

THE MAHAWELI DEVELOPMENT PROJECT

- AN OVERVIEW

by

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There is no doubt that the Mahaweli Development Project has captured the imagination of the population of this country. It has its supporters and critics. Considering the fact that I have been associated with this project for the last 14 years I feel it my duty to speak on this project on this occasion. As far as I am aware the first meaningful step to develop the resources of the Mahaweli Ganga was taken on the 7th of February 1958 when the Government of Ceylon and the United States Operation Mission to Ceylon entered into a Project Agreement which provided for a joint program in water resource planning with special emphasis on the preparation of a plan for the total multi-purpose development of the water resources of the Mahaweli Basin. This was followed by the UNDP/FAO/Sri Lanka Team which made a comprehensive study between 1965 to 1968. This team studied the Mahaweli and adjacent basins and mapped out the development of the Northern and Eastern dry zones and identified several dam sites and irrigable areas for development.

The Mahaweli Ganga is Lanka's largest river. Rising in the central hills 2500 meters above mean sea level, it meanders over 335 kilometers to discharge into Koddar Bay South of Trincomalee. Draining more than 16 per cent of the island's land area, the Mahaweli in its serpentine journey to the sea carries some 10 billion cubic meters of water which is more than 20 per cent of the total run off of all the island's rivers. It is an enormous resource as far as this country is concerned.

In spite of the favourable rainfall and soil conditions in the basin and the large hydro-power potential of the river's steep gradient in the upper regions, the Mahaweli remained one of the least exploited river systems in Sri Lanka. About 72% of the land suitable for agriculture in the river basin remained under jungle and less than 10 per cent of the river run-off was utilized for irrigation.

The more enterprising Kings of ancient Sri Lanka, heirs to a remarkable tradition of irrigation engineering, left behind evidence that they had the measure of the might of the Mahaweli and had indeed come to grips with in at least a few places.

The development of the water resources of the Mahaweli for agriculture in the Dry Zone has figured prominently in the plans of Sri Lanka's national leaders in modern times, particularly after Independence in 1948.

The great advantage of the Mahaweli river, unlike the other rivers which flow through the Dry Zone is that it is able to harness the heavy rainfall of the central hills and take it right across the Dry Zone for over a distance of over 150 km.

The aforesaid UNDP/FAO/ Sri Lanka Team Study resulted in the multi-phase, multi-stage Master Plan, the "Mahaweli Ganga Irrigation and Hydro-Power Survey of 1969". This Master Plan envisaged the development under irrigation of 364,000 hectares of land in the Dry zone, which included improved irrigation facilities for 99,500 hectares of already developed land. Of the new lands, 145,500 ha, were in the basin of the Mahaweli and Maduru Oya and 119,000 ha, in the North-Central part of the island. This plan also envisaged the generation of 2037 million kilowatt hours of hydro-power energy with an installed capacity of 600 MW of hydro-power. It is of interest to note that the installed capacity of Mahaweli Power House is currently 660 MW and presently generate 50% of the annual requirements of the country.

UNDP/FAO plan envisaged construction of a series of reservoirs on the Mahaweli Ganga. Its tributary the Amban Ganga, the Maduru Oya, Kala Oya and Malwatu Oya. The first phase consisted of the construction of the Polgolla - Bowatenna complex, the Victoria - Minipe diversion and the Moragahakanda Reservoir to benefit 135,000 hectares of land under irrigation and installation of 200 MW of power generation. The second phase proposed the development of 96,000 hectares using the storage of water from the Victoria and Moragahakanda Reservoirs and installation of approximately 150 MW of power. The Third Phase was for the construction of the Kotmale and Randenigala reservoirs and development of other tributaries of the Amban Ganga to irrigate parts of the North Central Province, and installation of approximately 380 MW of Hydro-power.

The construction schedule of the Master Plan was phased over a 30 year time period. The plan was drawn up on the basis that the country did not have the resources to implement more than one major project at a time. Basically the Mahaweli Project at that stage was to provide irrigation for agriculture and water for domestic use, to generate Hydro-power for a whole range of agro- based industries in the Mahaweli area and elsewhere, provide effective flood control and most important, open out new land for agricultural settlement.

Work on the first project of the Master Plan, the Polgolla - Bowatenna Diversion was inaugurated on 23rd February 1970 by the late Hon. Dudley Senanayake, the then Prime Minister and his Minister of Lands, Irrigation and Power, the late Hon. C.P. de Silva. The main components of the Project were the Polgolla Diversion Dam and Tunnel the Ukuwela Power station and the Bowatenna Dam and Tunnel. The Project was completed in 1976. benefitting 53,400 ha. of existing land in Anuradhapura, Polonnaruwa and Trincomalee districts.

The development of 28,700 ha. of new lands in the Kandalama and Kalawewa areas, known as 'H' area is now complete and over 30,000 families have been settled in this area. Eight new townships, twenty six village centres and hamlets, have been set up to provide facilities for education, health, agriculture inputs, marketing, agricultural processing and consumer supplies.

By 1977 the economy had ground to a virtual standstill with large imports of rice, rolling power cuts and a million persons unemployed.

When the new government came into power in 1977, it was realised that these problems needed immediate attention. It was felt that the country could not wait very long to find answers to these problems. Therefore, the new Government re-examined the step-by-step implementation of the Mahaweli Master Plan. It felt that the Plan lacked dynamism and did not relate to the harsh economic realities which faced the country at the time.

The Government therefore decided to telescope the implementation programme proposed in the Master Plan into an accelerated programme of six years which included only the major projects of the Master Plan. The Government was prompted by many motivating considerations to accelerate its implementation within the shortest possible time. The imperatives of keeping the nation fed, reducing the annual drain of foreign exchange resources of the country arising from imports, the need to

control the rising prices of food and the problems of acute unemployment were among the main considerations. The Ministry for Mahaweli Development was set up to implement the decision of the Government to accelerate the Mahaweli Programme. It set up under this Ministry the Mahaweli Authority which was made responsible for the overall planning, co-ordination and implementation of the programme.

The Ministry functioned as an umbrella organization and had under it the Mahaweli Development Board and the Central Engineering Consultancy Bureau as the chief agencies executing the Mahaweli Programme. Other organizations involved were the Department of Irrigation, the Survey Department and the River Valleys Development Board.

The Mahaweli Authority was incorporated by an Act of Parliament on March 22, 1979. The functions of the Authority were -viz.

To plan and implement the Mahaweli Ganga Development Scheme including the construction and operation of reservoirs, irrigation distribution system and installations for the generation and supply of electrical energy.

To optimise agricultural productivity and employment potential and to generate and secure economic and agricultural development within any special area.

To conserve and maintain the physical environment within any special area.

To further the general welfare and cultural progress of the community within any special area and to administer the affairs of such area.

To promote and secure the participation of private capital both internal and external in the economic and agricultural development of any special area, and

To promote and secure the co-operation of government departments, state institutions, local authorities, public corporations and other persons, whether private or public, in the planning and implementation of the Mahaweli Ganga Development Scheme and in the development of any special area.

The Accelerated Mahaweli Programme envisaged the construction of a series of reservoirs with hydro-power generation.

Originally it included the construction of the Kotmale, Victoria, Maduru Oya, Randenigala and Moraghakanda projects simultaneously in a single concerted construction phase. A later review of the implementation strategy by the Netherlands Consultancy Firm NEDECO pointed to a situation that with proper water management, the construction of Kotmale, Victoria and Maduru Oya reservoirs alone would be sufficient to irrigate the land area and generate hydro-power to the extent required under Accelerated Programme. However, the Government decided to take up the construction of four reservoirs, including the Randenigala reservoir along with the three recommended by the NEDECO studies. The construction of Randenigala was proposed solely on the basis of the country's energy requirements anticipated around the late 1980s.

The Accelerated Mahaweli Programme was therefore brought down to three main components comprising the main headworks projects of Victoria, Kotmale, Maduru Oya and Randenigala, the downstream engineering works dealing with diversion works and lastly the irrigation and development of downstream areas which include Systems B and C and later A and D, the balance lands in System H and some lands in System G comprising the old Elahera colonisation scheme.

The basic features of the project falling within the Accelerated Programme covered the irrigation and drainage systems and generation of Hydro-power. Many countries were in agreement with the development strategy of the Government and readily responded to requests for assistance. They agreed to finance individual projects.

The Government of the United Kingdom agreed to finance the Victoria Project, the Government of Canada the Maduru Oya Project, the Government of the Federal Republic of Germany the Randenigala Project and the Government of Sweden the Kotmale Project. The Government of the United States of America, Japan and Saudi Arabia, Kuwait and International Agencies agreed to finance the downstream development programme.

Headworks

Much has been written about the main dams and reservoirs and I do not propose to discuss them here at any great length.

Kotmale Project

The Kotmale Project was one of five major headworks projects undertaken under the Accelerated Mahaweli Ganga Scheme. It develops the hydro-potential of the

major right bank tributary of the Mahaweli Ganga, the Kotmale Oya.

This consists essentially of a regulating reservoir on the Kotmale Oya formed by a rock filled dam with an upstream concrete membrane at Kadadora a point about 6½ km upstream of its confluence with the Mahaweli Ganga and a system of tunnels and shafts that leads the water to an underground power station (the only underground power station in Sri Lanka) on the right bank of the Mahaweli Ganga another 6½ km downstream of that confluence. The primary function of the project is the generation of electric power but additional irrigation and power benefits arise from the improved regulation of river flows at the Polgolla diversion immediately upstream of the Victoria reservoir. The present Kotmale Dam top elevation is 706.5M MSL and provision has been made to raise it to elevation 735 m MSL in the future. Construction work on the Kotmale Project commenced in February 1979. The reservoir was impounded in November 1984 and commercial power generation commenced in June 1985. The project was ceremonially commissioned in August 1985.

The Dam and the appurtenant structures have been handed over to Headworks Administration, Operation and Maintenance (HAO & M) Unit of MASL while the Power House and the connected structures have been handed over to C.E.B. for operation and maintenance.

(Basic Parameters - Annex 1)
(Costs - Annex 2)

Victoria

Victoria Multipurpose Project was the first of the four large multipurpose projects to be completed. It was ceremonially commissioned in April 1985. This project is one of the key elements in the Mahaweli Master Plan. Following a study in 1962 of the resources of the Mahaweli Ganga basin by the Hunting Survey Corporation of Canada, a Master Plan for the development of the basins's hydro electric and irrigation resources was completed by the FAO/UNDP/Sri Lanka Team in 1968. This Plan identified the Victoria Falls site as a prime location for a dam and storage reservoir. A feasibility study commissioned in May 1978 and completed in early 1979 formulated a project for both power and irrigation.

(Basic Parameters - Annex 3)
(Costs - Annex 4)

Maduru Oya Project

The Maduru Oya Reservoir forms part of the Mahaweli Accelerated Programme for the maximum utilisation of the water resources of the dry zone in a basin adjacent to that of the Mahaweli. The reservoir with a capacity of 595.5 million cubic meters at full supply level will irrigate 47,500 hectares of new land in System 'B'. This was the first major irrigation project to be completed under the Accelerated Mahaweli Programme in October 1962.

The dam consists of zoned rockfill with a central clay core. At the time of locating the new dam axis, the remains of an ancient earth dam was discovered at the proposed site. As a result the dam axis was moved upstream. The natural flow from Maduru Oya can irrigate only about one third of the land available in System 'B'. Therefore the Maduru Oya reservoir is augmented by Mahaweli water from Minipe through a transbasin canal to Ratkinda/Ulthiya reservoir complex and from there through a 5.4 km long tunnel to supplement the Maduru Oya reservoir.

During excavation of the Right Bank outlet, the ancient Maduru Oya sluice was discovered. Hence the layout of the new outlet was modified to preserve this artefact of the ancient hydraulic civilization for posterity.

Provision has been made for installing two power plants of 4.8 MW on the left bank and 2.4 MW on Right Bank. The Left Bank Canal has been constructed for full development. The Right Bank main canal has been constructed upto 1.9 Km including the reservoir (called NDK) which is formed by a 17 meter high earthfull dam across three streams known as Nagolla, Kadunna and Dee Ela streams.

Benefits

Cultivation of the land coming under Maduru Oya Project is expected to reduce the expenditure on Food Imports by 150 Million Rupees annually. Other benefits include employment in farming, fish in Maduru Oya reservoir, Agro-Industries and resettlement of people in new land. A wild life sanctuary upstream of the dam has been established.

(Basic Parameters - Annex 5)
(Costs - Annex 6)

Randenigala/Rantambe Project

The Randenigala Project is the last of the major Multipurpose Projects undertaken in the Accelerated Mahaweli Programme. It consists of two dams at

Randenigala and Rantambe. Randenigala is the largest reservoir under the Mahaweli Programme, and is located 6 km (3.5 miles) upstream of Minipe anicut from where the new main Right Bank and the old Left Bank canals take off for irrigation development downstream. This project will generate about 525 GWh of electrical energy or 20 per cent of the country's present annual electrical energy requirement and will act as the most important regulating reservoir for water management of System C and B and later for System A.

The Project consists of the construction of a rock-fill dam across the Mahaweli, creating a reservoir of 860 Million cu.m capacity. The rock fill dam, spillway and power station were completed in 1986 to schedule.

Project Benefits

Irrigation

The Randenigala reservoir will regulate the water release of the Victoria reservoir and will provide supplemental irrigation benefits to Systems A, B and C.

Power

The Randenigala power station will generate 428 GWH of firm energy and 100 GWH of secondary energy.

Cost Estimates

The originally estimated cost of the Randenigala Dam and hydro- electric unit was Rs. 700 million, including a foreign component of Rs. 350 million the allocation for irrigation being Rs. 415 million and for power Rs. 285 million.

Randenigala Civil Contractors (RCC), a Joint Venture of the three construction firms Dycherhoff & Widemann, Bilfinger & Berger, and Alfred Kunz of the Federal Republic of Germany was awarded the Civil Works contract which is the main component of the project.

(Basic Parameters - Annex 7)

(Costs - Annex 8)

Rantambe Project

Rantambe Dam is located just downstream of the confluence of Uma Oya with Mahaweli Ganga, about 3 km. downstream of the Randenigala Dam and 2.5 km upstream of the Minipe Anicut. The primary function of the project is the generation of electrical energy using the water releases from Randenigala reservoir and the flow of Uma Oya. In addition the Rantambe reservoir provides "buffer storage" which will enable Randenigala power plant to generate full peak power without loss of irrigation benefits.

The Rantambe reservoir will regulate the outflow from Randenigala to satisfy the irrigation water requirements of Minipe Left Bank and Right Bank Transbasin canals.

The contract for civil works was awarded to Zueblin-Hochtief Joint Venture (ZHR) of Federal Republic of Germany, in December 1986. The contract for the installation of Hydro-mechanical equipment, Mechanical equipment and Electrical equipment were awarded to the firms DSD Dillinger Stahlbau GmbH, Sulzer Escher Wyss GmbH and Asea Brown Boveri AG, respectively of the Federal Republic of Germany. The consultancy services were provided by Joint Venture Randenigala (JVR) in association with the Central Engineering Consultancy Bureau (CECB).

The foreign cost of the project was financed by a loan of 230 million DM, provided on concessionary terms by the Federal Republic of Germany. The Ceylon Electricity Board financed the local component amounting to Rs. 1050 million.

(Basic Parameters - Annex 9)

(Costs - Annex 10)

Today, after a decade, the completed Hydro Power Projects have made a valuable contribution to the economic development of Sri Lanka by more than doubling the installed capacity of the Ceylon Electricity Board and generation of 10,821 Gigawatt hours of energy. The gross revenue in respect of the power so generated amounted to Rs. 18 billion (approx) as at end July 1991 at current prices.

(Power Generation - Annex 11)

Foreign Assistance

The Mahaweli Projects collectively and individually have been by far the largest and the most ambitious development projects undertaken in Sri Lanka and the case for foreign aid and international support was made on the basis that the food, employment and energy problems would be solved with the completion of the Accelerated Mahaweli Programme.

International institutions such as the World Bank cautioned the government about the problems involved in the accelerated implementation. We were appreciative of their concern because without adequate resources, embarking on a Project of this magnitude would be tantamount to adventurism. But our social and economic problems were such that there was no other alternative.

The tremendous task of mobilization of financial, technical, human and other resources on an unprecedented scale had to be undertaken. As one can well imagine, such a mammoth and ambitious project called for the harnessing of resources particularly the raising of foreign funds for the construction of the dams, power-houses, transbasin canal and for the implementation of the various downstream settlement programs. In this regard the government was fortunate to be able to obtain the necessary funds either as grants or as soft loans from friendly Governments and Financial Institutions.

International financing agencies and friendly countries appreciated the economic problems facing Sri Lanka and the vital role the Accelerated Mahaweli Programme would play in their solution. These countries stepped forward readily with assistance towards the successful implementation of the Programme. The World Bank took an active interest in co-ordinating the foreign aid required and special sessions were held at the annual Aid Group Meetings to discuss exclusively the Accelerated Mahaweli Development Programme.

The quick response and the ready co-operation that the international community showed in providing the financial and technical resources for the implementation of these projects is significant. One factor behind the favourable responses was that within two years of the announcement of the Accelerated Programme, the government had arranged to complete all aspects of the programme and linked donors with the main elements of the programme. The Sri Lanka Aid Group mobilized and channelled the external resources that were forthcoming from donor countries and international institutions under the co-ordination and the sponsorship of the World Bank. Almost 70% of the funding was from foreign sources. The total foreign funding commitment amounted to approximately Rs. 25.0 Billion.

The bulk of the foreign aid for the Mahaweli projects came in the form of project grants and loans from different donor countries.

The unusually large flow of funds to the Mahaweli scheme is evident in the disbursement of project loans as between the Mahaweli and other key sectors. In the period 1978 - 1985, a sum of Rs. 19.4 billion or 39 per cent of total project loans had been for Mahaweli development. Total project loans for rural sector development was Rs. 5.9 billion or 8.7 per cent, for plantations Rs. 3.4 billion or 3.6 per cent, for industry Rs. 2.4 billion or 4.4 per cent, fisheries Rs. 1 billion or 1.9 per cent, health and malaria Rs. 0.9 billion or 1.7 per cent, livestock Rs. 1.9 billion or 3.4 per cent, water supply Rs. 2.0 billion or 3.9 per cent,

transport Rs. 2.2 billion or 4.5 per cent and telecommunications Rs. 2.4 billion or 4.7 per cent.

(Sec Annex 12)

Foreign Contractors

Nearly 70% of the funding of the headworks was coming in through foreign sources and in terms of the conditions of the foreign assistance received for the Project the principal contractors were generally from the country which provided such assistance. This level of funding and inflow of funds had never occurred before on so large a scale on any other project in Sri Lanka's history.

In the case of the Maduru Oya Project a consortium of four Canadian firms was awarded the construction contracts while on the Victoria Project Balfour Beatty Nuttal of the United Kingdom was awarded the contracts for the dam and tunnel construction works. M/s Costain International of U.K. carried out the Power Station Contract.

At Kotmale the contracts for initial underground and Reservoir works were awarded to Messrs Skanska Cementguterist and the contracts for the Electrical and Mechanical works to ASEA both of Sweden.

The Randenigala contracts were awarded to a Joint Venture of three firms, Dycherhoff & Widemann, Bilfinger and Berger and Alfred Kunz of the Federal Republic of Germany.

Similarly, foreign consultants were also made responsible for each of the foreign funded projects.

Downstream Engineering

The main focus of the Mahaweli downstream development effort is directed towards the planning of development areas in relation to the availability of water in the system as well as other factors such as soil types and topography, the planning of social and irrigation infrastructure in the development areas.

The availability of irrigation facilities in the new lands was a pre-requisite for the re-settlement of farmers transferred from the over-populated regions of the country.

Water releases from the Kotmale, Victoria, Randenigala and Rantambe reservoirs power generation is diverted at Minipe and is conveyed through the Right Bank Transbasin Canal into the Ulhitiya-Rathkinda service reservoirs. System C is irrigated by two major canals, one

taking off from the Left Bank of the Ulhitiya Reservoir and the other from the Right Bank of the Rathkinda Reservoir.

A Link tunnel from Ratkinda reservoir is used to augment supplies of the Maduru Oya reservoir to be used for the irrigation of System B.

The preliminary designs for the downstream complex were done by the Irrigation Department and the final and detailed designs by the Mahaweli Engineering and Constructions Agency with assistance from Sir Alexander Gibb and Partners. The supervision of all construction work was by the Mahaweli Engineering & Construction Agency (MECA) with advice from Nippon Koei Co. Ltd of Japan.

The Minipe Headworks consist of a new Anicut across the Mahaweli Ganga, a Head Sluice and a Silt Ejector. The New Minipe Anicut is located 2 kilometres downstream of Rantambe Reservoir, the lowest reservoir on the Mahaweli cascade. The Headworks were constructed by the State Development and Construction Corporation at a total cost of Rs. 13.2 Million. The Sri Lanka government provided the funds.

The Right Bank Transbasin Canal which conveys water from Minipe Head Sluice to Ulhitiya - Ratkinda reservoirs for use in Systems B and C is the largest canal in Sri Lanka. It has a capacity of 64 cubic metres per second and is concrete lined. The canal in its 30.8 kilometer length crosses four major tributaries of the Mahaweli - namely, Badulu Oya, Loggal Oya, Heppola Oya and Diyabana Oya. The construction work upto 4.7 Km was performed by local contractors while the balance work was done by Vianini an Italian contractor. The main features of this project were the Transbasin Canal, the Badulu Oya Aquaduct, the Badulu Oya Tunnel and the Transbasin Canal.

Systems Development

System H

The project area designated as System 'H' lies within the Kalawewa basin. The major part of the project area falls within the Anuradhapura District, with smaller sections falling within the districts of Matale and Kurunegala.

Under Stage I of the Polgolla Diversion Project, nearly 54,000 hectares were provided with irrigation water for cultivation during both seasons.

Stage II of this project envisaged the development of nearly 25,000 hectares of new land for irrigated agriculture by the provision of irrigation facilities and other social infrastructure facilities required for the new settlements. These included schools, health centres, post offices, police stations, co-operative stores etc. A network of new roads were constructed together with improvements to a large number of existing roads. New Townships such as Galnewa, Meegalewa, Galgamuwa were constructed and large-scale improvements were effected, to the existing towns such as Madatugama, Eppawela, Talawa, Thambuttegama and Nochchiyagama. About 25,000 buildings were constructed to house project staff and for services such as health, education, postal, police, agriculture services, banks etc. These are distributed in townships as well as in 17 village centres and 260 hamlet centres provided within the project area in System H.

The area designated as System C is a strip of land of about 10 km in width, extending North from Minipe and Mahiyangana with the Mahaweli Ganga as the Western boundary, and lies in the administrative districts of Badulla, Ampara and Polonnaruwa. The area is further sub-divided into 6 zones, Zone 1 covering the areas already developed around the Mahiyangana town and Zones 2 to 6 being the areas taken up for new development. The total extent covered by these 6 zones is around 66,000 hectares out of which approximately 23,000 hectares are developed for irrigated agriculture.

The development work of these areas which included provision of irrigation and social infrastructure facilities, was funded by the EEC, Kuwait Fund, OECF (Japan) World Bank and the Government of Sri Lanka.

Distribution of irrigation water for System 'C' is from the Ulhitiya - Rathkinda Reservoirs, which receives Mahaweli water diverted at Minipe through the Minipe Right Bank Transbasin Canal.

The Ulhitiya Left Bank Main Canal and its Branch Canals totalling 30 km in length, together with their distributory and field canals irrigate an extent of around 4,200 hectares in Zone 2. This network is complete and has functioned since 1983.

Zones 3 to 6 covering an extent of around 18,000 hectares receive irrigation water from the Main and Branch Canal Complex taking off from the Ratkinda Reservoir. All construction work of this Main and Branch Canal Complex is complete, together with the distributory and field canal network in Zones 3 and 4. The balance work of the irrigation system in Zones 5 and 6 is now under construction.

All social infrastructure work in settlement centres Zones 2, 3 and 4 is complete.

All work in new Girandurukotte Township, which is located towards the Southern end of Zone 2 is complete and has been functioning since 1985. A new Sports Complex consisting of a large sports ground, Volley ball courts, 3 pavillions, 6 spectator galleries and other services have been completed. Construction work on the new township of Dehiattakandiya located towards the centre of Zone 4 is almost complete.

A total of 220 km of market roads will connect the new Settlement Centres to the trunk road running from Mahiyangana to Manampitiya. The earth work and the structures for about 150 km of these market roads are complete and around 95 km have been metalled and tarred.

System B (Left Bank)

The Project area which extends on either side of the Polonnaruwa - Batticaloa main road between Manampitiya and Punani, is bounded by the Mahaweli Ganga and the Maduru Oya and lies in the Polonnaruwa and Batticaloa districts. The area is sub-divided into 5 zones and covers a total extent of 75,000 hectares of which approximately 23,000 hectares will be developed for irrigated agriculture. The development work is funded by the EEC, Saudi Fund, USAID, Australia and the Government of Sri Lanka.

Irrigation Facilities

The Project area receives its irrigation supplies from the Maduru Oya Reservoir which is fed by its own catchment augmented by supplies from the Minipe diversion, through the link tunnel connecting Maduru Oya and Ratkinda Reservoirs. The concrete lined Main and Branch Canal System taking off from the Maduru Oya Left Bank sluice, together with its distributory and field canal network, serves as the Irrigation System for the Project area.

Work on the Main and Branch Canals totalling 127 km in length, is complete. The distributory and field canal network for Zones 1, 5 and 2 are complete and works in Zones 3 and 4A are in progress.

The project area with ground elevations, varying from about 80 metres above sea level in the South to about 10 metres at the North-Eastern end, is the flattest of the Mahaweli Systems taken up for development. Hence special attention is given to improvements of the drainage system to minimize flood damage.

Work in the settlement centres in Zones 1,5 and 2 are complete. The existing towns at Aralaganwila (Kolongashandiya) and Manampitiya are to be upgraded with additional facilities and a new township is being set up at Siddhapura. The new town at Welikanda with all facilities including a water supply scheme and a sewerage disposal scheme is complete.

The market roads in Zones 1 and 5 are almost complete and this work is in progress in the other zones.

System 'B' (Right Bank)

The Project envisages the development of about 15,000 hectares for irrigated agriculture on the Right Bank of Maduru Oya in the administrative district of Batticaloa. The area will be irrigated by approximately 100 km of main and branch canals, 333 km of distributory canals and 800 km of field canals.

The construction of the tertiary irrigation system and other infrastructure facilities, were to be funded by the World Bank and other donors but due to the prevailing security reasons the donors have withdrawn from the project.

Trunk Roads

A total of 147 km of new trunk roads are being built connecting the new townships of Girandurukotte, Dehiattakandiya, Aralaganwila and Welikanda to Mahiyangana, Manampitiya, Maha Oya and Trikonamadu. All construction work of these roads is complete. Details of this road system are as follows:

1. Mahiyangana - Ulhitiya Road 24 km
2. Ulhitiya - Manampitiya Road 43 km
3. Maha Oya - Maduru Oya Road, 24 km
4. Aralaganwila - Maduru Oya Road, 15 km
5. Dehiattakandiya - Aralaganwila Road 19 km
6. Welikanda - Trikonamadu Road 22 km

Downstream Development & Production

Settlement Process

Settlement in System H is virtually complete, with 30,889 farmer and non-farmer families being settled in the Systems by end July 1991 against a programme of 31,194

In System C, 17,919 farmer families have been settled completing 63.7% of the project target of 24,400. Additionally, 1098, non-farmer families and 1961 sub-families have been settled against programmes of 5134

and 3154 respectively. System C settlement is programmed for completion by end 1991.

Settlement in the cashew plantation area in System C is under way and 220 farmers are in place. They are selected from among second generation settlers. The number of cashew farmers would be settled by 1992 and would total 400.

In System B, 12,855 of 22,703 farmer families, completing 57% of the target 462 of a programmed 3839 non-farmer families and 1946 of 2251 sub-families had been settled as at end July 1991.

In System G 3872 farmer families have been settled out of a target of 4,585 completing 84% of the target.

Under the Upper Mahaweli re-settlement programme, 5,364 from the Kotmale, Victoria, Randenigala and Rantambe Project areas had been re-settled either in the vicinity of the project areas or in the downstream systems. Land alienation of the Mahaweli areas was originally limited to the poor and the landless with young families having an agricultural background. These re-settlers who were inducted into the Mahaweli areas without adherence to the criteria for settler selection, constitute about 8% of the total number of farmer families absorbed under the Accelerated Mahaweli Programme.

Cumulatively, 78,126 families including 16,873 non-farmer families and sub-families have found new homes in the Mahaweli areas (inclusive of Uda Walawe and System L)

(Settlement Progress - Annex 13)

The North Central and Eastern Provinces in which the Mahaweli Systems are concentrated reveal a positive migration balance of 22% between 1971 to 1981 or a net addition of 146,972 persons to the two provinces through migration. The intercensal natural increase between 1971 and 1981 was nearly 35% of the increase recorded in the entirety of the Dry Zone and consequently the ensuing intercensal population increase of 4.0% per year in the two provinces was 62% higher than the average for the Dry Zone. The Mahaweli Programme has had a definite impact upon these demographic changes in the Dry Zone.

Agricultural Land Area

Cultivable land under the Mahaweli systems, including Uda Walawe area, is estimated at 3,374 square kilometres. By July 1991, this area served 84,203 farm households belonging to first and second generation farmers and also, 22,882 non-farmer families totalling 107,065 families.

Assuming an average household size of 5 persons, it is estimated that the population currently dependent on the Mahaweli programme for their means of sustenance number around 535,325 persons. On the basis of a natural increase rate of 1.4% per year, an estimated annual addition to this population through birth-death balance alone, would be around 7292 persons per year.

Agricultural Progress

Paddy Production

Agriculture is the main thrust of the Mahaweli Programme. Paddy is cultivated throughout the Project areas in the Maha season with average yields of around 100 bushels (5.1 M.T / Ha) being recorded regularly as against the national average of between 67- 70 bushels per acre (3.3 - 3.6 M.T/Ha)

The Mahaweli Systems H,C, B and G and Uda Walawe have produced 3,308,790 metric tons of paddy or 10.43% of the cumulative national production of 31,735,546 Metric Tons from the 1976 cropping season, at the commencement of the Accelerated Programme, upto the Yala 1990 cropping year. 156,784 metric tons of other food crops, including maize, chilli, cow pea, onions, ground nut and green gram were also produced during the same period.

Agricultural production in the Mahaweli area has moved to a point where by 1989/90, it contributed over 17% of the total annual paddy production of the country and to over 50% of the national chilli and onion production. In 1987, the total quantity of chilli produced was 5159 metric tons valued at Rs.153 million. The import price of chilli, during this year was Rs.50,238/= per metric ton. The saving of foreign exchange from the production of this commodity by Mahaweli Project was Rs. 259 Million. The value of onions, pulses and oil seeds produced in the Mahaweli areas exceeded Rs. 120 Million in 1987. The Mahaweli Project areas have now become the foremost center of agricultural production in the country.

Mahaweli farmers have become the most productive rice growers in the country within a remarkably short period of time. Paddy yields in System H have increased from 4.75 metric tons in Maha 1978/79 to 5.55 metric tons per hectare in Maha 1989/90 and in System C, yields have increased from 1.76 metric tons per hectare in Maha 1983/84 to 4.21 metric tons per hectare by Maha 1989/90. The growth rate in yields in System H during the reference period was 1.4% per season (Maha), while that of System C was much higher at 15.6% per season. In System G, the average yield increased from 4.4 metric tons per hectare to

4.96 metric tons from Maha 1982/83 to Maha 1989/90. The growth rate in yields was 1.7% per season in System G and 3.3% per season in Uda Walawe Special Area, respectively. These differences in the rates of growth in yields among the systems were due to prevailing differences in the implementation of cropping calendars, efficient land and water use, the timely supply of inputs as well as the impact of localized edaphic conditions. In comparison the national average paddy production during the Maha 1989/90 season was 3.56 metric tons per hectare.

Overall, during the period 1981/82 to 1988/89 the Mahaweli Systems have averaged 3.74 metric tons per hectare against the national average of 2.75 metric tons. This was nearly 50% higher than the national average.

The North Central and Eastern Provinces, which include the Mahaweli systems report an estimated annual paddy production of nearly 0.50 metric tons per capita between 1982/83 to 1989/90. This was 3 times higher than the national average. In 1989/90 the per capita paddy production in the Mahaweli Project was over twice higher, at 1.2 metric tons per capita, than the average performance of the encompassing provinces. The paddy production in this year alone represents a gross saving of Rs. 2683 million to the national coffers in terms of the import value at 1989 prices.

Other Field Crops Production

System H has produced half the country's annual requirements of chillies in past seasons. A form of regional specialization has emerged in System H on account of planned seasonal cropping programmes of the Mahaweli. Similar specializations seem to be emerging within other Systems - ground nut is cultivated in System G, Bombay onions, Gherkins and Maize in System C and vegetables and mung beans in Uda Walawe.

Livestock Farming

The Draught Animal & Dairy Development Programme of the Mahaweli Authority of Sri Lanka commenced operations in the year 1981. This Programme functions in Systems A,B,C,H, Walawe Special Area and also gives health cover in Systems G & L.

Upgrading Programme

This is the main thrust of the activity to reduce large roaming herds of nondescript indigenous small sized unproductive animals and to introduce a system of settler farmers owning 2 - 3 upgraded animals each. This upgrading programme commenced with the introduction

of the Sahiwal and Tharparkar as a first stage and thereafter in order to obtain high milk production using the temperate breed Jersey. The ultimate objective being the production of an identifiable milking cow. The first stage of the upgrading programme has had the desired results and the Jersey upgrading programme both by natural mating and artificial insemination has commenced in Systems H & C.

Milk Marketing

In order to encourage the settler farmers to milk their animals, Milk Co-operative Societies have been established with Milk Collecting Centres and in each System chilling facilities have been provided with a Mini Dairy at System C, producing Flavoured Milk, Yoghurt, Ice Cream, Curd and Ghee of very high quality. These are being marketed even in Colombo.

Control of Epidemic Disease

In the dry zone on an average 15% of the cattle population die annually due to the killer disease Haemorrhagic Septicaemia. With regular vaccination in the Mahaweli Areas, mortality has been reduced to around 1 - 2%.

Agricultural Supporting Services : Credit

Bank of Ceylon branches at Aralaganwila, Dehiattakandiya, Bakamuna and Galkiriyagama, People's Bank branches at Welikanda, Girandurukotte, Bakamuna, Thambuttegama, Eppawela, Galnewa and Meegalewa and the Hatton National Bank in Nochchiyagama financed cultivation activities of farmers in Mahaweli Systems.

Available statistics reveal that in spite of the presence of the institutional credit network and activity in the Mahaweli areas, a substantial percentage of farmers continue to obtain their credit needs from informal sources. Studies done on this phenomenon in the Mahaweli H and C areas reveal that high transaction costs in credit taking from institutional sources, informal cultivation rights conveyances, accumulated past loan defaultings and other problems discourage many settlers from taking credit from institutional sources. This phenomenon is not common to the Mahaweli areas alone but is a widespread problem in the country. Readymade solutions are not available but lending through farmer societies appears to have the desired result at present.

Employment, Investment and Enterprise Development

The Mahaweli Authority has now evolved a strategy for enterprise and investment development and the generation of employment which would see private investors both local and foreign joining forces with settler families and the government in exploiting the vast economic potential of the Mahaweli. Its aim was to create an entrepreneur base in the farming communities with a view to expanding agricultural and agro-based settlements.

The response from the private sector to mobilize their resources and take part in this programme has been positive. The total value of private sector investment already approved exceeds Rupees 200 million. This programme is based on linking the medium and large scale investor who has exposure to local and foreign markets and with expertise in agro-technology with the settler community through a process of grower/purchaser relationships.

Already diversified crops such as chilli, gherkin, okra, egg plant and sweet melon are being grown and processed for export. More outgrower strategies will be developed, associated with such new crops, in order to generate a higher income distribution effect than at present.

Under the Entrepreneur Development Programme, 84 new projects and 54 expanded projects have been established in Systems H,C and B and in the Kotmale and Uda Walawe areas providing employment opportunities for 269 persons.

Settler Incomes

An estimated total income of Rs. 3,858 million was generated in the project by 82,103 householders through crop production during the 1989/90 cultivation year. The landless farmers who have been settled in the Mahaweli Project areas now derive an estimated average household (gross) income of about Rs.4,216/- per month from crop production (1989/90). The real gross farm income from crops is estimated at a little above Rs. 3,200/- per month. The gross income position places the average Mahaweli settler well above nearly 47% of the households in the country that live below the poverty line of Rs. 700/- per months.

The provision of health and educational facilities in the Mahaweli settlement areas have been a key component of the Mahaweli Master Plan as well as in corporate plans of implementation.

Inducement for Farmers

In 1987, the best Mahaweli farmers selected through a Mahaweli Maha Goviya Competition were sent on a three week tour of Thailand to observe advanced techniques in agricultural production. The farmers benefited immensely from the experience and are now engaged in effective agricultural extension work amongst their fellow farmers. Similar competitions were held in 1988 and 1989. In addition, 10 women farmers from System H who were the winners of a home garden vegetable competition were also sent to Thailand.

Community Development and Participation

Community Development is the catalyst of all settlement activities. The equal importance given to community development as to agriculture and irrigation has had a very positive impact on settlement life and caused a faster rate of development. The community development programmes have helped to create a community that is conscious of their needs and obligations both as individuals and as members of the community. A healthier farming community and better farmer participation in project activities have contributed to this fast rate of development.

Plans are underway to organized training in fields such as cattle rearing, tailoring, handicrafts, masonry, carpentry and motor mechanism. Such training complemented by credit facilities offered by the banks has enabled the Mahaweli youth to be gainfully employed.

Health Care

Steps have been taken through Community Development societies to conduct educational programmes on health and sanitation, food and nutrition and home economics.

Recreation Facilities

Sports facilities considered necessary for character building are encouraged and developed. Annual sports festivals have been organized at newly established sports stadiums within the Mahaweli areas. The Mahaweli sports festival, now an annual feature, is being held in rotation in each System. About 1500 sportsmen and women from the settlements have participated in each of the festivals.

Town Development

New towns have been established at Galnewa, Meegallewa, Talawa, Nochchiyagama, Thambuttegama, Madatugama and Galkiriyagama in System H, and at Girandurukotte, Dehiattakandiya and Lihiniyagama in System B. In System G, the town of Bakamuna has been upgraded. In all systems, existing facilities have been strengthened to cater to the influx of the new population.

Environmental Aspects

The preservation of the environment is a high priority consideration under the Mahaweli programme and already a number of programmes have been initiated in this connection.

To counter the loss of wild life habitats due to the clearing of forested areas, buffer zones have been established and degraded habitats have been enriched. A system of inter-linked protected areas is being implemented through the Department of Wild Life. Conservation involving about 210,000 hectares in and around the Mahaweli Accelerated Programme area is under way to provide for conservation of wild life. New National Parks have been created and the existing nature reserves and jungle corridors have been increased. Already about 140,500 hectares of protected areas have been legally established.

Reforestation programmes have been undertaken in the immediate catchments of Victoria, Kotmale and Randenigala and at Minipe.

6720 hectares have been reforested in the Upper Mahaweli catchment area and 2490 hectares in the immediate reservoir catchments and in the transbasin Canal area.

Large extents of land are also being set aside for the raising of fuel wood plantations and village wood lots. 980 hectares have already been established in Systems B, C and H

What distinguishes Mahaweli projects from other large scale irrigation projects is the attention paid to human and social welfare. Too often projects have not made provision for health centres, schools, for settler children, nutrition, agricultural training centres, credit facilities, post offices, market centres and the development of settlers societies so that people can begin to make decisions for themselves and not depend on government agencies. All these aspects have been looked into in the Mahaweli development/settlement schemes. Consequently there has been no history of drop outs in the Project. The increase

in the level of productivity is a sure indication of fairly stable conditions in the settlement areas.

The Mahaweli Development Programme is not necessarily a land development exercise but more a social development programme. In brief, this is the major difference between the old settlement schemes and settlement under the Mahaweli programme. Most of the eventual beneficiaries of the project are from the poorest of the poor category of the population in the country. They are people who will be expected to maintain the system later in order that they may engage in economic development. Therefore they have an added social responsibility to ensure that the post construction maintenance cost is at a minimum. These farmer settlers will not be regarded as subsistence farmer as in the old settlement schemes. Under the Mahaweli programme, the settlers are expected in time to become commercial farmers contributing large quantities of food for the market place. The farmers are given the facilities required for farming on commercial lines and are trained in the use of new technologies.

Integrated development of new lands was designed on the basis of experience gained from earlier major land settlement schemes in Sri Lanka. The basic design, concepts and development criteria of the older schemes were refined and implemented in the new Mahaweli systems. One of the major benefits of the new settlement schemes was that equal opportunities were provided to settlers by distributing project benefits through settlement of holdings of equal size. A spirit of self-reliance among settlers was developed by their participation in farm development work. Settlements under the integrated programme were made socially cohesive and economically viable by the provision of the basic social infrastructure and by agricultural extension and supporting services. A major objective was to ensure strong co-ordination at the project management level through the appointment of resident project personnel for agriculture, community development and water management.

The Mahaweli Authority took into account the needs of the settlers both by way of basic amenities for settler families as well as in terms of the settler community as a whole. The Mahaweli planners have made considerable progress in the social infrastructure set up in the Systems. By end July 1991, 294 Primary, Junior and Secondary schools, 120 post offices, sub-post offices, 208 Co-operative stores, 50 State and Private Banks and 212 Health Centres had been established in the systems. Several towns and village centres and 17 Police Stations have also been set up.

The Mahaweli Authority which co-ordinates operations between the relevant state and international agencies has no parallel in so far as its functions and responsibilities are concerned. It is different from other Ministries and State Departments in that it has been made responsible for all the diverse activities within the Mahaweli Programme. These cover construction and operation of the irrigation systems, improving agricultural productivity conserving the physical environment, furthering the general welfare and cultural progress of the settler community, encouraging participation of private capital in the economic and agricultural development of Mahaweli areas and promoting the co-operation of all government departments, state institutions, local authorities, public corporations and others in the planning and execution of the Mahaweli Ganga Development Scheme and in the development of any special area.

The Government's plans for the development of the resources of the Mahaweli Ganga were the culmination of about 20 years of data gathering, investigations and planning by the Irrigation Department and external agencies like the United States Operations Mission and Hunting Technical Services. Internationally recognised consultancy experts were involved in these research studies. These included UNDP/FAO experts who prepared the original 30 year Master Plan in 1967.

In January 1979, a team from NEDECO in the Netherlands was assigned the task of submitting a report on implementation strategies for the Accelerated Mahaweli Programme and to study strategies for development. NEDECO submitted that their UNDP/FAO Master Plan prepared 10 years earlier did not give more than an outline of the Master Plan and recommended alternations in the fundamental characteristics of the proposed Accelerated Programme. The NEDECO team after a study of a number of implementation strategies for the Accelerated Programme suggested a gradually accelerating speed of implementation, commencing with 6000 hectares of land in 1980 ending with 40,000 hectares by 1984. The NEDECO report stressed the need to implement the report vigorously, beginning with the construction of the Kotmale, Victoria and Maduru Oya reservoirs as these reservoirs augmented with natural river flow appeared to be adequate to irrigate the land under the Accelerated Programme.

Several meetings followed the NEDECO report and Sri Lanka experts on soils and crops categorically stated that some of the NEDECO recommendations were not substantiated by research studies on soils and the potential of soils in the lower Mahaweli area to produce a wide

variety of crops and more investigation and studies were recommended to define the final plan more accurately. Subsequently the six major multi-purpose reservoirs, Victoria, Kotmale, Randenigala and Moragahakanda reservoirs and the Maduru Oya and Ulhitiya schemes were selected for acceleration.

In conclusion, I would like to ask the question "In retrospect has the massive expenditure on the Mahaweli Programme been justified. In reply, I would say that apart from the considerable quantity of paddy and other Food crops that has been produced and the energy that has been generated, the fulfillment of the dreams and aspirations of the planners has been a great source of satisfaction. The life giving water of the Mahaweli project has already provided the basis for human settlement and growth points for the economy from which agricultural development and the development of ancillary industries will spring, providing avenues of employment and further development. It is truly in the Mahaweli areas that the

future development of the country lies and the challenge of the future would be as to how best we could harness the life giving waters and the human resources to build up viable communities in the future.

It cannot be denied that the prosperity of our country down the ages has been linked to the periods during which such resources were harnessed for the benefit of our own people.

In any country there are only a few events that find a permanent place in its history. I am convinced that the Mahaweli Development Programme would be one of them.

It is my belief that the Mahaweli Project will free the people of this country from hunger for generations.

Finally I wish to thank you for the patience with which you have listened to this memorial lecture.

ANNEX 1

BASIC PARAMETERS KOTMALE HYDRO-POWER PROJECT

HYDROLOGY

Catchment area at Dam Site	544 sq km
Maximum observed discharge	1615 m ³ /sec

RESERVOIR

Top water level (TWL)	703 m MSL
Maximum flood level	704.3 m MSL
Minimum operation level (MOL)	665 m MSL
Gross Storage up to TWL	174 × 10 ⁶ m ³

Dam

Type - Rockfill with concrete membrane	87 m
Maximum height above bed level	706.5 m
Crest Elevation	600 m
Length along crest	4.3 × 10 ³ m ²
Total quantity of rockfill (approx.)	

SPILLWAY

Type - Radial gated chute type spillway	
Number & size of gates	3 No. 14m × 15m
Maximum capacity of spillway	5,550 m ³ /sec.

DIVERSION TUNNELS (River Diversion during Construction)

Type	'D' type concrete lined
Number & size	2 Nos. 9.2m equivalent dia.
Lengths	746 m and 841 m
Maximum capacity	1,700 m ³ /sec. (1 in 100 year flood)

LOW PRESSURE TUNNEL

Type	Horseshoe shaped concrete lined
Total length	6954 m
Equivalent diameter	6.4 m
Maximum capacity	113.3 m ³ /sec.

UPSTREAM SURGE SHAFT

Type	Restricted Orifice
Diameter	15 m concrete lined
Height	142 m

HIGH PRESSURE SHAFT/PENSTOCK

Type	Steel lined
Diameter	Varies from 5.5m to 4.8m
Length	120 m

UNDERGROUND POWER STATION

Size of cavern	67 m × 20m × 38m
Installed capacity	3 × 67 MW
Turbine - Type	Vertical Francis
Rating	67 MW at 201.5 m Nett Head
Generator - Type	Conventional 3 bearing, vertical
Rating	90 MVA 0.85 pf.
Gross Head	226 m
Annual Power Generation	465 GWh
Firm Energy	315 GWh

TAILRACE TUNNEL

Type	Horseshoe concrete lined
Length	635 m
Equivalent Diameter	6.4 m

CLIENT

Government of Sri Lanka
represented by the Mahaweli Authority of Sri Lanka.

CONSULTANT

Halcrow Water, United Kingdom in collaboration with
Kennedy and Donkin, United Kingdom and
Central Engineering Consultancy Bureau Sri Lanka.

CONTRACTORS

AB Skanska Cementgjuteriet (SKANSKA) Sweden (for Civil Works)
ASEA, Sweden (For Elec - Mech. Equipment)

*Originally the only bottom third of the High Pressure Shaft was steel lined. Later under the programme for remedial measures, steel liner was extended by 482 OM upto Surge Shaft

ANNE2 2

KOTHALE PROJECT

	FX UNIT	Civil Works Initial Works Contractor: SKANSKA Sweden	Civil Works Underground works SKANSKA Sweden	Civil Works Reservoir works SKANSKA Sweden	Electro-mechanical equi KOT/K1 ASKA Sweden	Electro-mechanical equi KOT/K2 LF tann. gates & screens ASKA, Sweden	Electro-mechanical equi KOT/K3 Spillway Outlet eqips. ASKA, Sweden	Electro-mechanical equi KOT/K4 Bottom Outlet eqips. ASKA, Sweden	Electro-mechanical equi KOT/P1 Power stat. ASKA, Sweden	Electro-mechanical equi KOT/P 2 Power Sub-station ASKA, Sweden	Electro-mechanical equi KOT/P 1A ASKA, Sweden	Electro-mechanical equi KOT/P 2A ASKA, Sweden	TOTAL values
Engineering Estimate	SKK Rs												
Contract award price	SKK Rs	568,685,000	1,065,900,472	3,810,000,000	14,394,000 6,765,000	17,000,000 11,400,000	52,100,000 12,750,000	17,350,000 5,000,000	114,876,976 34,835,981	66,561,767 23,717,701	75,483,784 25,103,382	33,935,750 3,670,177	5,474,000,000 391,782,277 4,767,035,713
Final payment (total)	SKK (-Rs)	100,532,739 (635,976,235)	453,630,840 (1,535,222,693)	763,212,932 (2,609,519,745)	19,883,731 (60,936,532)	36,462,189 (117,492,970)	61,673,791 (200,125,394)	17,949,846 (57,837,932)	114,644,213 (374,320,642)	61,251,121 (193,174,249)	74,855,845 (243,957,361)	32,340,323 (116,062,472)	1,825,653,870 (6,144,626,225)
Total paid to contractor (see note below 2)	Rs	759,626,417	2,531,779,420	3,999,570,560	67,881,720	126,139,837	207,892,899	50,384,932	488,356,623	216,891,950	269,060,743	119,740,649	8,764,725,766
Bonuses provided for in the tender & whether paid	Rs	none	none	none	none	none	none	none	none	none	none	none	none
Additional bonuses introduced during contracts & whether paid	Rs	combined civil SKANSKA	50,000,000 50,000,000										50,000,000 50,000,000
Date, project commenced													August 1979
Date of commissioning													August 1985
Grand total of contract payments :-													SKK 1,825,653,870
(inc. bonus in final payments)													Rs. 8,764,725,766
													0

* SKK component in payments to contractors: SKK

ANNEX 3

VICTORIA DAM AND POWER STATION
BASIC PARAMETERS

MAIN FEATURES OF THE PROJECT

HYDROLOGY AND DISCHARGE FACILITIES

Catchment area	1891 Km ²
Mean river flow (31 years of record)	105 m ³ /s
Highest recorded river flow (excluding Hulu Ganga)	6000 m ³ /s
Design flood	9510 m ³ /s
Discharge capacity of gated flood overspill	7900 m ³ /s
Maximum discharge capacity of low level outlets	760 m ³ /s
Maximum discharge capacity of tunnel for 210MW power output	140 m ³ /s
Maximum discharge capacity of compensation outlets	10.5 m ³ /s

RESERVOIR

Maximum flood water level 441.2 metres above sea level. Normal top water level	438 metres
Lowest drawdown level	370 metres
Gross storage capacity (at 438 m)	722 million m ³
Useful storage capacity (between levels 438 and 370 m MSL)	688 million m ³
Surface water area (at 438 m MSL)	23.7 km ²

DAM

Crest roadway level	442.5 metres MSL
Crest length	520 metres
Maximum height above foundations	122 metres
Height above original river bed	106.5 metres
Minimum thickness	6 metres
Maximum thickness	25 metres
Volume of concrete	480,000 m ³

STILLING BASIN

Minimum level of apron	337 metres MSL
Average width of apron	110 metres
Maximum length of apron	105 metres
Lengths of training walls - left bank	153 metres
- right bank	127 metres
Volume of concrete in stilling basin	43,000 m ³

TUNNEL

Present development of one tunnel	2
Number of intake shafts	92 metres
Depth of intake shafts	12 metres
Excavated diameter of shafts	5646 metres
Length of tunnel	6.2 metres
Diameter of tunnel (inside concrete lining)	7.2 metres
Excavated diameter of tunnel	116 metres
Depth of surge chamber	21 metres
Diameter of surge chamber (inside concrete lining)	34.6 metres
Depth of riser shaft	6.2 metres
Diameter of riser shaft (inside concrete lining)	2.9 metres
Throttle diameter in riser shaft	

POWER STATION

Present development for three machines	82 metres
Length of machine hall and control block	16 metres
Width of machine hall	35 metres
Maximum structural width	37 metres
Height above lowest foundation	26 metres
Depth of lowest foundation below original ground level	

TURBINES

Type	Francis
Number in present development	3
Total number for complete development	6
Level of spiral casing centreline	228 metres MSL
Design (net head)	190 metres
Speed of rotation	333 revs/min

GENERATORS

Type	Semi umbrella
Number in present development	3
Total number for complete development	6
Generating voltage	12.5 kv
With a 0.85 power factor the rated output for each generator	70 MW
Total rated capacity for present development	210 MW
Total rated capacity for complete development (later)	420 MW
Energy production Capability - Firm	686 GWH/year
- Secondary (initial)	284 GWH/year

VICTORIA PROJECT

	FX UNIT	Civil Works C1 Dam Contractor: BBN UK	Civil Works C2 Tunnel works BBN UK	Civil Works C3 Power station building Costain UK	Hydraulic equipment C4 Whessoe Doving UK	Electrical distribu. systs C5 Balf. Kilpat. UK	Electro-mechanical equi Turbines C11 Boving UK	Electro-mechanical equi Generators C12 GEC UK	Electro-mechanical equi Transformers C13 Banker Siddley UK	Electro-mechanical equi HV Switch C14 HPI Rayroll UK	Electro-mechanical equi Stat. misc plant C15 GEC Elect UK	Electro-mechanical equi Cables C16 ICC UK	Electro-mechanical equi Cranes C17 Morris UK	Electro-mechanical equi 220 KV T./line New Contract C18 GEC	TOTAL value			
Engineering Estimate	Stl Rs														3,800,000,000			
Contract award price	Stl Rs	1,467,625,620	645,301,793	250,611,011	540,827,989	23,486,701	219,423,069	219,480,195	40,850,327	80,823,428	51292401	41200757	22055190	92672766	3,719,678,327			
Final payment (total) * (see note below *)	Stl Rs	3,555,255,714	1,378,462,694	360,892,080	682,766,603	30,707,065	260,140,089	282,043,372	61,292,856	127,241,355	60020028	61020092	25051260	102777203	7,003,690,000			
Bonuses provided for in the tender & whether paid:	Rs Rs	66,000,000 66,000,000	27,000,000 7,000,000	9,000,000 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	102,000,000 73,000,000			
Additional bonuses introduced during contracts & whether paid	Rs Rs	combined C1 & C2 60,000,000 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	60,000,000 0			
Date, project commenced															August 1979			
Date of commissioning															April 1985			
* 3 bonuses were allowed on C2, Tunnel = Rs 27.0m -but only 2 were paid = Rs 7.0m -3rd failed to achieve target = Rs 20m. -Therefore, the combined bonus of Rs 60 m not paid.															Grand total of contract payments:- (inc. bonus in final payments)		Stl Rs	7,003,690,000
* Sterling component in payments to contractors:	Stl	74,722,643	23,017,220	7,609,524	16,309,684	802,671	6,535,700	6,422,430	1,613,205	3,014,685	1,630,673	1,247,799	610,509	2,234,370	146,651,290			

MADURU OYA HEAD WORKS/BASIC PARAMETERS

1.1 Reservoir		
Catchment Area	453 sq. km	
Full Supply Level (FSL)	98m above MSL	
Minimum Operating Level (MOL) Power	84.5m above MSL	
Irrigation	84.5m	
Reservoir Volume at FSL	$596.5 \times 10^6 \text{ m}^3$	
Active Storage Volume	$473.2 \times 10^6 \text{ m}^3$	
Reservoir Area at FSL	6390 ha.	
Reservoir Flood Surge Level	99 m above MSL	
1.2 Dams		
(a) Main Dam		Rockfill with Centre Core
Type	1090m	
Crest Length	10.0m	
Crest Width	103.0m above MSL	
Crest Elevation	43m	
Maximum Height Above Foundation	5.0m	
Freeboard Allowance at FSL	2.0m	
Minimum Freeboard		
(b) Left Bank Saddle Dam		Earthfill/Rockfill/Central Core
Type	520 m	
Crest Length	6.0 m	
Crest Width	101.0 m above MSL	
Crest Elevation	20 m	
Maximum Height Above Foundation		
(c) Right Bank Saddle Dam		Earthfill
Type	60.0 m	
Crest Length	4.0 m	
Crest Width	101.0 m above MSL	
Crest Elevation	12 m	
Maximum Height Above Foundation		
1.3 Spillway		Side Channel Ungated Ogee Weir
Type	150.0 m	
Crest Length	98.0 m above MSL	
Crest Elevation	4270 m^3/s	
PMF inflow	1610 m^3/s	
Routed Design Discharge	$350.5 \text{ m} \times 10^6 \text{ m}^3$	
Volume of Storm inflow	2.2 m	
Ogee Design Head		
	3.0 m	
Maximum Floor Surge	93.5 m above MSL	
Approach Apron Level	30.0 m	
Unlined Chute Width	Unlined Rock Stilling Basin	
Energy Dissipation		
1.4 Link Tunnel		D. Shape, Pressure Flow (unlined, paved invert)
Type	34.0 m^3/s	
Design Flow	Max. 106.68 m Min. 104.42 m	
Upstream Water Levels	Normal 97.42 m Flood 99.30 m	
Downstream Water Levels	4.7 $\times$ 4.85 m	
Size - unlined sections (w $\times$ h minimum)	4.2 $\text{m} \times$ 4.6 m	
- concrete lined sections with steel ribs	4.4 $\text{m} \times$ 4.7 m	
- concrete or shotcrete lined sections		
Flow Velocity at Design Discharge (unlined sections)	1.66 km	
Length	5.64 km	
1.5 Outlet Works (SLUICES)		
(a) Left Bank		Intake tower, concrete pressure conduits
Type	Q (m^3/s)	
Design Flows	56.2	
Maximum Irrigation Demand	15.7	
Per Unit Power Plant Flow		
(b) Right Bank		Intake tower, concrete pressure conduits
Type	Q (m^3/s)	
Design Flows	32.5	
Maximum Irrigation Demand	150.0	
Emergency Drawdown Flow		
Irrigation Canal Size (b $\times$ w $\times$ h)	4.0 $\times$ 13.45 $\times$ 5.4 m	
Canal Invert Level	75.4 m above MSL	

MADURU OYA PROJECT

	FX UNIT	Civil works Dam : C2 Contractor: FAFJ Jt.Venture Canada	Civil works Link Tunnel: C4 FAFJ Jt.Venture Canada	Hydro-mechan- ical equ.: 3A China	By-pass tunnel (extra work) FAFJ Canada	T O T A L values
Engineering Estimate	C\$ Rs					0 1,500,000,000
Contract award price	C\$ Rs	72,153,000 241,542,000	15,105,000 53,835,000	1,178,061 2,164,500	0 0	88,436,061 297,541,500
Final payment (total)	C\$ Rs	64,243,472 228,445,400	16,071,996 69,535,667	1,257,456 1,194,824	842,812 7,748,852	82,415,736 306,924,743
Bonuses provided for in the tender & whether paid	Rs Rs					none none
Additional bonuses introduced during contr- acts & whether paid	Rs Rs					none none
Date, project commenced Date of commissioning						January, 1980 July, 1983
Grand total of contract payments :-						C \$ Rs.
						82,415,736 306,924,743

RANDENIGALA DAM AND POWER STATION BASIC PARAMETERS

Reservoir	
Maximum flood level	236.2 m MSL
Retention level	232.0 m MSL
Exceptional drawdown level	203.0 m MSL
Normal tailwater level	152.0 m MSL
Catchment area	2,330 km ²
Probable maximum flood outflow	8,085 m ³ /s
Reservoir capacity (at retention level)	860 MCM
Active storage (for exceptional drawdown level)	565 MCM
Reservoir surface at retention level	23.5 km ²

Dam

Type: rockfill with central impervious earth core	
Crest elevation	239.0 m MSL
Riverbed elevation approx.	148.0 m MSL
Maximum height of dam	94.0 m
Volume of dam	3.9 MCM
Crest length	485 m
Crest width	10 m
Maximum base width	303 m

Spillway

Maximum capacity	8,100 m ³ /s
Crest elevation	218.0 m MSL
Number of gates	3
Type of gates	Tainter
Height of gates	15.26 m
Width of gates	16.70 m
Total width of chutes (3x16.0m)	48.0 m
Length of chute spillway	232 m

Bottom and Irrigation Outlet

Tunnel length between Intake tower and outlet	459 m
Type of service gates (2 Nos.)	Tainter
Size of service gates (h x w)	2.40 m x 1.80 m
Type of revision gates (Nos.)	Sliding/roller
Size of revision gates (h x w)	2.60 m x 1.80 m
Capacity at drawdown level	284 m ³ /s
Capacity at retention level	318 m ³ /s

Power Intake and Waterways

Height of power intake	80 m
Sill elevation at intake	179.3 m MSL
Discharges at E1.232.0 m MSL	2x90.0 m ³ /s
at E1.203.0 m MSL	2x70.1 m ³ /s
Type of revision gate	roller
Size of revision gate (h x w)	6.80 m x 4.90 m
Length of Penstock	270 m
Diameter of Penstock	6.20 m

Power Station

Number of turbine/generator units	2
Type of turbines	Francis
Setting of turbines	148.50 m MSL
Rated gross head	80 m
Rated net head	77.8 m
Rated discharge 2 x 90	180 m ³ /s
Installed capacity	2 x 61 MW
Annual estimated energy generation	428 GWh

ANNEX 8

RANENIGALA PROJECT

	FX UNIT	Lot 1 Civil Works Contractor: JV Germany	Lot 3A - Hydro- mechanical equip M.A.M. Maschinen- fabrik GmbH Germany	Lot 4A - Mech- anical equipa. Sulzer-Escher Wyss GmbH Germany	Lot 5A - Elect- rical equipa. Brown, Boveri & Cie AG Germany	T O T A L values
Engineering Estimate	DM Rs					350,251,000 1,492,047,000
Contract award price	DM Rs	201,716,135 520,295,833	23,539,873 33,567,300	38,010,000 14,447,495	75,131,878 43,058,858	338,397,886 611,369,486
Final payment (total)	DM Rs	249,562,200 952,482,619	24,922,904 41,467,484	39,397,894 19,108,805	77,201,667 54,305,728	391,084,665 1,067,364,636
Bonuses provided for in the tender & whether paid	Rs Rs	none none	none none	none none	none none	none none
Additional bonuses introduced during contr- acts & whether paid	Rs Rs	none none	none none	none none	none none	none none
Date, project commenced						August 1982
Date of commissioning						August 1986

12-Aug-91
Ranenigala

RANTEMBE DAM AND POWER STATION BASIC PARAMETERS

Reservoir

Maximum flood level	155.0 m MSL
Retention level	152.0 m MSL
Minimum operating level	140.0 m MSL
Catchment area	3,118 km ²
Probable maximum flood	10,235 m ³ /s
Reservoir capacity	
- retention level	21.0 MCM
- active storage	16.6 MCM
- reservoir surface at retention level	2 km ²

Dam

Type	Concrete Gravity
Crest elevation	155.50 m MSL
Maximum height of dam	41.50 m
Volume of dam	0.20 MCM
Crest length	420 m
Crest width	7 m
Maximum base width	50 m

Spillway

Maximum capacity	10,235 m ³ /s
Crest elevation	137.00 m MSL
Number of Gates	4
Type of Gates	Tainter
Height	16.21 m
Width	16.00 m

Bottom and Irrigation Outlet

Type of service gates (2 Nos.)	Tainter
Size of service gates (h x w)	3.60 x 2.55 m
Type of revision gates (2 Nos.)	sliding/roller
Size of revision gates (h x w)	3.60 m x 2.55 m
Capacity at retention level	300 m ³ /s

POWER INTAKE AND WATERWAYS

Type of Guard gates (2 Nos.)	sliding/roller
Size of Guard gates (h x w)	4.81 m x 4.30 m
Type of revision gates (2 Nos.)	sliding/roller
Size of revision gates (h x w)	4.81 m x 4.30 m
Length of Penstocks	50 m
Diameter of Penstock	4.3 m

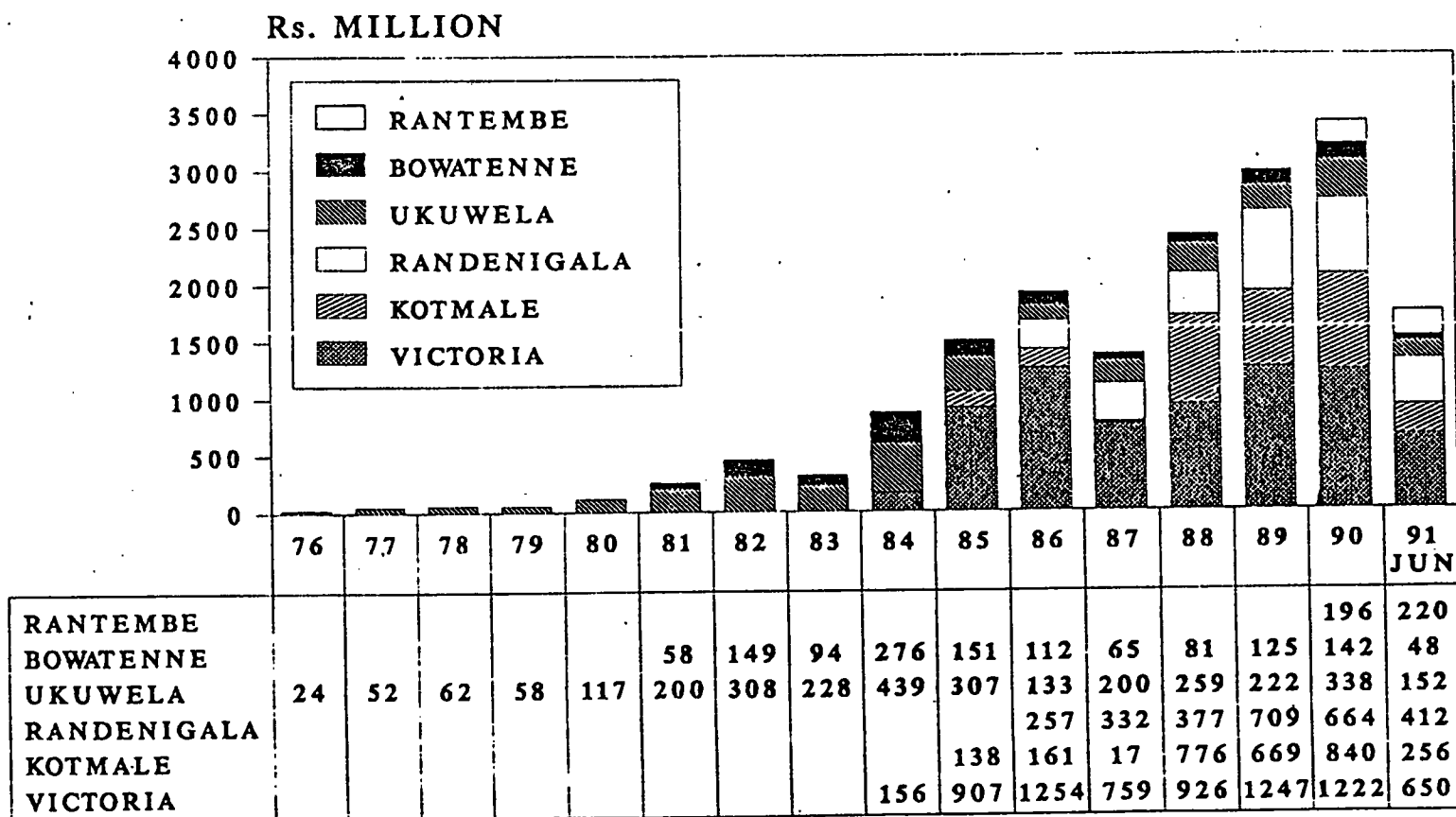
Power Station

Number of turbine/ generator units	2
Type of turbines	Francis
Setting of turbines	114.3 m MSL
Rated gross head	33.5 m
Rated net head	32.7 m
Rated discharge 2x90	180 m ³ /s
Installed capacity	51.8 MW
Annual estimated energy generation	
- firm	180 GWh
- secondary	73 GWh

RANTEMBE PROJECT

	Lot 2 - Civil Works Zublin-Hochtief JV Germany	Lot 3B - Hydro- mechanical Equip. DSD Dillinger Stahlbau GmbH Germany	Lot 4B - Mechanical Equipment Sulzer Escher Wyss Germany	Lot 5B - Electrical Equipment ASEA Brown Boveri Germany
Engineer's Estimate	DM 88,138,380.- Rs 341,644,523.-	DM Rs	DM Rs	DM Rs
Contract Award Price	DM 57,678,656.- Rs 345,552,626.-	DM 15,125,526.- Rs 29,019,898.-	DM 28,628,360.- Rs 20,663,790.-	DM 35,375,347.- Rs 20,870,187.-
Payment made upto July '91	DM 79,103,860.94 Rs 496,231,943.50	DM 16,767,953.54 Rs 43,510,806.22	DM 30,382,934.45 Rs 30,403,585.50	DM 38,043,014.03 Rs 29,519,494.61
Bonuses provided for in the tender and whether paid	None	None	None	None
Additional bonuses intro- duced during contracts and whether paid	None	None	None	None
Start date of each contract	17.12.1986	07.11.1986	07.11.1986	07.11.1986
Date of commercial operation	----- -----	10.03.1990 28.04.1990	(Unit 1)----- (Unit 2)-----	----- -----

MAHAWELI POWER GENERATION REVENUE COLLECTED BY YEAR (1976 TO 1991 JUNE)



CUMULATIVE REVENUE Rs. 17,671 Million

EXTERNAL ASSISTANCE TO MAHAWELI PROJECT

DONOR	DATE	AMOUNT		GRANT/LOAN	INTEREST	GRACE PERIOD	REPAYMENT PERIOD	OTHER CHARGES	ITEM OF WORK
Canada	27.03.80	C \$ 76.0	M	Loan	free	10 years	40 years	-	Maduru Oya
		C \$ 7.0	M	Grant	-	-	-	-	
	21.10.76	C \$ 6.0	M	Loan	free	10 years	40 years	-	System 'H'
		C \$ 26.0	M	Food Aid counterpart funds to meet local cost.			-	-	Settler Assistance Sy. 'H'
		C \$ 1.7	M	Grant	-	-	-	-	Expert Services for PMU
		C \$ 0910	M	Grant	-	-	-	-	Social Services
		C \$ 4.650	M	Grant	-	-	-	-	Aralaganwila
		C \$ 3.4	M	Grant	-	-	-	-	Extension Training Centre
U.S.A.	26.6.80	U.S. \$ 10.0	M	Loan	2% first 10 years 3% thereafter	10 years	30 years	-	Sy. 'B': Left Bank Design & Supervision
	29.5.81	U.S. \$ 107.0	M	Loan	- do -	10 years	30 years	-	Sy. 'B' - Left Bank
	29.5.81	U.S. \$ 3.0	M	Grant	-	-	-	-	Environment
	30.9.82	U.S. \$ 5.0	M	Grant	-	-	-	-	
	09.11.77	U.S. \$ 5.2	M	Loan	3%	15 years	25 years	-	System 'H'
	29.05.81	U.S. \$ 50.0	M	Loan	2% first 10 years 3% thereafter	10 years	30 years	-	Sector Support Sy. H, C, B & G
	31.8.77	U.S. \$ 0.8	M	Grant	-	-	-	-	On Farm water management
	28.8.87	U.S. \$ 13.0	M	Loan	2% for 1st 10 years & 3 % thereafter	10 years	30 years	-	Mahaweli Downstream Support Project
		\$ 1.997	M	Grant	-	-	-	-	Mahaweli Agriculture & Rural Devp. Project
	28.8.87	\$ 10.2	M	Grant	-	-	-	-	
		\$ 3.8	M	Loan	2% for 1st 10 years & 3% thereafter	10 years	30 years	-	
	June 1989	\$ 15.0	M	Grant	-	-	-	-	Mahaweli Enterprise Development Project
	U.K.	21.12.79	£ 113.0	M	Grant	-	-	-	-
16.12.80		£ 20.0	M	Bank Loan	7.5%	5 1/2 years	10 years	0.1% negotiation fee	Electro Mechanical Equipment (Hanover Trust)
27.06.77		£ 4.3	M	Grant	-	-	-	-	System 'H'

continuation..

- 2 -

DONOR	DATE	AMOUNT		GRANT/LOAN	INTEREST	GRACE PERIOD	PAYMENT PERIOD	OTHER CHARGES	ITEM OF WORK
WORLD BANK	06.05.81	SDR 73.3	M	LOAN	1.0%	10 years	30 years	0.25% service charges	System 'C'
	27.06.77	US\$ 19.0	M	LOAN	0.5% first 10 years 1.5% thereafter	10 years	40 years	0.25% service charge	System 'H'
	16.04.80	US\$ 3.0	M	LOAN	0.5% first 10 years 1.5% thereafter	10 years	40 years	0.75% service charge	Transbasin Diversion Plan
	1970	US\$ 14.0 US\$ 15.4	M M	LOAN LOAN	7% Free	06 years 10 years	24 years 30 years	0.75% service	Polgolla Diversion - do -
SWEDEN	16.07.82	Skr. 1395.0	M	GRANT	-	-	-	-	Kotmale
	12.12.80	Skr. 256.2	M	LOAN	8.35%	5 years	8 years	-	Bank loan-Electro Mechanical Equipment
		Skr. 720.0	M	-	-	-	-	-	Bridge financing
F.R.G.	09.11.81	DM 400.0	M	LOAN	0.75%	10 years	40 years	0.25% service on disbursed amounts	Randenigala
		DM 8.0	M	GRANT	-	-	-	-	Feasibility Study
SAUDI ARABIA	03.01.84	S.Riyals 85.0	M	LOAN	3%	5 years	15 years	-	Sys. B - Left Bank
EEC	01.08.85	US\$ 25.0	M	GRANT	-	-	-	-	Sys. B Left Bank
	23.01.81	EAU 15.4	M	GRANT	-	-	-	-	Sys. 'C'
	22.12.78	EAU 2.0	M	GRANT	-	-	-	-	Sys. 'C'
	16.04.80	US\$ 2.0	M	LOAN	0.5% first 10 years 1.5% thereafter	10 years	40 years	0.75% service charge	Transbasin Diversion Plan and Studies
OPEC	09.04.81	US\$ 9.0	M	LOAN	Free	-	6 years	-	Sys. 'B' Left Bank counterpart funds for supply of commodities
AUSTRALIA	16.01.81	A\$ 4.0	M	GRANT	-	-	-	-	Counterpart funds for secondary & tertiary canals
	01.10.82	A\$ 5.0	M	GRANT	-	-	-	-	
	29.09.83	A\$ 6.0	M	GRANT	-	-	-	-	
JAPAN	16.12.81	¥ 7700.0	M	LOAN	2.75%	10 years	10 years	-	System 'C'
	16.12.83	¥ 996.0	M	GRANT	-	-	-	-	Pilot Demonstration Farm - Sys. 'C'
	20.05.88	¥ 2950	M	LOAN	2.75%	10 years	20 years	-	Additional Loans for Sys. C
		¥ 2200	M	GRANT	-	-	-	-	Food Aid Counterpart Funds

DONOR	DATE	AMOUNT	GRANT/LOAN	INTEREST	GRACE PERIOD	REPAYMENT	OTHER CHARGES	ITEM OF WORK
BELGIUM	05.12.81	BF 60.0 M	Grant	-	-	-	-	System 'C'
NETHERLANDS	14.10.76	DFL 13.0 M	Loan	2.5%	8 years	22 years	-	System 'H'
		0.8 M	Grant	-	-	-	-	Draught Animal Programme
KUWAIT	12.07.82	KD 12.860 M	Loan	1.5%	7 years	25 years	-	System 'C'
ADB	11.05.84	(U.S. \$ 45.0M) U.S. \$ 13.1 M	Loan	free	10 years	30 years	1.0% service charge	Walawe
	31.10.80	U.S. \$ 10.0 M	Loan	free	10 years	30 years	1.0% service charge	MARD
CHINA	29.06.72	RMBY 1.7 M	Loan	-	10 years	20 years	-	Malwanagama Farm
UNDP	15.12.81	U.S. \$ 1.5 M	Grant	-	-	-	-	Training facilities & consultancy
FAO	07.06.84	U.S. \$ 0.5 M	Grant	-	-	-	-	Consultancy & Training
	29.07.85	U.S. \$ 0.176 M	Grant	-	-	-	-	Marketing advisory Unit
	12.07.86	U.S. \$ 6.88 M	Grant	-	-	-	-	Food assistance
	30.07.81	U.S. \$ 9.681 M	Grant	-	-	-	-	Food assistance
WFP	07.11.83	U.S. \$ 18.162 M	Grant	-	-	-	-	Food assistance
UNICEF		U.S. \$ 3.686 M	Grant	-	-	-	-	Primary-Health care System 'B'

**SETTLEMENT PROGRESS - SYSTEM B(LB),C,G,H,UW,L
AND UMCD/REV (RE-SETTLEMENT)**

- AS AT END JULY, 1991 -

PUL/MASL

SYSTEM	PROJECT TARGET				ANNUAL TARGET 1991				PROGRESS DURING YEAR TO END JULY 1991					CUMULATIVE PROGRESS TO END JULY 1991				
	FARMER FAMILIES	NON-FARMER FAMILIES	SUB FAMILIES	CASHEW FARMERS	FARMER FAMILIES	NON-FARMER FAMILIES	SUB FAMILIES	CASHEW FARMERS	FARMER FAMILIES	NON-FARMER FAMILIES	SUB FAMILIES	CASHEW FARMERS	TOTAL	FARMER FAMILIES	NON-FARMER FAMILIES	SUB FAMILIES	CASHEW FARMERS	TOTAL
System B(LB) a/	22,703	3,839	2,251	-	1,612	-	419	-	633	45	161	-	839	12,855	462	1,946	-	15,263
System C d/	23,400	5,134	3,154	400	3,543	-	1,641	400	1013	418	435	125	1991	17,919	1,098	1,951	163	21,131
System G b/	4,585	1,414	437	320	-	165	300	-	3	2	1	-	6	3,872	1,326	174	57	5,429
System H e/	23,578	7,616	-	-	-	-	-	-	262	437	0	-	699	23,499	7,390	-	-	30,889
System L c/	3,364	-	-	-	-	-	-	-	0	0	0	-	0	3,364	-	-	-	3,364
Ura Wabawe	32,562	-	-	-	-	-	-	-	14	259	97	-	370	15,418	10,060	97	-	25,575
Upper Mahawes (Re-settlement)																		
Kumale	2,873	-	-	-	-	-	-	-	48	-	-	-	48	2,806	-	-	-	2,806
Victoria	-	2,549	-	-	-	-	-	-	-	-	-	-	0	-	2,526	-	-	2,526
Pandemagala	66	-	-	-	-	-	-	-	-	-	-	-	0	66	-	-	-	66
Hantambe	16	-	-	-	-	-	-	-	-	-	-	-	0	16	-	-	-	16
TOTAL	113,147	20,552	5,842	720	5,155	165	2,360	400	1,973	1,161	694	125	3,953	79,815	22,862	4,168	220	107,065

Source : MEA

- a/ - Includes 1382 old settlers in the Pimburaletewa Settlement.
 - 356 Farmer families, 6 non-farmer families & 49 sub families have been cancelled due to unoccupying.
- b/ - Includes 1190 old settlers in the Elahera settlement. Settlement target revised (1190+3395).
 - Sys G Cumulative settlement progress includes 1013 endrocher re-settled families.
- c/ - 190 permanent deserters and 869 migrant families are in System L.
- d/ - 5 Farmer families & 102 Non-farmer families have been cancelled during the year.
 - 38 Cashew farmers settled prior to 1991.
- e/ - 79 Farmer families & 286 Non-farmer families have been cancelled during the year.
- FOCM/UM/MASL - Settlement progress covers H,H,H,H,H,H areas only

1 2 4 5 7 9

ROADS CONSTRUCTED BY MAHAWELI AUTHORITY UPTO AUGUST 1991

(Classified according to Road Development Authority specifications)

LOCATION OR PROJECT	N A M E	CLASS 'A' Kms.	CLASS 'B' Kms.	CLASS 'C' & 'D' Bitumen Surfaced Kms.	CLASS 'C' & 'D' Gravelled Kms.
KOTMALE	Harangala - Kumbaloluwa	-	17.05	-	-
	Niyangandora - Kotmale New Town	-	3.90	-	-
	Harangala - Dam Crest	-	1.40	-	-
	Atabage - Ulapane	-	8.00	-	-
	Ulapane - Nugawela	-	9.60	-	-
	Nugawela - Maswela	-	6.00	-	-
	Mawela - Gomuru Oya	-	1.50	-	-
	Peacock Hill - Kadadora	-	7.80	-	-
	Pusulpitiya - Wataddara	-	-	1.8	-
VICTORIA	Tennekumbura - Moragahamulla	35.20	-	-	-
	Tennekumbura - Mailapitiya	16.70	-	-	-
	Kandehandiya - Dehigahapitiya	6.20	-	-	-
	Adikarigama - Victoria Power House	5.80	-	-	-
	Doraliyadda - Victoria Dam Top	-	8.20	-	-
	Victoria Dam Top - Adikarigama	-	2.30	-	-

LOCATION OR PROJECT	N A M E	CLASS 'A' Kms.	CLASS 'B' Kms.	CLASS 'C' & 'D' Bitumen Surfaced Kms.	CLASS 'C' & 'D' Gravelled Kms.
RANDENIGALA & RANTAMBE SYSTEM 'B'	Victoria Power House - Minipe	33.90	-	-	-
	Ninipe - Randenigala Dam	-	9.10	-	-
	Manampitiya - Aralaganwila Maduru-Oya	-	32.40	-	-
	Welikanda - Sinhapura	-	10.40	-	-
	- Combined -	-	-	11.20	-
SYSTEM 'C'	- Combined -	-	-	-	133.88
	Mahiyangana - Dimbulagala	66.80	-	-	-
	51st Mile Post - Ulhitiya Spi	-	8.04	-	-
	Barrier Junction - Girandurukotte	-	7.00	-	-
	- Combined -	-	-	96.16	-
SYSTEM 'G'	- Combined -	-	-	-	132.32
	- Combined -	-	-	11.00	-
	- Combined -	-	-	-	65.00
SYSTEM 'H'	Andarawewa - Balaluwewa Road	-	52.75	-	-
	Eppawela - Nallachchiya	-	10.00	-	-
	- Combined -	-	-	153.28	30.80
TOTAL		164.60	195.44	273.44	362.00