teaching hospitals. With the upgrading of Jaffna and Galle General Hospitals and the establishment of the Jaffna Medical College and the proposed establishment of the Galle Medical College, the shortage of doctors should ease in due course. Since the medical course is a long one and there is a shortage of doctors accumulated over many years, the shortage is likely to persist right through the 1980s.

In the case of the Arts and Oriental Language courses, there is greater freedom of choice at the University level but in effect even this choice is restricted on account of the limited range of subjects taught in most schools at the senior secondary level. This pressure has resulted in the disproportionate expansion of the Arts and Oriental Languages faculties. The proposed new Universities in Galle and Batticaloa and the new campus at Polgolla are even more heavily weighted in favour of the Humanities. Acute shortages of skills may therefore continue in many scientific and technical fields while thousands of graduates in the Humanities with uncertain prospects of employment enter the labour market every year.

TABLE 1

DEMAND AND SUPPLY OF HIGH-LEVEL MANPOWER TECHNICIANS AND SKILLED WORKERS

(1971–1978)

Category	*Demand*	*Supply*
Engineers ..	1,489	1,880
Architects ..	40	90
Technicians ..	7,950	7,200
Skilled Craftsmen	18,400	19,200
Doctors ..	1,800	1,950
Dentists ..	240	270
Nurses ..	3,620	3,620
Agriculture Graduates	470	450
Agriculture Technicians	1,000	1,000
Veterinary Surgeons	160	160
Science Graduates	7,920	5,150
Teachers ..	26,500	28,250

Source : *'Data on the Demand and Supply of Skilled Workers, Scientists, Engineers and Professionals'. Employment and Manpower Planning Division, Ministry of Employment and Economic Affairs* 14-11-75.

The brain drain has made the situation much more difficult, in that it is mostly for those skills which are in local short supply that there is overseas demand. Particularly where the training is undertaken for a Ministry, Government Department or Corporation to cater to its own staff requirements, the flexibility required to expand the training input to meet such factors as the brain drain is lacking. A comparison of Table 1 showing the projected (domestic, in some cases departmental) demand and supply of high-level manpower skill levels (1971-78) and Table 2 showing the numbers of trained personnel who left for employment abroad in the period May 1971 to June, 1976, explains the shortages that have arisen in the case of doctors and engineers. Many other skills are in short supply for similar reasons.

The administered policy in respect of conservation of essential skills in short supply is largely a sum of *ad hoc* measures introduced and modified over the years as particularly acute skill shortages surfaced. These measures, though essential in particular situations, have no long-term perspective and are designed to temporarily ease rather than solve the problem. Some foreign governments have been prevailed upon to refrain from poaching skills from Sri Lanka's public sector without clearance from the Government. The Compulsory Public Service Act No. 9 of 1971 and the Passport (Regulation) and Exit Permit Act of 1971 were, respectively, designed to restrict the outflow of doctors, engineers and some technical persons whose skills were in short supply and to ensure regular remittances from our citizens working abroad.

There has been some administrative relaxation and at present, it is mostly some medical and paramedical personnel who are affected by the Compulsory Public Service Act. The requirements regarding foreign exchange remittances and exit permits have been done away with altogether. The stipulation regarding signing of bonds to serve the country after scholarship or leave abroad are contained in various circulars and financial and establishment regulations. The instructions contained in the Establishment Circular Letter No. 170 of 18-12-1974 concerning officers proceeding on study or training on full pay study leave and the Establishment Circular Letter No. 179 of 6-3-1975 concerning officers proceeding on no-pay leave, superseded the earlier more stringent instructions and regulations on bonds and agreements. Circular No. 170 was quickly cancelled by the Ministry of Public Administration, but Circular No. 170 is still in force. Generally, the effect of this circular is to reduce the period of obligatory service after study/training abroad on full-pay leave and also to permit the immediate discharge of such obligation on payment of cash.

Some of these relaxations were the consequence of the report of the Cabinet Committee which inquired into the problem of technologically, professionally and academically qualified personnel leaving Sri Lanka—Sessional Paper No. X of 1974. This comprehensive, liberal and far-sighted report by a high-powered Cabinet Committee was the first attempt to take an overall view of the problems of brain drain from Sri Lanka, analyse its causes and work out solutions. The Cabinet accepted these recommendations and decided that they should be implemented with effect from 1 November, 1974. Though an Officials Committee was appointed to work out details for implementation of the recommendations, only a few of

TABLE 2

TRAINED PERSONNEL WHO LEFT FOR EMPLOYMENT ABROAD

	May 1971 Apr. 1972	May 1972 Apr. 1973	May 1973 Apr. 1974	May and June 1974	July 1974 June 1975	July 1975 June 1976*	July 1976 Dec.* 1976	Total
Occupation/Category								
Doctors	108	171	238	41	343	343	110	1,254
Engineers	54	113	94	14	118	498	183	1,074
Accountants ..	23	41	88	11	86	162	98	499
University Teachers	—	15	24	02	14	54	32	141
Other Teachers ..	82	55	52	04	70	279	86	628
Lawyers	08	32	13	02	28	49	35	160
Technicians	—	20	27	15	228	176	71	537
Total	275	450	536	89	787	1,561	595	4,295

* Data were obtained by examining Embarkation Cards.

Source : *'Migration of trained and skilled manpower and unskilled labour to West Asia', Employment and Manpower Planning Division, Ministry of Plan Implementation*, 26-9-78.

Some have been given effect to, and some others have been virtually annulled—as seen by the withdrawal of the Establishment Circular Letter No. 179. Perhaps, it was considered that the effect of some of the recommendations might be to quicken some of the existing skill outflows. In fact the outflow has increased since 1971.

An interesting recommendation in the Cabinet Committee report of 1974 relates to the flow of manpower to developing countries. The Committee has recommended the

exchange of technical personnel with other developing countries on a bilateral basis. This recommendation has been implemented hesitantly and in one direction only—flow out of Sri Lanka. Except for some very recent developments, the initiative has come almost entirely from other countries.

In the 68-month period from May 1971 to December 1976, 1254 doctors, 1074 engineers, 499 accountants, 141 University teachers and 1325 other skilled personnel left Sri Lanka for employment abroad.—see Table 2. These persons constituted about 15 percent of the total number of professional and technical personnel (including teachers) available in the country in 1971. The proportions are particularly high in the case of doctors and accountants, and in both cases, the rate of flow has steadily increased from year to year. These are skills of which Sri Lanka is short. The shortage is very acute in certain medical and paramedical specialities and University teachers in certain subjects. The migration of high-level manpower has been predominently to developed countries, particularly, U.K., U.S.A., Australia and New Zealand.

These figures grossly understate the outflow in that they do not include statistics of many of the Sri Lankans who qualify abroad into the professions. There is an increasing number of Sri Lankans undergoing post-secondary education overseas. The monthly outflow of professionals is of the order of 100 (Table 2) whereas the total monthly emigration is of the order of 10,000 (Table 3). Undoubtedly the latter figure includes many students who seek high-level professional training abroad and who will probably stay overseas after graduation.

A recent development has been the opening and widening of new outlets in West Asia for skill-flows from Sri Lanka. Much of these flows have been of skilled and semi-skilled personnel but there has also been a considerable flow of labour categorised as unskilled. According to one estimate about 20,000 emigrated from Sri Lanka to West Africa in the period 1-1-76 to 30-6-78 including 720 middle-level technicians, 2,840 masons, 2,665

Table 3—EMIGRATION STATISTICS PASSPORTS ISSUED

Month	*Number Issued*
1977 December	8,499
1978 January	9,496
February	8,405
March	10,554
April	8,277
May	10,107
June	11,007
July	11,466
August	10,890
Total	88,701
Average monthly issue ..	9,855

Source : *'Migration of Trained and Skilled Manpower and Unskilled Labour to West Asia', Employment and Manpower Planning Division, Ministry of Plan Implementation*, 26-9-78.

carpenters, 2,197 mechanics and 5,452 categorised as unskilled.* Numerous recruitment agencies have sprung up and are active, some of these of doubtful reputation. Many instances of financial and other malpractices on the part of the employment agencies as well as unsatisfactory conditions of employment in the country of immigration have been reported, but the flow is unabated. A consequence of this emigration is that many vital intermediate and low-level skills are in short supply.

Another important development is that for the first time, Sri Lanka is exporting female labour, mostly classified as semi-skilled or unskilled, in significant numbers. Many unsophisticated 'semi-literate' young women from Sri Lanka are in domestic employment in West Asia. According to one estimate about 1660 females have left Sri Lanka for employment in West Asia in the period 1-1-76 to 30-6-78*. Inevitably this has led to social problems. Some horror stories have been highlighted in the local press, and some pressure has built up to curb the export of female labour. On the other hand it is evident that many thousands of women in Sri Lanka are seeking jobs in West Asia, undaunted by adverse reports.

Unlike earlier emigration to developed countries, this emigration requires the intervention of specialised employment agencies. The Department of Labour has been functioning as the largest recruitment agency for employment in skilled and semi-skilled positions in West Asia. In the period 1-1-76 to 30-6-78 the Department of Labour has assisted the emigration from Sri Lanka and employment in West Asia of 3,252 persons mostly in craft-level occupations. However, several private sector agencies have been functioning irregularly and irresponsibly. The Government of Sri Lanka has now decided to control and regulate the activities of private employment agencies, primarily to protect the emigrant and prospective emigrant. The function of licensing private sector employment agencies and regulating and controlling their activities has been assigned to the Ministry of Labour. The necessary legislation is under preparation.

The concern of the present Government on account of the brain drain is clear from the following extract from its first statement of policy.

"My Government will take measures to relieve the frustration caused among the intelligentsia and other highly trained and qualified persons, resulting in large numbers of such persons who are urgently needed for the development of our country leaving our shores for service abroad, by creating the necessary climate and providing incentives and opportunities for their progress and job satisfaction, not only to halt the tragic 'Brain Drain' in the future, but also to attract those who have already left to return to the service of our people.

"My government believes that the people of our country are entitled to enjoy without restriction the best professional and technical services that are available in the country and will formulate, in consultation with the appropriate professional and technical personnel both within and outside the public services, appropriate schemes to make such services freely available to the people".

This statement has been backed up not only by the decision to expand the training of scientific and technical personnel, particularly, doctors and civil engineers but also by a series of improvements in the salary scales and other benefits. Doctors and engineers have gained most by these benefits which include payment of special allowances, allowance of virtually unrestricted private practice outside working hours, no-pay leave for study/employment abroad, facilities to import cars, and re-employment on satisfactory terms for those who had resigned or retired. (e.g. a wide range

* *R. B. Korale in an unpublished paper.*

of benefits including additional allowances upto Rs. 600/- per month are set out in the Public Administration Circular No. 120 of March 1978 titled 'Exodus of Engineers from Sri Lanka!.' In his Budget Speech of November 15, 1978 the Finance Minister indicated that the sweeping salary increases and tax concessions to State Officers were designed partly to counter the external brain drain.

Government policy in relation to the brain drain is now more positive than ever before. The Minister of Labour visited 5 West Asian countries with large Sri Lankan populations in June 1978 and met and spoke to many Sri Lankans working there. He took up the question of their living and working conditions and also the possibility of further emigration of Sri Lankans to those countries. A report of these visits was presented to Parliament.

POLICY

The internal brain drain is closely related to the external brain drain in both cause and effect. It afflicts all countries, rich and poor, but generally developing countries suffer more. Among developing countries, those in which the urban-rural or other regional differentials are sharpest would be most affected. The obvious remedy lies in the social and economic development of the backward regions on a priority basis, coupled with special incentives to skilled persons to serve in these regions. Very few developing countries have succeeded in effectively implementing such policies. In fact it is the reverse bias which is widely prevalent.

Superficially, the internal brain drain may appear easier to control than the external brain drain, in that its solution is entirely within the competence of the Government of the country, but this may be illusive. The locus of political and economic power is usually in the more developed regions and the urban areas, and this usually ensures that it is the developed areas which receive priority attention for further development, to the neglect of the backward regions. Coercive attempts to stem the internal brain drain without solving the root causes (e.g. compelling Government medical officers to serve in areas and institutions where minimum social amenities or working facilities are not available) may only serve to flood the external brain drain.

Key motive force

A key motive force in the brain drain, both internal and external, is the absence of satisfactory career prospects, inadequate professional recognition and lack of job-satisfaction. It is important to ensure that technical personnel even in remote outposts have reasonable access to professional journals and relevant scientific literature. It is also necessary to ensure that people working in the periphery have opportunities of doing research, and of participating in the activities of scientific and professional bodies. They should not be at a disadvantage compared to their colleagues in urban centres in such matters as appointments and promotions, in the award of fellowships etc.

There are backward areas in almost every country in which the economy is sick and contracting, and from which most of the young and able, the energetic, ambitious and enterprising have fled. The community in such regions may be surviving mainly on state subsidies, the savings and pensions of the older folk, and some money sent to their dependents by those who have migrated to regions with healthier economies. The sick regions on their own can attract neither the capital nor the skills required for economic regeneration. Without substantial and planned intervention from outside, the vicious circle leading to the continued degradation of the region cannot be broken. Generally it is the state which can undertake this task. Central to any scheme of state intervention must be a programme to halt and reverse the brain drain.

Lack of mobility can be just as problematic as excess mobility. This is particularly true of internal migration. Many countries have pockets of persistent labour surplus as well as pockets of persistent labour shortage. In addition, within a town or a region, there may be some occupations for which labour supply far exceeds demand and others for which labour supply falls far short of demand. In Sri Lanka there are many areas in the Dry Zone which suffer severe seasonal shortages of agricultural labour; there are many hill country tea areas which suffer from lack of labour nearly all the year round on account of the repatriation of Indian estate labour. On the other hand the official unemployment figure for the country is over one million i.e. around 20% of the total labour force. Lack of internal mobility both geographical and between occupations accounts for this paradox. It may be possible to clear obstacles to geographical mobility by offering land for settlement, various subsidies and good living and working conditions. Occupational barriers could be overcome by changes in the wage structure and living and working conditions.

Sale of skills

Where the skill shortage is less acute but the training cost or the skill level high (e.g. in the case of electrical engineers and lawyers in Sri Lanka), skills could be sold. There could be government-to-government agreements on outright payment on emigration, or there could be individual bonds to repatriate a specified quantity of money in foreign currency. Alternatively the skills could be loaned e.g. state officers could be released for a period on no-pay leave on bond to return and serve the country for a specified term. Where the training costs and skill levels are low, emigration can be freely permitted, or even encouraged so as to ease the employment problem at home and assist the development of the country of immigration. In certain cases, skill flows can be profitably tied to reverse aid projects, e.g. the flow of doctors to the U.S.A. to U.S. aid to the medical colleges; the flow of engineers to the UK to British aid to the engineering colleges; and the flow of civil engineering craftsmen to West Asia to West Asian aid for craft-level training programmes. There could also be mutually beneficial arrangements for the exchange of skills, particularly with other developing countries.

The bulk of the skilled personnel will be required to stay and contribute to the development of the country. It is most desirable that they should stay willingly and contribute their best. Broadening of higher educational facilities could

assure those contemplating emigration of the education prospects of their children in their homeland. In some cases, salary scales may have to be increased and promotion prospects improved. Although salaries in poor countries cannot possibly be made comparable to those in rich countries, these should be structured to reflect the relative importance assigned to the different skills. Good working facilities and satisfactory living conditions are important. Access to scientific and professional literature, facilities for higher studies, research and professional advancement, and opportunities to gain the recognition at home and abroad should be provided. Fair promotional prospects and a satisfactory system of appointments and transfers are essential.

The economic and social development of the periphery are both vital to stem the internal brain drain. The rural areas must not only hold economic opportunities but also enjoy the benefits of adequate educational, health, housing, recreational, transport, shopping and other facilities. Underdeveloped regions can be given priority in locating public investment, and special incentives such as tax benefits can be offered for private sector investment in these areas. Public officers serving in certain areas may need to be given privileges such as special allowances, transport facilities and living quarters on nominal charges. Special consideration can be given to those who have put in a stipulated minimum period of service in disadvantaged regions in the matter of transfers, promotions, selection for fellowships and special appointments. At present those in the urban centres, particularly the capital, hold the advantage in most of these matters. This bias will be particularly difficult to reverse.

The policies to be adopted in respect of the external brain drain would depend on such factors as the supply and demand of skills, their elasticities, the cost of production of various categories of skills and their relative prices. Where there is severe shortage (e.g. in the case of certain medical specialities and paramedical services in Sri Lanka), temporary prohibition against emigration may be required as well as incentives to attract skills from abroad. This may involve travel restrictions, individual bonds and agreements with foreign governments to refrain from poaching on these skills. These are tolerable only as short-term emergency measures.

The most important proposal of the Cabinet Committee Report of 1974 was the grant of no-pay leave to scientific and technical personnel in the public service to work abroad for up to 5 years, preserving pension rights and gaining incremental credit. This facility would enable officers to serve abroad temporarily, widen their experience and save money in foreign exchange to import cars and other items which may otherwise be out of their reach. It is unfortunate that this recommendation, though originally accepted by the Cabinet, was not implemented. Particularly in the case of the younger, junior and middle grade personnel, this privilege alone could satisfy much of their hopes and aspirations without recourse to permanent emigration. The cost to the State would have been minimal, and other countries would also have benefited. A similar proposal has now been mooted but no firm decision has been given by the Government. Almost certainly in the long-run, and even perhaps in the short-run, the net outflow of scarce skills can be slowed down if such a scheme is currently administered. Most officers keen to do a spell abroad would be willing to await their turn for no-pay leave if they are confident that the scheme is being implemented in a fair manner and that they will not have to wait too long for their turn. In return they will have the satisfaction that their posts would be kept for them with pension rights preserved and increments added. The administrative difficulties in working out a scheme of this nature are not insurmountable.

In some fields, these measures may have to be supplemented by policies to attract back earlier emigrants. Those who had resigned their posts in the public service could be offered their jobs back on the salary points they would have reached if they had not emigrated. Certain categories of personnel have already been given this privilege. There could also be income tax relief in respect of foreign currency earnings brought in, and special concessions in respect of corresponding foreign exchange requirements later for specified purposes such as education. Some progress has been made in the granting of such privileges. Some relief has already been given in respect of import restrictions and import duty.

Some of these policies require the concurrence of other governments. It is only to be expected that countries which have been able to draw all the skills they require from other countries without cost or strings, may not wish to be tied up in various agreements, or pay compensation for the skills they so acquire. On the other hand developing countries cannot tolerate such raiding indefinitely. Joint action by the 'donors', mostly developing countries, and some hard bargaining with 'recipients', mostly developed countries, may be necessary. Multilateral co-operation in this field is essential.

There are promising prospects of mutually profitable agreements relating to the brain drain between developing and developed countries. For example, a developed country may find it difficult or unduly expensive to produce all the skills it requires within its own borders or amongst its own citizens, and may prefer to finance the expansion of a training programme to develop such skills in a developing country, which could in return export some of the skills so produced to the aid-giving developed country. Bilateral agreements are difficult to enforce in the absence of co-operation on the part of other countries to which the emigrant may re-emigrate. Some framework of international agreement is therefore necessary within which various bilateral agreements could be accommodated.

The scope for mutually beneficial agreements between developing countries may be even greater. At the ILO Session in Geneva on 10-6-1975, the former Prime Minister proposed the establishment of an international skilled manpower pool and regional co-operation between developing countries in this matter, but this proposal was not adequately followed up. Comprehensive bilateral agreement covering the sale, lease, loan or gift of skills and related import, export and exchange control policies may be possible.

In addition, there could be agreement on a broad range of issues connected with employment, manpower planning, education, research, training, technical co-operation etc.

International co-operation in manpower studies to estimate present and future (domestic and international) manpower supply and demand may be necessary. Agreement on the development of a network of specialised institutions spread over the region for higher education, professional training and research to serve the region would be valuable. This will involve long overdue shifts away from the colonial heritage in respect of the content and orientation of education and training courses towards curricula and training more relevant to the needs of the region today. Mutual recognition of degrees and diplomas and some measures of standardisation, as well as professional use of training and higher educational facilities in other developing countries, supported by a network of fellowships, grants and subsidies are desirable. The tendency to look exclusively to the developed countries for higher education and specialisation will not be easily broken. Regional co-operation in the sharing of technology and the publication and distribution of scientific journals relevant to the needs and problems of the developing countries are essential. Schemes of national and international awards could be instituted to recognise outstanding achievements of persons from developing countries in any field, and to recognise and sponsor any research or other contribution relevant to the welfare of the developing countries by any person or institution.

The brain drain, both internal and external, can distort and obstruct the development of a country. Strong, positive remedial action may be required. Some of these measures can be taken by an affected country acting on its own; others will require the co-operation of other countries. Most developing countries may find it necessary to formulate and implement clear-cut policies in respect of the import and export, and internal migration of skills. It may be in the long-term interest of all countries that serious cooperative international action on the brain-drain is reached.

The Malaysian Brain Drain

Susan Lim

The "Brain Drain" syndrome is not peculiar to Sri Lanka. Many of the Asian countries which were at some time under colonial rule have in recent years been steadily losing the services of their qualified professionals through emigration. Malaysia is also one such example. We publish, by courtesy of the Pacific Magazines Ltd's *INSIGHT*, Susan Lim's description of how the mounting exodus of young professionals from Malaysia is now reaching crisis proportions. To Australia alone, about 4,500–5,000 find their way each year averaging about 300 a month.

Kuala Lumpur had always been home for Ming. He was born and raised there, just as his parents were, and it was there that he one day shrugged on the legal profession and took his first steps towards becoming a successful businessman. But earlier this year, Ming, his doctor wife and their two schoolage children tore up their Kuala Lumpur roots and moved to Singapore. Among Malaysia's middle-class professionals, particularly Chinese and Indian, Ming's story is by no means unique.

The "brain drain" syndrome is not, of course, peculiar to Malaysia. Industrialised countries such as Britain suffer from it, but in Kuala Lumpur it has reached what some officials privately admit to be crisis proportions. The years 1976 and 1977 were particularly bad, with so many doctors packing their bags and leaving that University Teaching Hospital reportedly could not fill major teaching posts. The Malaysian Medical Association was so alarmed that it called on the Government to take steps to stem the flow. But to no avail. The issue became a matter for public debate, and an extremely controversial one at that, with opposition MPs calling for a full inquiry into why the country was being drained of its best-trained minds. University and Health Ministry officials angrily countered that there has been no difficulties in filling posts left vacant by the emigrant medics.

Most of the brain drain has gone unnoticed by the general public, but the professional classes are still drifting away. If anything, they are doing it in ever increasing numbers. Officials at the Kuala Lumpur embassies of three countries most favoured by Malaysian emigrants—Australia, New Zealand, Canada and the US—report that there has been an increase in recent months in the number of resident visas granted and in the number of tentative inquiries handled. Statistics reveal that the emigrant class is made up mainly of doctors, paramedics such as radiologists and nurses, engineers, accountants, stenographers and secretaries and certain categories of skilled tradesmen. More interestingly, perhaps, is a new group—business entrepreneurs.

Australia's immigration authorities define entrepreneurs as those people with experience, technical competence and capital to provide new products and services or even new industries for the country's economy. Australia clearly values this category of immigrant. In a recent policy statement, the Immigration and Ethnic Affairs Minister, Michael Macellar stated that while the entrepreneurs may be few in number, their contribution has been great. Australia, he said, would continue to welcome them as long as they proved they could aid the economy and provide employment.

But what lies behind the departure from Malaysia of people like Ming, people who live a life of relative luxury, replete with chauffeur-driven cars, amahs for their children and servants? When asked, they invariably reply that it is for the sake of their children. They say the standard of education in Malaysia is declining and there are too few opportunities for higher studies. By education, they believe their children will not acquire the necessary qualifications for the professions that would normally be theirs. But there are other reasons—all of them equally pressing—for the exodus. These are job dissatisfaction, limited opportunities, lack of promotion and insufficient financial rewards. And then there are people who went to University in Western countries and cannot readjust to Malaysia's more restricted way of life.

While most Malaysian parents have now accepted the use of Bahasa (national language) as a teaching medium, many are concerned that the switch means that certificates issued at the end of the fifth and sixth forms will no longer be enough for students to gain admission to foreign schools and universities. Increasingly, these establishments are refusing recognition of certificates from Malaysian schools. As Ming puts it: "I don't care if my children have to learn Swahili in school, provided what they learn is useful and can help them compete internationally, whether for further education or for work".

Falling Standards

Students wanting to further their education abroad now have to sit a proficiency test in English, whereas in the past their "O" (ordinary) level or "A" (advanced) level passes were acceptable for most schools and universities in Britain, Australia, New Zealand and Canada. Official reaction to complaints of declining standards has been one of various reactions. The Deputy Prime Minister Datuk Seri Dr. Mahathir Mohamad, when asked in parliament last December about the situation (he was also the Education Minister at the time) replied that people were leaving the country because they were seeking a better standard of living. The exodus, he said, had nothing to do with dissatisfaction with the education system, pointing out that professionals in Singapore were also leaving in large numbers. When asked if that meant the standard of education there was also falling, the Deputy Premier said: "I'm convinced that if Malaysia were to open its doors to professionals like doctors, we will be flooded with these people from India and Ceylon who would only be too willing to come and practise here, and they would not question the country's education system, as it is better than many others".

This confidence notwithstanding, the criticism continues, and some of it is coming from unexpected quarters. The leading local newspaper, the New Straits Times, which is not famed for its attacks on the Government, had this to say: "Witness our falling standard in Bahasa and English. We seem so intent on swapping this, adopting that, crash-programming something else, there's little energy left to consolidate what we already have".

The debate on standards of education apart, it is also becoming increasingly difficult for many students to enter local colleges and universities. Some institutions have a 90 percent quota for bumiputra (indigenous) students, while for many others the figure is around 80 percent. Even University Malaya, the traditional multiracial university, enrolled more than 80 percent bumiputras this year. Competition for the other places is stiff, to say the least, and all the signs are that the situation will become tougher. Faced with this, the non bumiputras believe there is only one rational thing to do—emigrate.

Frustrations and Disillusionment

For the professionals themselves, the dissatisfaction was perhaps best summed up by the Director of the Institute of Medical Research (IMR), Dr. Francis de Witt, who said recently at a seminar: "Opportunities to earn rewards in terms of promotion, fellowship, substantial hikes are either absent or are far too few. Frustrations and disillusionment set in and they leave. One other official at the IMR says that the Bahasa language requirement for medical officers in government service is also causing much frustration among his colleagues. He says scientists have difficulty in taking time off to study for language exams, and, even worse, those who do take the exams often fail, making them even more discouraged. He says there are at least 18 vacancies for medical officers and research scientists not filled at the IMR alone and that the situation at government hospitals and clinics in the rural areas is even more critical. The seriousness of the situation is perhaps reflected by the fact that hospital assistants have been known to prescribe restricted drugs because there are not enough doctors around. This prompted the New Straits Times to comment: "While the vital role of the hospital assistants is to be appreciated, we should ensure that they are not tempted to do more than they are qualified to do. Human lives are at stake".

While many of the countries presently accepting Malaysian emigrants is actively recruiting them, the fact that they are making it relatively easy for professionals to gain entry as permanent residents means that they are not discouraging them. Australia, whose so-called White Immigration policy in the past (until the change in 1971) was not seen as the most liberal or attractive, at least to non-Europeans, is taking in by far the largest number of Malaysia's emigrants. According to Roger Shelley, the second secretary at the Australian High Commission, about 3,500 to 4,000 Malaysians find their way to Australia each year, averaging about 300 a month. Recently, though, the number of doctors going to Australia has dropped. They now have a little more difficulty gaining entry, with new regulations requiring them to have job sponsorship before they are given permanent residence. This is because Australia is producing enough doctors of its own and can no longer absorb many from external sources. But while Malaysian doctors are no longer being welcomed with open arms, entrepreneurs are being actively encouraged to bear up their Malaysian roots and take their skills with them to Australia.

Pull Factors

About 150 have settled in Australia since this time last year. While there is no limit on the amount of money these businessmen can take with them to their new country, there is a minimum requirement of at least A$100,000 to $150,000. With this cash in hand, there is no need for any qualifications apart from health and character clearance.

Altogether, about 6,000 Malaysians have emigrated in the last 12 months, and this is not counting the large number of students who do not return. There are 6,000 or so Malaysian students in Australia at present and Shelley estimated that about 70 percent of them will not return. The paradoxical thing about the students who do not return is that not all of them are doing work they are trained for. He cited the example of an engineering student who had gone on to a post-graduate degree and had applied to remain in Australia. Asked if he had a job which he was qualified to do, he said "Yes". He was working as a chef in a Chinese restaurant.

India's Fish Economy Part II

John Kurien

In our last issue we carried the first part of John Kurien's study and incisive analysis of India's fish economy and the impact of the entry of big business concerns into fishing in India. This part continues with the entry of the ultra-modern sector and the involvement of the big business houses in the fisheries sector concluding with an assessment of the possible future trends in India's fishing industry.

The understanding was that the exportable species would be sold to the business houses. The big houses which succeeded in this used these 'encouragements' to boost their social responsibility image, with all claims of having provided employment and assisted unemployed graduates and so forth. Several big houses also gradually invested in their own productive facilities (often because the earlier methods were opposed by the merchant capitalists who controlled the marine export trade at that time) and set about seriously to undertaking fishing, marine food processing and export as part of their diversification strategy from their respective monopolies in batteries, biscuits, cigarettes, tea and other products.

The basic features of this ultra-modern sector in the making were the very high degree of technological sophistication and the great dependence on commercial energy. The circuit of economic activity was high investment, high cost, high productivity, high depletion and high pollution. This made it almost inevitable that the end commodities produced in the course of the operations had to be sufficiently high unit value or turnover to ensure reasonably high pay-offs to the interests involved.

One should surmise that this involvement of industrial capitalists has its own internal logic. Their full-scale and committed entry is rationalised by the pursuit of profits which can be had by satisfying the ever-increasing consumption requirements of a metropolitan elite. The mutual interdependence of these priorities—profits and mark of satisfaction—is essential for the survival and expansion of industrial capitalism in fishing. The tie-up between ultra-modern techniques of production and marketing and ultra-modern consumption priorities is easily portrayed and propagated as being socially desirable and wholly undertaken for national interests.

THE FUTURE

In the background of the resource potentials and the brief description of evolution of the economy, we can examine more concretely the main issues that need to be highlighted, the discussion on deep-sea fishing interests and their impact on this fish economy.

Is Deep-sea Fishing Necessary?

To this question the answer is in the affirmative. Survey findings giving the unexploited potential of our resources indicate that as much as 2.21 million tonnes of marine resources lie untapped beyond the in-shore zone. In the in-shore waters the performance of the labour-intensive traditional sector leaves no doubt about the need to reserve that whole zone as the sole preserve of the traditional fishermen, to be exploited only by them. The participation of big fishing vessels using more sophisticated technology for propulsion fish finding, net encircling and hauling becomes necessary in the context of the limitations of the traditional crafts as well as the small mechanised boats. On this ground no total rejection of deep-sea fishing *per se* is valid.

The moot question, however, is not whether deep-sea fishing is necessary or not. The crux of the problem is whether the interests (big business or public sector) that control the deep-sea fishing operations will function in a manner conducive to the healthy and complementary growth and development of all the fish economy.

Encroachment on Traditional Waters

Deep-sea fishing operations by our definition is fishing to be undertaken beyond the 50 metre depth line; and if this can be adhered to, the chances of direct competition between fishermen using non-mechanised craft or small mechanised boats and the larger deep-sea vessels does not arise at all. Catches made in the deep sea do not affect the level of catches made in the in-shore waters. The question that needs to be asked is whether or not these vessels will restrict their operations to the deep sea.

There are several reasons to suspect that there will be direct competition. Take the case of the shrimp trawlers now being imported in large numbers. Irrespective of whether they are operated by big business houses or public sector fisheries corporations they have to catch and export prawns worth the value of their import licence in a certain period of time. There is a pressure to show performance, achieve targets and make profits. This means catching as much prawns as possible in the most economic manner of operations.

Authoritative data show that prawns in the deep-sea zone (50-200 mts.) are to be found in abundance only off the SWCR* with small quantities off the LECR* and UECR.* Deep-sea vessels operating off the SWCR.* stand to windfall gain; logically therefore, assuming a commitment to deep-sea fishing, there should be a concentration of vessels in this region. However, it is important to note that the other area where there is a greater abundance of prawns at present is in the in-shore zone off the UECR* Not accidentally all the big business houses now engaged in the marine export business have

* The Indian Exclusive Economic Zone (EEZ) is broadly divided into 4 regions:
North-West Coast Region (NWCR) comprising Gujarat and Maharashtra;
South-West Coast Region (SWCR) comprising Goa, Karnataka and Kerala;
Lower-East Coast Region (LECR) comprising Tamil Nadu, Pondicherry and Andhra Pradesh and the Upper-East Coast Region (UECR) comprising Orissa and West Bengal.

their base of operations in this region and it is inevitable that their deep-sea trawlers will also, by sheer economic necessity, increasingly concentrate their operations in this region and zone.

In the face of these realities the pronouncements of the Agriculture Minister that trawlers of the large houses would be kept 45 miles (72 kms.) away from the coastal areas are tantamount to hoodwinking. This is clear from the fact that the distance to even the edge of the continental shelf in the regions where deep-sea prawns exist is only 37.5 km. in the LECR, 68.4 km. in the UECR and 83.1 km. in the SWCR.

The likely ingress into the in-shore waters will therefore be mainly in the UECR where the levels of exploitation are very low. Present underexploitation in this area will also be used to explain away the ingress of deep sea vessels as not resulting in less scope for competition.

Such pronouncements may seem the more blatant form of exploitation, juxtaposing the ultra-modern with the traditional sours the loquacious politicians in defence of the oppressed and the downtrodden. However, this may be a futile and a short-term solution even if it becomes possible to ensure that deep-sea vessels make no physical infringements on the in-shore zone, by the use of the navy or coastal guards. The real exploitation, more subtle, less apparent and visible, will be the competition in the final market which is the same for the prawns, cuttle fish and tuna caught by both the deep-sea vessels and the traditional fishermen on non-mechanised or mechanised boats.

Conflict of Interests

The three major interest groups in the fish economy consist of the traditional fishermen, the merchant capitalists, and the business houses. We saw in our description of the working of the fish economy how ultimately all the three cater to the same elite metropolitan consumers. The vital difference is that whereas the big business house is part of an integrated production marketing consumption network linked to the world capitalist economy, the traditional fisherman is a marginal participant linked to it through the aegis of the merchant capitalists who presently dominate the marine export trade of the country. Dominance in the market by the big business houses will affect this class of merchant capitalists and in turn have its repercussions on the traditional fishermen. Thus, on a more careful analysis we find that the most vociferous opposition to the entry of the big business interests is from the spokesmen of this merchant capitalist class.

Their battle has been long-drawn. In the early seventies, with the initial entry of the Industrial capitalist houses into the marine export trade, by using some of the merchant capitalists as their agents for procuring and processing of the marine products, a great panic struck the old hands in the trade who had reaped their millions in the windfall profits made in the prawn rush of the sixties, especially in Kerala. Under the aegis of the Marine Products Export Development Authority (which was still in their control) a report was submitted to the Central government on the "need for and steps to be taken towards protecting and developing the interests of small and medium scale entrepreneurs who are in the marine products industry". The crux of the argument in the report was based on the question of motives. It said that whereas the small and medium-scale entrepreneurs interest in the development of the fishing industry was, both "motivated and deep" the big business houses came into the fishing industry only for making a quick profit from transactions in import licences and have "no stable or lasting interest in the industry or its development on healthy lines". A series of recommendations were suggested to curb the activities of the big business houses, the most significant one being that they should not be allowed to procure raw material from the traditional producers or the processors but should employ their own deep-sea fishing fleet, catch their own fish and export it.

In principle this seemed to have been accepted by the government which in turn placed restrictions on the business houses as regards purchasing and processing marine products which are not caught by their own vessels. Recent reports that the big business houses have been unable to utilise their own freezing plant capacities to the full because their own vessels are not in a position to supply them and their raw material requirements confirms the effectiveness of these restrictions.

The fear of the merchant capitalists is undoubtedly because they know that the big business houses have a clear edge over them in terms of finance, control over production, and what is most crucial in this field, the control over the market. Though the marine export trade of the country has progressed quantitatively by leaps and bounds (between 1950 and 1976) the volume of marine exports of India increased by 2709 per cent. from 0.23 lakh tonnes to 6.22 lakh tonnes, and in value by 4009 per cent. from Rs. 3.0 crores to Rs. 179.86 crores, though in terms of quality standards, product diversification, market strategies and the like it has miles to go. The root cause of this backwardness has been the approach of those who presently control the trade; having no direct responsibility for the production as such, they trade where they can and what they can, the motive being quick current profits by circulation.

The big business houses being directly involved with production and having long-term profit horizons will pay closer attention to the process of social reproduction and can hence be considered more 'civilised'. For that reason they may be more acceptable to those who come into contact with it — especially the consumers.

The implications of this are that the big business houses will be in a position to capture the market from the 'old hands in the trade' and thus substantially erode their business and their profits. As a matter of fact, the process has already begun with the announcement of the leader of a Japanese marine products importers' association, following some large-scale rejection of exported sea-foods on quality grounds, that they are preparing a list of names of 'selected Indian exporters' with whom they would advise their members to have dealings. The vast majority of the 'old hands' may not feature in this list.

The opposition to the big business houses entering deep-sea fishing operations by the present interests in the marine export trade has evolved in this background. The wider implications of such a setback to the 'old hands' are of more crucial consequence.

In the states where the expor processing and trade is carried on a a greater tempo—as for example in Kerala and Tamil Nadu—the merchant capitalist exporters have built up a large, extensive network of entrenched backward linkages. This goes down to the traditional fishermen in remote fishing villages and to those on the small mechanised boats operating from a few centres, through—hierarchy of middlemen and agents. The dependence of the fishermen on this hierarchy for the sale (most often on part-credit) of all exportable species caught by them is virtually total. Having no alternative sources who will procure their products on better terms (in spite of the numerous marketing co-operatives and fisheries corporations) all losses and setbacks experienced by the processors/exporters are passed down the hierarchy until finally the fishermen (who anyway got it 'free' arguethe middlemen on the shore) bears the total brunt.

It is apparent from this that greater penetration of the ultramodern big business interests can lead to tne total marginalisation of the traditional fishermen. Safeguards to prevent such an eventuality are essential. The role of fisheries corporations to fulfil this task is subject to question because they operate their backward linkages in exactly the same manner as the merchant capitalists, with the exception that they have 'accredited agents'. The only solution seems to be a large base of genuine, well organised producer co-operatives (comprised of producers alone) who will take the responsibility for marketing all the fish of their members in the manner best suited to the kind of species being handled.

Protein for the Masses

It has been the traditional fishermen using their rudimentary craft and gear who have caught the fish which ultimately reached the rural consumers. Over time this linkage between traditional producers and rural consumers has been strengthened primarily because the labour-intensive nature and the non-commercial energy usage of both traditional fishermen and small distributors kept costs of production low and hence prices within the reach of the low purchasing power of rural consumers—classic case of production for the masses by the masses.

Low purchasing power of the masses is a reality that needs to be in mind in any discussion of protein for the masses. The linking of the vast untapped resources at sea to the crying protein needs on land will therefore crucially depend on the nature of operations (cost, type of technology, spatial distribution, etc.) that will intervene to convert resources into cost-competitive supplies.

Protein for the masses is a proposition of basically catching more of the smaller, less fleshy, bulk quantity species; it means more anchovies, sardines and ribbon fish in preference to prawns, promfret and seer. Since such resources are also available in our deep seas the question is whether deep-sea fishing vessels will fish them out and if so whether this fish will reach the rural consumers at a price which they can afford.

The main attraction of the smaller less fleshy fish to the deep-sea fishing interests is that such fish are available in bulk quantities, as the data show. Given the spiralling of world market prices for fish meal following the collapse of the Peruvian anchovy, considerable attention will be focussed on the bulk resources of the smaller lower-priced species for this purpose. Here again, given the interests controlling the deep-sea operations, when the option is between fish meal for earning foreign exchange and protein for the masses, the choice is obvious.

To believe that deep-sea fishing is an effective means of supplying protein for the masses is the result of a naive understanding of the logic and language of the market. To propagate such a policy tantamounts to concealing purely commercial pursuits by proclaiming socially desirable objectives.

Resource Depletion

The declaration of 20-mile exclusive economic zones by maritime states the world over comes in the wake of a global concern for the fast depletion of fishery resources. (There are reports in the world press about the 'disappearance' of anchovies, salmon, sardines, halibut, cod, erring and haddock. World marine fish landings have been decreasing every year since 1970).

Often the tendency is to attribute fishery resources depletion to inefficient factor allocation alone. This is but the consequence; the cause lies basically in the profit motive which dictates the patterns of production.

In any big industrial fishing operation the basic objective is to maximise current profits. At the initial stages the existence of super-normal profits (because of large unexploited resources) encourages rapid expansion of the industry until profits are totally competed away (when the optimal exploitation levels are reached) and consequently leads to losses when the resources have been depleted beyond revival.

The classic example of this whole cycle operating in a period of 20 years is the case of the Peruvian anchovy. In 1955 the anchovy catch in Peru was 0.5 million tonnes. The fish then was the chief source of food for the guano birds and also supported a small traditional fishery industry. With the demand for fish meal to hasten the fattening of table birds and hogs for American consumers, the anchovy catch rose to an all-time high of 12.5 million tonnes (20 per cent of world marine landings) in 1970. To achieve this a phenomenal increase in capital investment in boats and fish meal processing factories was undertaken. Between 1957 and 1966 alone the investment (gross in 1963 prices) increased from £5.5 million to £263 million. This accounted for an increase in the number of registered boats from 272 to 1,932 and fishmeal processing capacity from 242 tonnes/hour to 7,321 tonnes/hour during the same period. However, after 1970, due to a thorough overexploitation the anchovy 'disappeared' spelling catastrophe to the whole industry. In 1973 the catch was only 2.3 million tonnes and in late 1977 IMARPE, the Peruvian marine institute, announced a possible total ban on anchovy fishing which may last for/upto four years.

Encouragement of sophisticated technology and its protagonists will certainly yield enhanced levels of exploitation at present but would spell disaster for the future of both fishing and fishermen.

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