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MAHAWELI

PROJECTS & PROGRAMME

1985

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A survey of the progress of work
on the Accelerated Programme
of Mahaweli Development
in 1984
and the development proposed
in 1985

Mahaweli
Projects & Programme
1985
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and the
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Foreword

In this Centenary year of the birth of our first Prime Minister, Mr. D. S. Senanayake—popularly called the “Father of the Nation”—we can justly be proud of this Government’s achievements under the leadership of His Excellency President J. R. Jayewardene. It is significant and augurs well that during our period of office, we have not only been able to continue the good work started by Mr. D. S. Senanayake, but also to gain the proud distinction of showing even greater results in the fields of irrigation and hydro-power development than at any other period after Independence. This country has now reached the goal of self-sufficiency not only in its food supplies but also in many other requirements for the well being of our people, such as cheap hydro-power, energy for Rural Electrification and Industrial Development.

Our country has no mineral wealth, coal fields or oil wells to provide the base to generate energy. On the other hand, our national wealth lies mainly in our perennial water resources, fertile land for cultivation of crops and sufficient manpower. In spite of these natural resources our country continued to be in want; the food import bill had amounted to about one-third of the annual budget, the import of fuel supplies for developing energy to meet our power demand had been crippling our economy and unemployment in the country had reached about 20% of the work force just prior to July 1977. His Excellency J. R. Jayewardene took the bold decision to accelerate the Mahaweli Development Programme and it was launched in 1978 to make best use of the natural resources available and harness them for the betterment of our people. Many of our rivers rising in the central highlands cascade down hundreds of meters carrying large volumes of water to the sea, without being fully utilised for the development of mankind.

The Mahaweli Gange is the largest river in the Island and it has the benefit of catching the copious rainfall from both monsoons. It has the further advantage of having its catchment in the wettest part of the country in the central highlands, and flowing through the driest uninhabited vast fertile plains in the Island. The Mahaweli Ganga has a very high hydro-power potential, if only we harness its copious flows which fall through so many hundreds of meters, before reaching the plains in the Dry Zone. This is exactly what we are now achieving by building Projects like, Victoria, Kotmale and Randenigala hydro-power stations. The Reservoirs at these places have been constructed to provide sufficient storage to regulate the river flows, to generate hydro-powerenergy at a steady rate and tide over lean periods when there is no rainfall.

The storage thus released to develop power will further serve to provide steady irrigation facilities to vast extents of irrigated fields, in the fertile plains of the Dry Zone, which have hitherto been lying fallow due to lack of water for cultivation. The soils in those regions have natural fertility and are now overgrown with jungle, where only wild animals roam.

The year that is now ending and the new year that is about to dawn, will go down in history as the two most fruitful years, when the largest development projects have been accomplished, after the time of Mr. D. S. Senanayake, who was responsible for the Gal Oya multi-purpose Project, when the largest Reservoir at the time was appropriately named after him.

Maduru Oya Rockfill Dam, completed last year, has formed as large a man made reservoir as Gal Oya with three larger projects to follow. This year it filled up and its abundant waters have been released to irrigate new lands in System B (Phase 1) on the Left Bank for the first time in this area.

Victoria Reservoir has created history being the highest hydraulic structure, towering over 400 ft. in height, and being the first sophisticated double curvature arch dam to be constructed in the Island. The Power Station under it is the largest in Sri Lanka, contributing about half of the total combined power generating capacity now available in the country.

The Kotmale dam was completed and the impounding of the reservoir was ceremoniously commenced by His Excellency J. R. Jayewardene on 17. 11. 84. It has an underground Power Station (for the first time in this country) to be commissioned next year, which will help to sustain the power demand of the Island, without having to use thermal energy, thus saving considerable sums of money in the import of expensive fuel supplies.

Work on Randenigala Dam is proceeding according to schedule. The peak of its construction activities will be reached next year, to achieve the target of its completion in 1986.

The construction work on these multi-purpose projects has not only given employment to thousands and thousands of our work force, but also provided specialised training to them in a variety of skills, that will enable them to become high wage earners, not only in this country on future projects, but also in other affluent countries, where there is an ever increasing demand for such skilled personnel.

On the downstream side, development is going apace in the opening up of new lands in System C & B, consisting of nearly 2,000,000 acres in extent. These areas are being systematically settled with farm families for agricultural development.

A new anicut has been constructed across the Mahaweli, below the hills just before the Mahaweli enters the plains of Bintenne, where there was an anicut from the ancient times at Minipe. The largest Irrigation Canal in the Island has now been constructed on the Minipe Right Bank, to divert the Mahaweli Waters, which are stored in Victoria Reservoir to irrigate the vast extents of fertile plains in Systems C & B. Randenigala will live up to its name when it is completed and will provide golden opportunities for further development with irrigation facilities and hydro-power energy.

Two service reservoirs completed in System C last year at Ulhitiya and Ratkinda are already providing irrigation facilities for the first phase of development. Zones 2 and 3 of System C are now fully settled with farm families, who will cultivate virgin lands for the first time in this area, which had been inhabited only by the Veddhās and wild animals and now fast becoming the rice bowl of Sri Lanka.

The newly settled farmers have been provided with new townships and also the necessary infrastructure facilities to enable them to lead prosperous and contented lives.

Our resounding victory at the by-election at Minneriya, shows the undoubted reaction of the contented farmers of today, as a result of our efforts which augmented that area with Mahaweli waters and enabled them to do continuous cultivation thus reaping bumper harvests to make their lot a happy one.

The first project in the Mahaweli Programme was completed at Polgolla in the Kundasale electorate, where the people, benefited by that multi-purpose project, have shown their appreciation of the work of this Government, by returning the UNP Candidate with an unprecedented majority at the recent by-election.



GAMINI DISSANAYAKE
*Minister of Lands & Land Development
and
Minister of Mahaweli Development*

21, December.

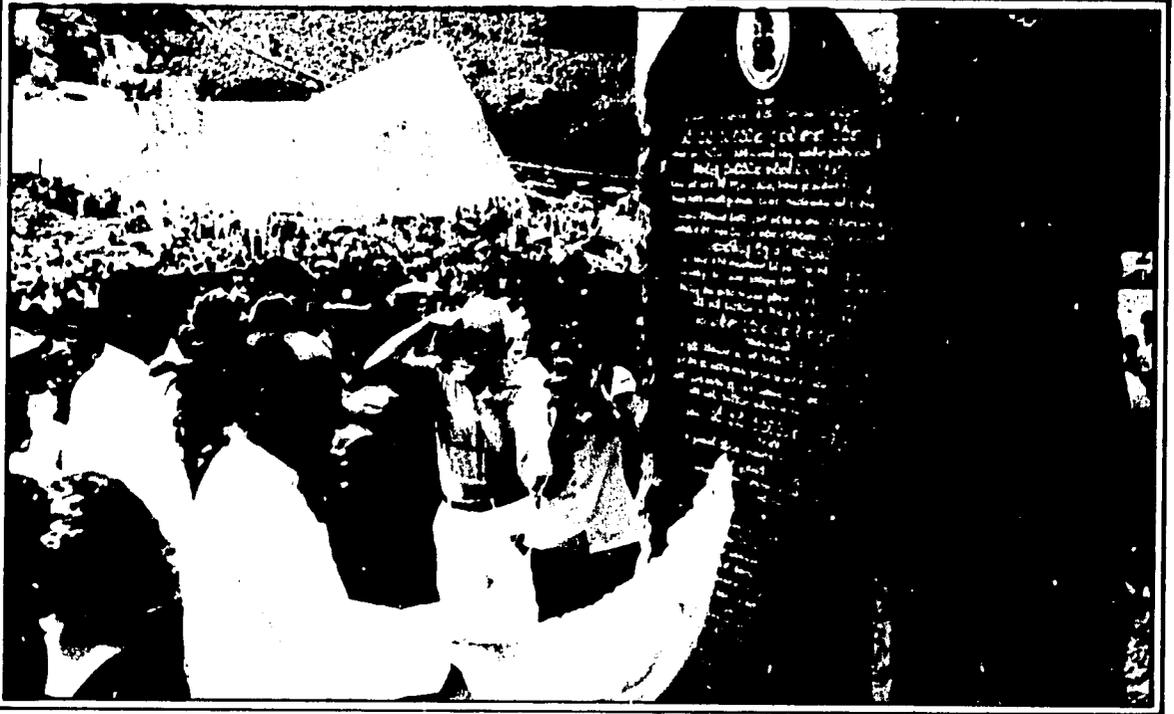
1984.



His Excellency President J. R. Jayewardene and Mrs. Jayewardene were welcomed by the Hon. Minister of Lands, Land Development and Mahaweli Development, Mr. Gamini Dissanayake and Mrs. Dissanayake on their arrival at Kotmale Dam site for the impounding ceremony and were conducted in procession. Among the distinguished guests present was the Hon. Minister of Finance & Planning, Mr. Ronnie de Mel.

The impounding of Kotmale Reservoir was ceremonially commenced by His Excellency President J. R. Jayewardene on 17.11.84. The Hon. Minister of Lands, Land Development and Mahaweli Development, Mr. Gamini Dissanayake, the Hon. Minister of Finance and Planning, Mr. Ronnie De Mel, the Hon. Speaker Mr. E. L. Senanayake, the Hon. Minister of Rural Industries, Mr. S. Thondaman, the Deputy Minister of Mahaweli Development Mr. M. L. M. Abousally, the Deputy Minister of Lands and Land Development Mr. A. M. S. Adikari and Mrs. J. R. Jayewardene and Mrs. Srima Dissanayake were among those present.





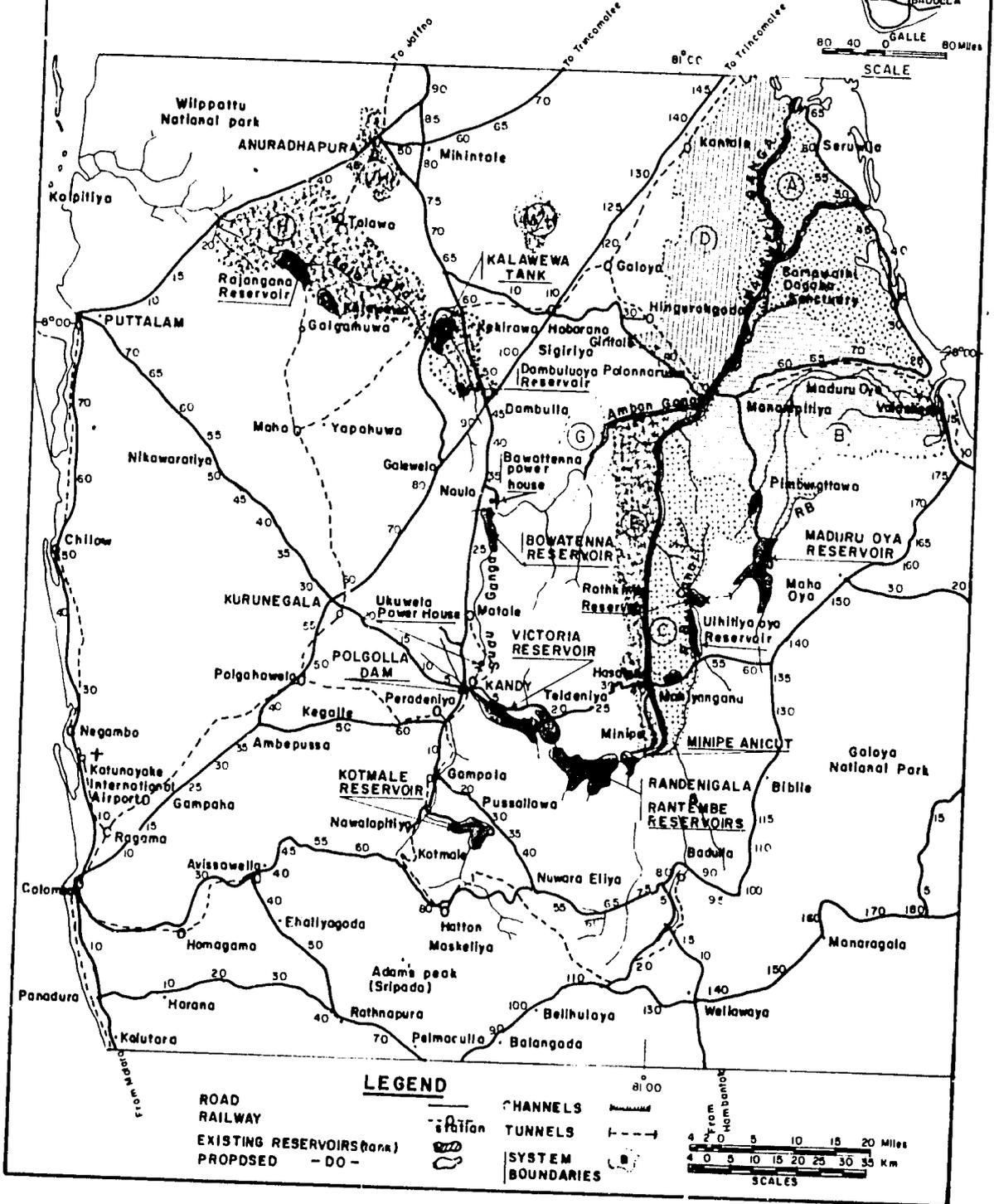
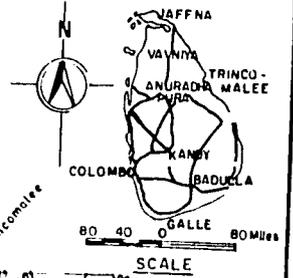
His Excellency President J. R. Jayewardene unveiled the plaque to mark the impounding of Kotmale Reservoir



Maduru Oya Right Bank Canal was ceremonially opened by Hon. Minister of Lands, Land Development and Mahaweli Development, Mr. Gamini Disanayake on 15.11.84 in association with the U. S. Ambassador in Sri Lanka Mr. John H. Reid.



ACCELERATED MAHAWELI PROGRAMME





Bright smiles that mirror the hopes and aspirations of these young Mahaweli settlers greet the youthful Minister of Lands and Land Development and Mahaweli Development, Mr. Gamini Dissanayake, on one of his recent visits to System C.

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Introduction

This publication describing the progress of the Accelerated Mahaweli Programme has been brought out for the Committee Stage of the annual Budget. It also contains a programme for the ensuing financial year. Since, however, the concept underlying the Accelerated Mahaweli Programme and the objectives to be achieved through its implementation as well as its basic features have been repeated in previous issues, it is not proposed to revert to their description 'in extenso' on this occasion.

It would be pertinent to recount what has been broadly achieved in the several projects that constitute the Accelerated Mahaweli Programme up to the time of writing and to knotch up the progress of what are regarded as the major headworks. The Maduru-Oya Reservoir stands completed while Victoria Reservoir which was impounded in April 1984 is nearly full. Power is being generated through two of the three units of 70 MW each. The third unit will be ready for commercial power generation by early 1985. Kotmale dam top height was reached at the end of March 1984 and the impounding of the reservoir took place recently. Progress on the civil works and equipment contracts are predominantly on schedule.

In regard to the major engineering works downstream, the Right Bank Trans-basin canal from Minipe to Ulhitiya and Ratkinda reservoirs was commissioned

on 21. 4. 84. This largest canal in Sri Lanka is now linked to the Maduru-Oya through a tunnel from Ratkinda to supplement the storage yielded by the Maduru-Oya catchment for irrigation of lands in System B. Construction of the Left Bank main and branch canals from Ulhitiya in System C. is complete. Water issues along the Right Bank Main Canal from Ratkinda were made for the first time on 1st November, 1984, and Phase I has been completed.

Entrenching Socio-Cultural Values

In the last year's publication it was stated that the convergence of interest was progressively shifting to the setting up and mangement of human settlements. This process continued in 1984 with greater attention being paid to the finer details in settlement planning and implementation. New concepts and ideas were constantly being processed so as to bring about greater refinement and sophistication to the settlement exercise. Especially, the idea that socio-cultural elements should be blended into the economic development process was not only receiving appropriate recognition but also the importance of its timing in the process, so that it would occur contemporaneously along with economic development and that was increasingly acknowledged, in order that the newly established communities would reach full all round "maturity" rapidly.

It became clear that an approach such as the satisfaction of basic wants – food, clothing, shelter – would not suffice in a development effort such as undertaken by the Accelerated Mahaweli Programme nor would relief to disadvantaged or affected segments of the population represent the character of the total exercise of settlement – an exercise that is aimed at creating the circumstances that would lead to the enjoyment of a “full” life in the new areas, an exercise oriented towards the re-creation of a civilization replete in all its features, economic, social, cultural, religious and political. Various new ideas demanded careful consideration and sifting, especially those that emanate in the area of social sciences – ideas such as whether for the complete and harmonious development of the region, the inducted community structure and pattern adopted in the land settlement process should not be diversified, so as to provide for the society mix that characterises the communities in the rest of the country and so as to promote increasing multi-sectoral professionalism and informed leadership in social, economic and other spheres of activity in the new areas.

Multi-Sectoral Approach.

These in turn would lead to growing efficiencies in those sectors through the harnessing of the entrepreneurial, financial, managerial and other skills, expertise and capabilities in different classes of society. Experience has revealed that a strict single sector approach would not bring in the total reward. It often resulted merely either in the transfer of poverty or inefficient production technology from one region in the country to another – a transfer of Technology which retained its original character and endemic inadequacies even in the new locations. The conscious effort on the part of the

planners in the Mahaweli family of agencies was to avoid the re-creation of the casual syndrome for such inefficiencies. For instance in the Agrarian sector, subject areas such as diversification of agriculture – not merely diversification of cropping patterns, but farming as a whole, so as also to harmonise with the national food and nutritional strategies and water management inclined heavily towards a diagnostic approach but involving also beneficiaries' participation through turn out groups. The provision of input services with more attention to considerations of requirements of farm power and the need to develop breeding programmes for draught animals for such purposes, marketing and other output services, including investigation and installation of new or improved or increased processing capacities, were found to absorb both the interest and the attention of management.

Agriculture is becoming more commercialised and production more and more market oriented, especially as the surpluses generated are enormous, greatly exceeding the demands of local or regional consumers. The Livestock Development Programme envisages the emergence of a new settler utilizing a land unit capable of maximizing his income through dairy farming.

The participation of the Private Sector in agro-business ventures where the settler-outgrowers are supported through a nucleus estate and factory run by private enterprise.

New marketing mechanisms that catalyse the process, with the Mahaweli Economic Agency acting as a supporting institution and also with the close involvement of commercial banks are being explored. Markets are systematically studied and the necessary promotion being

done. Proper market structures and channels are being identified. Already the concept of "Export Villages" handling specified crops for foreign markets has been proved to be effective and beneficial for farmers in some Mahaweli Systems.

Community Programme

The community programme covered a wide set of ideas. Community Forestry Programmes have been worked out to serve both daily needs of settlers and also with the intention of creating an awareness amongst them for the protection of the environment around them. Settlers involve themselves in the twin programmes for fresh forestry development and re-forestation. The Community Forestry Programme is worked out in a manner whereby the settler groups get themselves involved in a re-planting programme. The necessary assistance, like planting material and extension advice, is provided by the authorities. Other activities like control of soil erosion and the protection of the fauna and flora, also worked out as a part of this environmental protection programme. National Parks have been established to safeguard the wild life population and for the enrichment of forests.

The establishment of Settler Development Societies has served to provide the settlers with a forum for expressing their views on the various matters pertaining to their day to day activities. These Societies have helped to foster a closer dialogue between the management and the settlers and provides the settler an opportunity to participate in planning and decision-making. The Unit Service Centre run by the Unit Manager, is the meeting place for all community activities. This Centre also provides the settlers with their necessary inputs, technical advice and primary health-care. Many a

Settler Development Programme is initiated from this Centre.

Off-Farm Employment

The Home Development Centres have been set-up to cater to the needs of women and children. Teaching of skills pertaining to home economics, home gardening, child care are some of the training activities undertaken by these Centres. These Centres have greatly helped in making the settlers' wives and their children to make their contribution and play a greater role in the life of the community and provide better living for the family.

The Development Centres already established are equipped with the necessary technical facilities for activities like welding, masonry, carpentry, and lathe work to train the settler in the technical skills. This training will help to provide off-farm employment to the second generation of settlers and will also bring supplementary income to the settler families for them to achieve a higher standard of life.

Settler Orientation

Settlers are given a briefing of their new environmental setting as soon as they are selected in their villages. Sufficient information about their new place of residence and work, the assistance they would receive and all other information is given to them even before their arrival at the Project. They are also given a cordial welcome on arrival and various aspects to help them to get acclimatised in their new environment without much waste of time. The settlers are also provided with opportunities to associate themselves with construction activities on the Project. They can participate in small scale contracts, like the construction of small canals, hamlet roads etc. This has

given them a sense of partnership and a sense of belonging to the Project. Their interest has helped to improve the quality of the construction work and has provided a training in leadership activities. Above all, this has also provided them an added source of income during the formative stages.

Though comprehensive, incipient difficulties required the profiles of these programmes to be studied in greater detail for their future improvement. Also the intensity of the coverage of each of the items varied significantly, mainly because the more urgent and pressing among them pre-empted the time and energies of the management away from the others which though important, could receive leisurely treatment. In the result

however, the necessary balance in the activity mix was not forthcoming in the desired degree. The recognition of this situation helped to strengthen the concept that it would be through the application of the principles and guidelines pertaining to regional development planning that would finally bring about total satisfaction of the multi-disciplinary and multi-sectoral needs of the new communities. Further efforts in this direction were therefore, being actively pursued in the belief that the right approach has been found.

It is with pleasure that we see the beginnings of a modern civilization emerging in these once desolate areas, based on principles and guidelines of developing communities structured for the attainment of an acceptable level of living standard.



Impounding of Victoria Reservoir was ceremonially commenced by His Excellency President J. R. Jayewardene on April 7th 1984. Picture shows His Excellency J.R. Jayewardene and Mrs. Jayewardene being conducted in procession to the site by the Hon. Minister of Lands, Land Development and Mahaweli Development, Mr. Gamini Dissanayake and Mrs. Dissanayake, the Deputy Minister of Mahaweli Development Mr. M. L. M. Aboosally, the Director-General of Sri Lanka Mahaweli Authority, Mr. N. G. P. Paaditharatne. Sir John Nicholas, the British High Commissioner in Sri Lanka and Mrs. Nicholas were among those present.

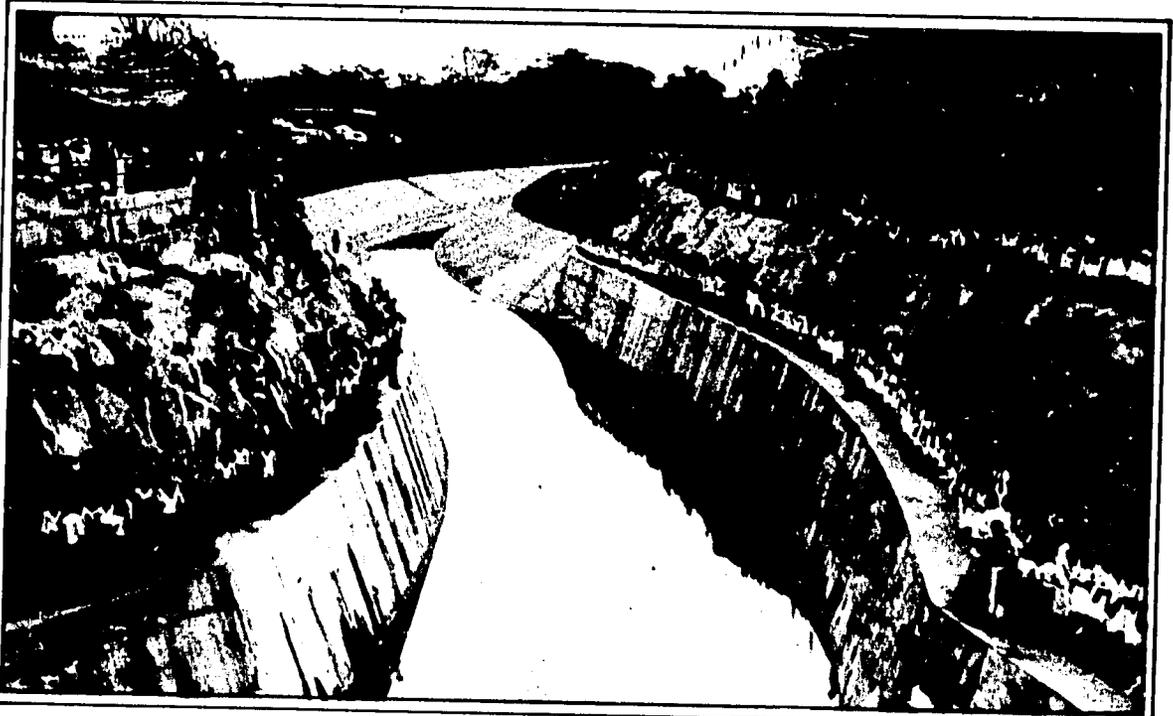
His Excellency Abdul Gayoum, the President of Maldives Islands, toured Victoria Reservoir site on his visit to Sri Lanka recently.





On the invitation of the Hon. Minister of Lands, Land Development and Mahaweli Development, Mr. Gaminl Dissanayake, His Excellency President J. R. Jayewardene ceremonially opened on 21 April 1984 the Minipe Right Bank Canal. Mr. M. L. M. Aboosally, Deputy Minister of Mahaweli Development, Mr. R. M. Appuhamy, District Minister of Badulla and Mrs. Srimala Dissanayake were among those present on the occasion.

Mahaweli water flowing through Minipe Right Bank Canal just after it was opened by His Excellency President J. R. Jayewardene.



Financial Aspects

U. N. D. P. Studies

The "Master Plan" for development of the land and water resources of the Mahaweli Ganga were carried out by the United Nations Development Programme with money released from its special fund (U.S.\$ 1,146,000) during 1964-68. The Ceylon Government contribution for counterpart assistance was equivalent to \$ 837,000. The U. N. D. P. Master Plan prepared in 1968 contained recommendations for about 12 projects for the irrigation development of 900,000 acres of land in the Mahaweli Basin and adjacent areas and hydropower development with an installed capacity of 508 Megawatts.

Project I - Polgolla Diversion (including Bowatenna)

The first project in the Master Plan was undertaken in 1970, with financial assistance from the World Bank, namely, \$ 14.5 million from the International Bank for Reconstruction & Development (long term soft loan) and another \$ 14.5 million from International Development Agency (long term interest free loan). Project I was completed in 1976 at a total estimated cost of Rs. 550 million. The benefits derived from the 132,000 acres of existing lands in Systems H, D and G and the hydro-power energy derived from the 40 Megawatt Power Station under Polgolla Diversion at Ukuwela, more than repaid in two years the investment on Project I.

New Lands under Project I

The first 6000 acres in H1 (in System H under Kalawewa) a part of 12,000 acres in H2 and a part of 14,000 ac. in H7 and H8 were taken up and developed in 1976/77. Financial assistance in a sum of \$ 42.2 million was obtained in the middle of 1977 for the development of 40,000 acres in H4 and H5 from the World Bank (\$ 19 million) and other friendly countries, namely US AID (\$ 6 million) Canada (\$ 5 million) United Kingdom (\$ 7.2 million) and Netherlands (\$ 5 million), Ceylon Government counterpart contribution being \$ 28.1 million. System H was completed and settled with new farmers during 1976 to 1983 and serves as a pilot project for the subsequent development of vast areas in Systems C and B of the Mahaweli Accelerated Programme. The new area developed in System H is 24,460 ha. and the cost was Rs. 1492 million.

Power Station under Bowatenna

This Power House was completed in 1981 with financial assistance from the Asian Development Bank (\$ 6 million) and OPEC (\$ 3.15 million), the cost being Rs. 328 million.

The Accelerated Mahaweli Programme

When the present Government took office in the latter part of 1977, it was decided to undertake as many of the projects in the Master Plan as possible,

to be completed during its period of office. The cost of all the projects in the Master Plan was Rs. 15,000 million at this time. Four of the most beneficial projects have been undertaken under the Accelerated Mahaweli Programme, along, with corresponding irrigation development downstream, with financial assistance forthcoming from friendly donor countries. A "Sri Lanka Aid Group" was formed to mobilise and channel the external resources that were forthcoming from Donor countries and International Institutions under the sponsorship of the World Bank to co-ordinate activities.

Victoria

Victoria Multipurpose Project was one of the four large multipurpose projects to be undertaken. It consists of a high concrete arch dam, a four mile long tunnel and Power Station with an installed capacity of 210 MW. Irrigation development of over 200,000 acres is possible under this project, in Systems C and B. The United Kingdom had first released a sum of £ 4.75 million under a Technical Assistance Grant for the feasibility studies of Victoria, undertaken by Sir Alexander Gibb and Partners, Consultants of U. K., with Sri Lankan counterpart services from the Central Engineering Consultancy Bureau, who also supervised the construction work. This was followed by an outright grant of £. 100 million sterling from the United Kingdom to meet the cost of civil engineering head-works. An additional sum of £. 13 million was provided in 1983, as a further grant from the U. K. to meet the additional civil engineering costs.

Another sum of £. 20 million was arranged as commercial credit from the Hannover Trust, (U.K.) for the Electro Mechanical Equipment costs of this project. These headworks have been satis-

factorily completed by Messrs Balfour-Beatty-Nuttall (U.K. Contractors). The total cost of Victoria Headworks is £ 145 million (foreign) and Rs. 2511 million (local) making a cost-total of Rs. 7890 million.

Maduru Oya

A Technical Assistance Grant of C \$ 7 million had been released by CANADA for feasibility studies undertaken by Messrs Crippon International, Canadian Consultants. Maduru Oya Dam was the next project to be undertaken in the Accelerated Programme with a long term soft loan of C \$. 76 million from Canada to meet the foreign costs of the construction of the Maduru Oya rock-fill dam and appurtenant Headworks, including a 3.5 long Link Tunnel to receive augmentation from the Mahaweli.

The Contractors were Messrs Foundation, Atlas-Gest, Fitzpatrick, & Janin (Joint Venture) of Canada. The total cost of the Maduru Oya Headworks amounts to Canadian \$ 100 million (foreign) plus local cost Rs. 923 million, making a total of Rs. 2631 million. Canada has also provided a sum of C. \$ 26 million towards the local costs by means of food aid during 1981 - 84.

The Headworks have been completed and the project was ceremonially inaugurated by His Excellency J. R. Jayewardene, President of Sri Lanka, in the presence of a Minister from the Canadian Government last year and the reservoir is now functioning. There is provision for installing two small power stations under each of the sluices, which will be done later.

Irrigation development under Maduru Oya (augmented by water from VICTORIA) will be in System B which is served by the Left Bank and the Right Bank Main Canals.

N. D. K. Dam

The first part of the R. B. Main Canal and a Dam (NDK) on it to impound the waters of Nagolla Ela, De Ela and Kadiunne Ela, have been constructed by the same organisation set up for the Headworks. The Canadian Government provided finances to meet the cost of C \$ 11 million (interest free loan \$ 9 million and grant C, \$ 2 million.)

Kotmale

Preliminary feasibility studies were carried out by USAID during 1959–1962 and this was followed by further studies by UNDP in 1964–68. The Water and Power Development Consultancy Services (WAPCOS) carried out final feasibility studies on this project during 1974–76 with Technical Assistance from India. The designs were finalised by Sir William Halcrow and Partners who were engaged in 1978 with Sri Lankan Government Resources and provided with counterpart services by the Central Engineering Consultancy Bureau of Sri Lanka.

Kotmale Multipurpose project was the third to be undertaken in the Accelerated Programme with financial assistance of SEK 1395 million from Sweden (in the form of Grants) to meet the foreign costs, for construction of the Civil Engineering works which were awarded to Messrs SKANSKA of Sweden. A further sum of SE Kroner 256.2 million was obtained from Skandinaviska Enskilda Banken of Sweden as commercial credit, being 85% of the aggregate sum required for the Electro Mechanical Equipment for the Power House which is being constructed by Messrs ASEA of Sweden. The total foreign cost is SEK 2024 million and the local cost is Rs. 1857 million making a total cost of Rs. 8755 million. It is expected to complete this project in 1985.

Randenigala

Feasibility studies for Randenigala and Rantembe projects were carried out by "Joint – Venture Randenigala" Consultants, comprising M/s. Salzgitter Agrarund Electrowatt assisted by CECB, with a Technical Assistance Grant of D.M. 8.5 million provided by the Federal Republic of Germany, (through Kreditanstalt fur Wiederaufbau – "KFW"). This was followed by a long term soft loan of DM 400 million from "KFW" for the construction of the Civil Engineering Components of the fourth multipurpose project namely, Randenigala Dam and Power House. The total cost of this complex amounts to DM 400 million (foreign) plus Rs. 822 million (local) making a total of Rs. 4450 million. Hydropower will be developed with an installed capacity of 122 MW to generate 525 Gecawatt hours of energy (average) annually. The Main Contractors for the construction of Randenigala Headworks are a Joint Venture of Messrs Dykerhoff Widemann, Belfinger & Berger, & Alfred Kunz.

Downstream Development

The water releases from all the four Major Reservoirs in the Mahaweli Accelerated Programme after power generation will be used for irrigation development downstream in System C through the Minipe Anicut, and Right Bank Main Canal and to System B under Maduru Oya Reservoir augmented through the LINK TUNNEL from Ratkinda.

System C with (financial assistance from World Bank, EEC, Japan and Kuwait). This contains a new area of about 56,000 ac. (22,500 ha.) to the north of Minipe Anicut on the Right Bank.

The New Minipe Anicut up to 4.7 km of the Right Bank Transbasin Canal, Ulhitiya and Ratkinda Service Reservoirs have been constructed by local contrac-

tors with Sri Lankan Government Finances. Cost of this part is Rs. 390 million (Anicut Rs. 14.34 M+Right Bank Transbasin Canal 0-4.7 km Rs. 72.8 Million+ Aqueduct Rs. 26.6 Million & Tunnel Rs. 33 Million + Ulhitiya Reservoir Rs. 154.8 Million + Ratkinda Reservoir Rs. 87.9 Million).

The R. B. Transbasin Canal (The main part 4.7 km to 30.8 km) has been Constructed by VIANINI (Italian Contractors) with a part of the World Bank Credit (from IDA) provided in a sum of SDR 73.3 million (\$ 90 million). Cost of this part is Rs. 1154 million.

Right Bank Main Canal No. 2 beyond Ratkinda and the Irrigation Canals to serve Zones 3 to 6, containing irrigable extent 18,500 ha. (45,000 acres) are being constructed with the balance left of the SDR 73.3 million (\$ 90 million) credit from IDA plus additional soft loans of \$ 45 million (OPEC) Japan, & \$ 45 million from Kuwait which are also being used for infrastructure development. The construction is by Hazama-Gumi, Toda, & C. Itoh of Japan (Joint Venture) and the Consultants are Nippon Koel, JEC, & Chue Koihatsu Corporation of Japan.

Zone 2 (of System C) Irrigation Canals and infrastructure development was constructed with a grant of EUA 22 million (European Unit of Accounting) from the European Community which includes infrastructure development. (Total cost of Zones 2 to 6 including Canals is Rs. 3985 million).

System B – Left Bank with financial assistance from USAID, Australia, OPEC and Saudi Arabia. A Technical Assistance Grant of US \$ 10 million was provided by USAID for the "Design and Supervision of construction" of the main and branch canals in System B. This also included

studies of the "Environmental Impact of the Development" in Systems B and C.

L. B. Main and Branch Canals in System B (irrigable area 25,000 ha.) are being constructed with a soft loan increased by USAID to US \$ 95 million. The US-AID Loan Agreement also provided a sum of US \$ 5 million for implementing an Environment Project, namely, for conserving Somawathiya Sanctuary, Wasgamuwa National Park, Maduru Oya National Park and the Flood Plan National Park.

\$ 1.5 million out of this is earmarked for a Training and Research Centre for Wild Life conservation. US AID has provided further Technical Assistance of \$ 3 million for Operation and Maintenance of System B Left Bank Canals for three years.

Irrigation Canals & Infrastructure Development

The construction of the L. B. Secondary and Tertiary canals of System B in Zones 1 & 5 have been undertaken with financial assistance from Australia (US \$ 15 million Commodity Aid), \$ 9 million from OPEC and the balance from U.S. Sector Support. The construction of the L. B. Secondary and Tertiary canals of Zones 2 and 3 (in System B, has been undertaken with a soft loan from Saudi Arabia Riyal 85 million (\$ 25 million) and a grant of EUA 20 million from E.E.C. (\$ 25 million – Total cost of System B Left Bank is Rs. 4800 million including Canals.

System B (Right Bank) – (with finances from Canada, World Bank & Saudi Arabia) Technical Assistance was provided by CANADA with a grant of C \$ 2 million for the consultancy services for the Designs and supervision of construction of R. B. Main Canal up to and including a detention reservoir at "N.D.K. Dam" to impound the waters of Nagolla Ela, De Ela & Kadiunna Ela.

The finances for its construction have been listed under Canadian Aid for Maduru Oya Headworks. (C. \$ 9 million interest free loan+C. \$ 2 million grant).

The World Bank has provided Technical Assistance for pre-appraisal studies of the Right Bank irrigation canal system required for developing System B below N.D.K. Dam, which has an irrigable extent of 14,000 ha. The total cost of the RB Irrigation System is Rs. 2535 million.

Saudi Arabia has agreed to provide Riyal 171 million (i.e. US \$ 50 million) for the designs construction and supervision of the Right Bank Main and Branch Canals below N.D.K. Dam (includes local costs).

The World Bank has agreed to provide SDR 28.3 million IDA credit (i.e \$ 30 million)+\$ 12.1 million IBRD loan(\$ 42 million)towards tertiary canals and infrastructure development of System B Right Bank.

Canada has agreed to provide C. \$ 48.3 million (C. \$ 20.4) grant and the balance (\$ 27.9) loan to supplement the development of the tertiary irrigation canals and infrastructure development on the Right Bank. (Foreign Cost of R. B. system development below NDK is estimated at US \$ 80 million - Total Rs. 2845 million towards which Saudi Arabia has promised Riyal 171 million (\$ 50 million).

Trunk Roads in Systems B and C

Asian Development Bank has provided a long term soft loan of US \$ 13.8 million for the new main and trunk roads connecting the Townships in System B and C. The total cost of the Trunks Roads is Rs. 307 million.

Budgetary (Sector) Support

In order to pick up the local costs of any item that needs to be funded by the Sri Lanka Government, U.S.A. has provid-

ed Sector Support with a soft loan of \$ 50 million; Canada has provided Food Aid in a sum of C. \$ 26 million and Japan has provided Food Aid in a sum of Rs. 473 million.

Assistance From U. N. & Other Organisations

UNDP has provided a sum of \$ 321,712 for the Monitoring and Progress Control Unit for the period 1979 to 1981 in Phase I.

A sum of \$ 682,208 has been provided for the period 1982 to 1984 in Phase II. UNDP has also provided assistance amounting to \$ 518,700 for F. A. O. to establish an Experimental and Training Farm in System B (on about 500 acres) at Aralaganvila to supply seed material for trying out cropping patterns, water management practices, and animal husbandry requirements of farmers.

UNFPA

A sum of \$ 100,000 has been provided from this source for Family Health training in System C during 1982-84.

UNTCDC

A sum of \$ 500,000 has been provided under Technical Co-operation among Developing Countries to pay the salaries of about 30 Engineers from India to assist the CECB.

UNICEF

CIDA has made available under the Children's Emergency Fund, a sum of \$ 500,000. This was released for Phase I in System H during 1979-80. A further sum of \$ 1,724,500 is provided for a social development programme by UNICEF in System H Phase II. The commitment by UNICEF in System B is \$ 3,293,000. This money is utilised mainly for training of farmers, child care and Community Health Programme.

W. F. P.

The World Food Programme has been providing Food Aid to settlers during the first 15 months, until they do a successful cultivation and reap their first harvest. During periods of drought the farmer-settlers were given "Food and Work" under the programme amounting to \$ 5,892,000 during 1977-83 in System H. \$ 9,681,700 during 1981-86 in System C and \$ 18,346,400 during 1982-83 in Systems B and C.

The People's Republic of China provided a grant of Yuan 2 million (Rs. 22 million) for the establishment of a Demonstration Farm at Malvanagama in System H under Kalawewa. Chinese experts are working on this farm to demonstrate food techniques etc.

Netherlands has provided a grant of Guilders 600,000 for extension of Draught and Dual purpose Animal Programmes, which are being carried out in the Downstream Development Areas in Systems H and C and another grant of Guilders 2.1 million for a straw treatment programme by MASL and the other Organisations.

The Netherlands had earlier provided Technical Assistance for an "Implementation Strategy Study" by NEDECO Consultants for the Accelerated Programme.

Canada

A Water Management Secretariat has been established in the MASL for which Canada has donated an I. B. M. 4331 Computer and provided the services of Consultants.

This Water Management Secretariat will be in direct communication, by a radio network, with the main water distribution centres in the Mahaweli Project areas.

Japan

The Japanese Government has provided Technical Assistance for the feasibility studies of Moragahakanda with the Consultancy Services of JICA. As this project was left out of the Accelerated Mahaweli Programme, Japan has come in as Co-financier for downstream development in System C Zones 3 to 6, and also provide a special grant of \$ 5 million for a pilot farm in Block 302 of C.

The **World Bank** has provided \$ 5 million credit for funding further studies by Electrowatt Consultants, to determine comparative benefits from different downstream development areas in order to achieve optimum utilisation of water in the Mahaweli Development Programme.

Victoria Multi-Purpose Project

The Victoria Headworks is now complete and will be ceremonially commissioned early next year by H. E. the President and a distinguished invitee from the United Kingdom. It is the highest dam in Sri Lanka and has the largest Power Station in the country. It consists of a double curvature arch dam of maximum height 122 m (400 ft.), a circular concrete-lined tunnel of 6 meters diameter (19.7 ft.), leading to 3 Francis turbines, each of 70 MW capacity and generating 780 GIGA Watt hours, housed in a reinforced concrete power station 52 m (170 ft.) long and 30 m (98 ft.) wide. The dam which is located between the Hulu ganga confluence and the Mahaweli ganga rapids called "Victoria Falls" measures 507 m (1663 ft.) along the crest. The catchment area at this dam site is 1869 sq. km (730 sq. miles) and the gross capacity of the reservoir is 728 M cu. m. (500,800 acre feet) at a full supply level of 438 m (1437 ft.). There is a 21 meter (69 ft.) diameter concrete-lined chamber to protect the tunnel from surge effects.

Eight radial gates 12.5 meters (41 ft.) wide and 6.5 meters (21 ft.) high are provided for the dam so designed as to open automatically when pre-determined water levels are reached. The design of these radial gates which require power only for closing, won an award for Innovation in Civil Engineering from the Institute of Civil Engineering, (U. K.) for the consultants who designed them. The effective

width of the over spill is 100 meters (328 ft.) and allows a maximum discharge capacity of 8,200 cu. m. per second (289,542 cusecs) under a head of 11 meters (36 ft.). Two low level sluices are provided in the dam for drawing down the reservoir at initial filling or any subsequent time and also to pass silt which may accumulate immediately above the dam. The Consultants for the Civil Engineering works are Sri Alexander Gibb and Partners of U. K. and for the electro-mechanical part, M/s. Preece, Cardew and Rider.

Initial Problems

Construction works on the Headworks was formally inaugurated by His Excellency President J. R. Jayewardene, on 23rd March 1980. Preliminary works like construction of access roads and camp buildings commenced during 1979. The Contracts for the Civil works on the Dam, Tunnel & Power house were awarded to Messers Balfour Beatty Nuttall and the electro-mechanical part of the power station to Messers Costain International Ltd., both from the United Kingdom.

The initial setbacks to the construction programme were due to delays in mobilisation and setting up the construction facilities for the dam. Later in foundation excavation work unfavourable geological conditions resulted in additional work. Measures were taken to accelerate the programme by providing incentives so that

the Contractor was able to bring in extra resources.

The river diversion through the temporary openings in the dam was effected on target by 16th January 1982. Also handing over the spill way for the gate contractor was achieved on schedule on 17th November 1982. The rate of concrete placing reached record levels during 1983 using modern methods of mixing and placing concrete, such as travellers on high lines above the dam called "BLONDINS". More than 50% of the total volume of Dam concrete was placed in that year. The impounding of the Dam was achieved on target and commissioned on the 7th of April 1984 by His Excellency the President at a ceremony to mark the occasion. An additional incentive was offered to the Contractor to bring in extra resources.

Re-alignment of Tunnel

The excavation of the tunnel was interrupted due to poor geological conditions in a portion of the tunnel roof which collapsed. A re-alignment of the tunnel trace in this reach was necessary and a relocation of the surge chamber to avoid the bad patch. The final "hole through" was achieved on 17th November 1982. Concrete lining of the tunnel was slow during the first half of 1983 but it gathered momentum thereafter. The grouting work on the tunnel continued after the impounding and the tunnel was ready for filling by 12th, July 1984.

The construction of the Power Station Building was slowed down by increased volume of work in the foundation excavation. During 1983 the contractor had to revise his programme but completed the critical items of work on schedule for installing the electro-mechanical equipment.

Progress on the Kotmale-Victoria Transmission line which was delayed by the earlier Indian Contractors was re-awarded to M/s. Balfour Beatty during 1983 and work was completed at the beginning of 1984. CEB provided a temporary connection to transmit Victoria Power to the national grid till Colombo - Kotmale line was ready. Electro-mechanical test for the 1st rotation was started on 15th, August and commercial operation proceeded thereafter.

Total Cost

The total cost of Civil and Electro-mechanical contracts is £. 180 M of which 145 M is the Foreign Component. The Government of the United Kingdom has provided a generous grant of £. 113 M. An additional £. 20 M loan was arranged from the Manufacturer's Havover Trust through the Export Credit Guarantee Department of the United Kingdom.

Contractors

The construction of the Arch Dam and Tunnel has been done by Balfour Beatty Nuttall of U. K. and the Power House by Messrs Costain also of U. K. The Electro-Mechanical part of the Power House is by Whesso Boving Co., of U. K.

Peripheral Development under Victoria

Trunk Roads

A total of 40 miles of new trunk roads is being constructed under Victoria Project, at a cost of Rs. 300 million (approximately). This work includes 17 miles (2 miles of which represent improvements to existing road by Highways Department) of road construction viz. on Kandy - Mahiyangana route, 5 miles of new link road traversing the Victoria Dam and providing access to Nuwara Eliya and Matale route as well as 8 miles of roadway on Right Bank linking Tennekumbura



Victoria Reservoir was ceremoniously impounded on 7.4.1984 by His Excellency President J. R. Jayewardene on the invitation of the Hon. Minister of Lands and Land Development and Mahaweli Development, Mr. Gamini Dissanayake. Picture shows the distinguished visitors being conducted in procession to the site.

Victoria Dam (400 ft high) rises majestically into the sky forming beneath it a vast reservoir just two weeks after the impounding.



with Talatuoya/Hanguranketa road at Kapuliyadde. This work further involves the construction of 7 major Bridges (viz. Tennekumbura, Huluganga, Karaliyadde, Guru Oya, Gauela, Talatuoya and Maha Oya Bridges) as well as several small span bridges and Hume pipe culverts. The total cost of work carried out in 1984 is about Rs. 120.00 million. The balance work is expected to be carried out in 1985.

Re-settlement of Displaced People

Out of a total of 6,000 families displaced almost 2/3rd of this number were to be resettled in downstream areas i.e. systems B, C & H while the balance were to be resettled in Kandy District. The majority of these families have been already re-settled and the balance to be resettled is 230 families (most of whom are shop keepers) in Kandy District and 150 families in downstream areas whose families will be resettled within the next 3 months. Re-settlement of traders and others engaged in various lines of business will be finalised after bank authorities have worked out details for financing rehabilitation.

New Town of Karalliyadde

Almost all government departments and a large number of commercial establishments affected by the Victoria Project will be housed in the new town of Karalliyadde. Already most of the buildings of the Madya Maha Vidyalaya have been completed, thereby, enabling the school to function without much difficulty. The remaining buildings will be completed before long.

The Government Hospital Complex will consist of an administration block, 6 wards, quarters for nurses and doctors and a mortuary. The construction of these buildings is progressing satisfactorily.

As regards the A.G.A.'s office, 50% of the work has been completed and this same rate of progress will be maintained till the buildings are completed. All arrangements have been made to commence the construction of the A.G.A.'s residential quarters.

It is hoped to start the construction of the Veterinary Surgeon's Office shortly. The buildings of the Magistrate Court are now under construction.

The M.P.C.S. Complex is at present functioning in a temporary building. The site for the permanent buildings has already been handed over to the authorities concerned, while funds for the purpose have also been released.

The town has already been supplied with a petroleum filling station and it is functioning satisfactorily.

The DDC office and library are presently housed in temporary buildings. Arrangements have been finalised for the construction of permanent buildings. Construction work will commence shortly. Plans for the public market are under preparation, while the site for the fair (pola) has already been handed over to the DDC.

The Sri Lanka Transport Board Office is now functioning at a site temporarily given for the purpose. A permanent site will be made available in due course.

It has been decided to construct 14 buildings to be used for a shopping complex. Already the construction of 10 buildings has been completed. Of the remaining buildings, more than half of the work has been completed.

Electricity has already been supplied to the new town.

Till a permanent supply of water is provided, arrangements have been made



As Mahaweli waters rise submerging Teldeniya and its surroundings, these women and the young Buddhist monk sadly ponder at the sight of losing their traditional homeland.

Some of the displaced persons under the Victoria Project have been settled in this new town of Rajawela, near Kandy.



by the CECB to supply water to the residents from wells.

The Bank of Ceylon and the People's Bank will have their branches in the new town. Suitable sites for the construction of the necessary buildings have been located and these will shortly be handed over to the bank authorities.

Five sites for private residences have already been allocated and the construction work at these sites is in progress.

Kundasale New Town

It has been proposed to develop Kundasale New Town as a predominantly small scale industries complex. All facilities have been provided to private business sector to start business in this township. Land also has been set apart for residential purposes. Construction work has begun on two sites.

Twenty two sites have been allocated for starting light industries. Garages, cycle repair shops, bakeries, biscuit factory and hotels etc., will come up on these sites.

The CECB has taken up the construction of 72 buildings for shops. Of these 21 have been completed while in the remaining buildings nearly half the work has been completed.

The Highways Department has undertaken the construction of quarters for clerical staff and three labour lines. Most of the work on these buildings has been completed.

The town is already been provided with postal facilities.

As regards electricity low tension lines have already been laid. The work in this connection is progressing satisfactorily.

A temporary water supply system is presently in operation.

Rajawella New Town

This town will be developed as a major commercial town under the Victoria Peripheral Development Scheme. The national Milk Board, the Timber Corporation and the Paddy Marketing Board have decided to have their centres in this town. The progress so far made in the development of this town is satisfactory.

As regards the internal roadways 90% of the work is complete.

The buildings of the Maha Vidyalaya and the Junior School have already been completed.

In the construction of the National Milk Board Factory more than half the work has been completed.

A site for Ceylon Electricity Board has been allocated.

The construction of Paddy Marketing Board buildings is progressing satisfactorily.

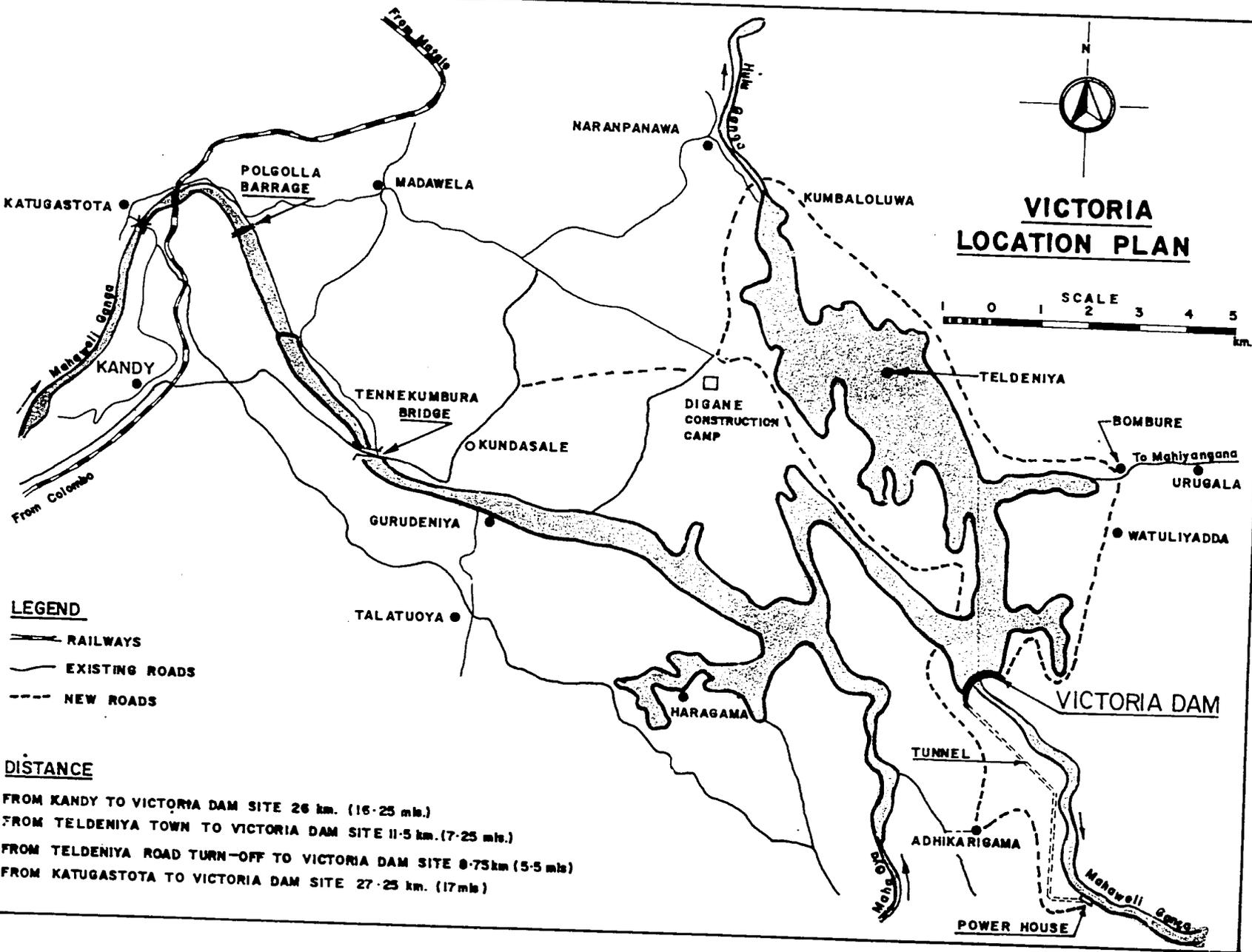
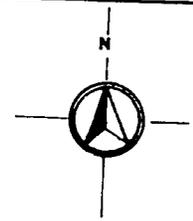
A suitable site has been allocated for the construction of a petrol filling station. Construction work has already commenced.

Thirteen families have been allocated private residential sites. Construction work has been started on 4 of these sites.

The CECB has undertaken the construction of 168 buildings for shops. Of these 40 buildings have been completed, 24 are nearing completion, 31 are nearly half complete and work has started on 27 buildings. Arrangements are afoot to commence work on the remaining 46 buildings.

Sites have been allocated to start various small scale industries. Six sites have been given to put up carpentry sheds. Already two sheds have been put up and carpentry work has been started. One site each has been allocated to start

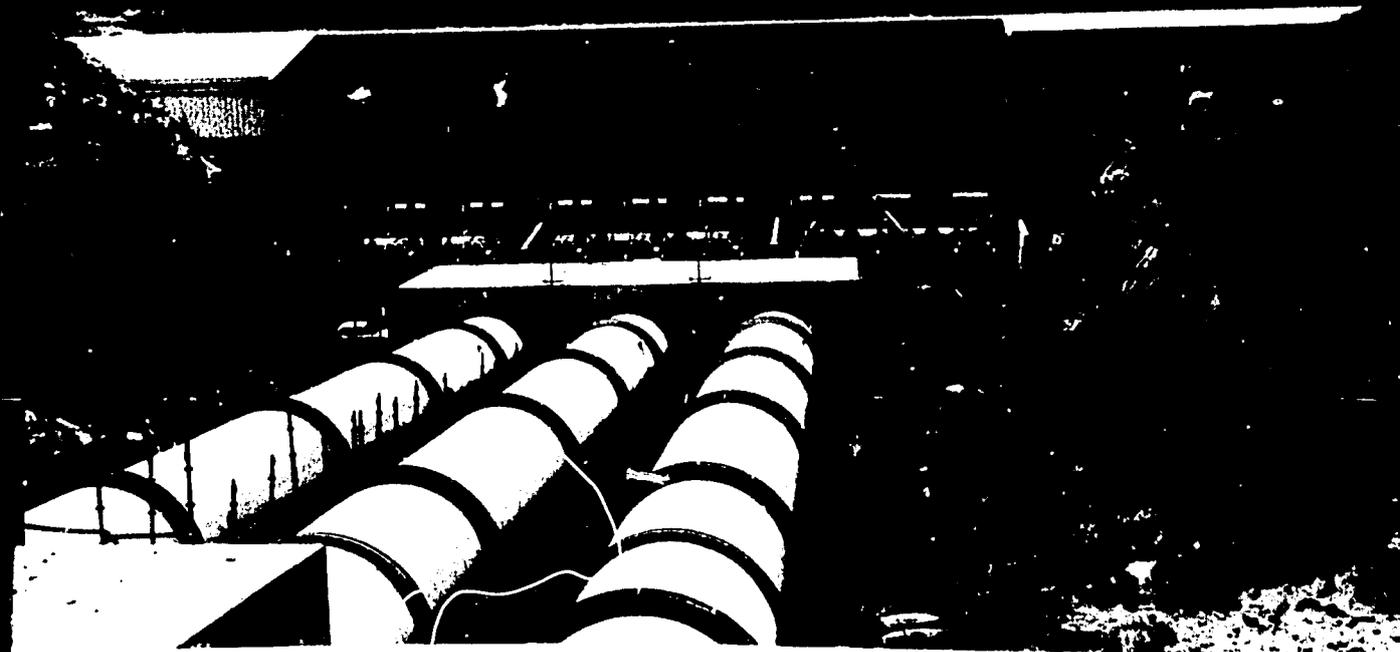
VICTORIA LOCATION PLAN



- LEGEND**
- RAILWAYS
 - EXISTING ROADS
 - NEW ROADS

- DISTANCE**
- FROM KANDY TO VICTORIA DAM SITE 26 km. (16.25 mls.)
 - FROM TELDENIYA TOWN TO VICTORIA DAM SITE 11.5 km. (7.25 mls.)
 - FROM TELDENIYA ROAD TURN-OFF TO VICTORIA DAM SITE 0.75 km (5.5 mls)
 - FROM KATUGASTOTA TO VICTORIA DAM SITE 27.25 km. (17 mls)

10/10



The Victoria Power House is now complete with two turbines generating power and a third turbine is ready for power generation in early 1985. Each turbine produces 70 MW of electricity which is fed to the National Grid in Colombo.

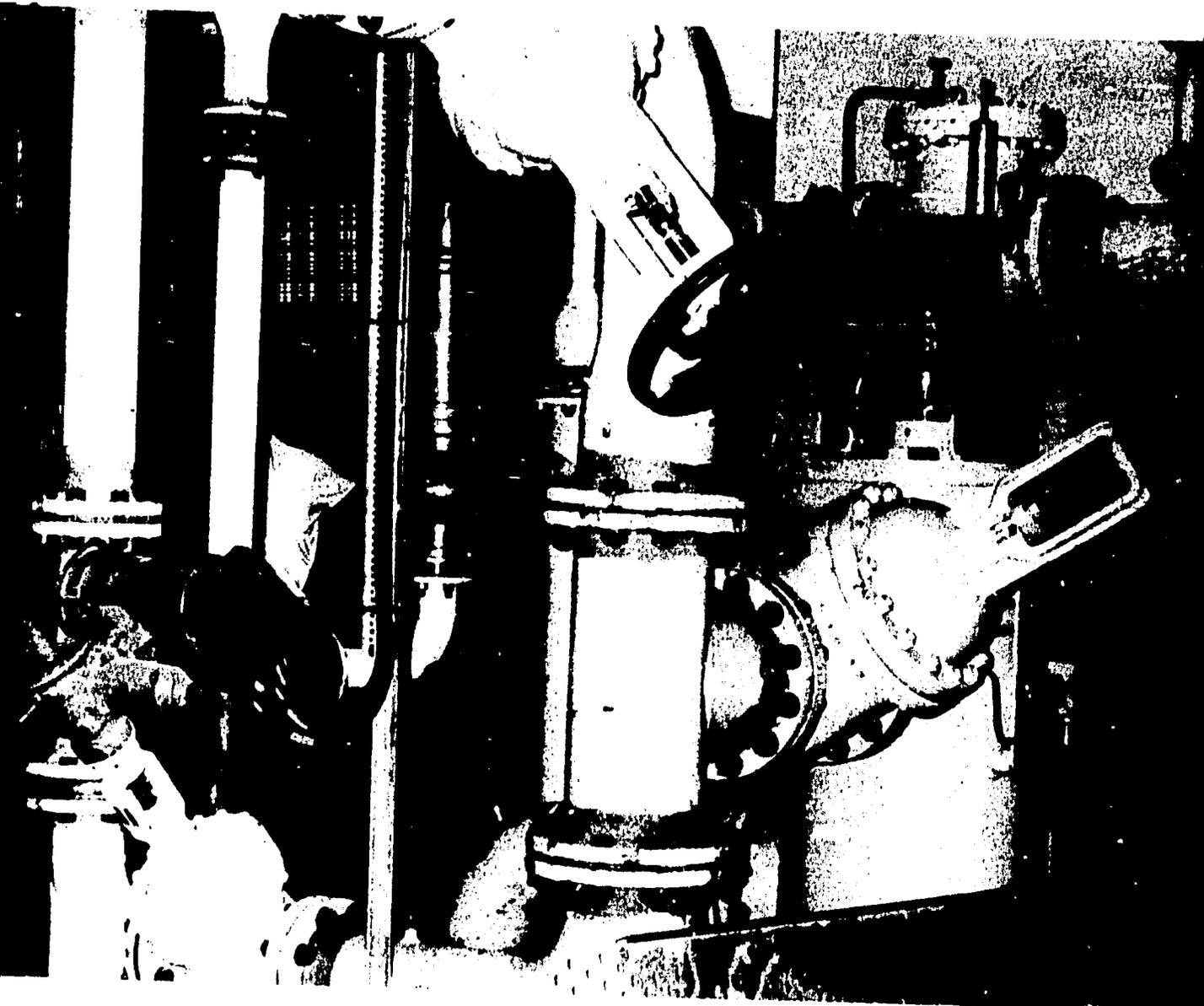


a garage, welding work place, weaving centre and for tinkering work. Two sites have been allocated to start blacksmith workshops 4 sites for paddy mills, 2 sites for timber depots and 3 sites for timber yards.

The Bank of Ceylon and the People's Bank have decided to open branches in

this town. Plans have already been submitted by the two banks. The sites for putting up the buildings will be decided by the MASL.

Telecommunication facilities will be available to this new town from Digana exchange.



A view of the interior of Victoria Power House .



A large number of displaced persons under Victoria Project were settled in System C. The Hon. Minister of Lands and Land Development and Mahaweli Development, Mr. Gamini Dissanayake, who is a frequent visitor here, checks up with the settlers on the progress they are making.

Re-Settlement of displaced persons under Victoria Project

The Victoria Project is located in an area of great scenic beauty, congenial climate and of historic importance. The valley inundated below the Polgolla barrage is considered by geographers as "a misfit valley" due to the precipitous nature in relation to the large volume of water carried by the river. The climate in the Victoria area is broadly similar to that of Kandy, but the rainfall is less and it is considered an area which has a climate between the dry and wet zone types. The area affected by the project has played a very significant role in the religious, cultural and historical development of Sri Lanka. The evidence of early human settlement is shown from the Brahmi inscriptions found at the ancient temples at Gonawatte and Bambaragala, which date back to the first century B. C. During the 15th century an area which is covered with water has played a very significant role in the politics of the time, particularly in view of the fact that some of the decisive battles have been fought against the foreign invading armies in this area. There were palaces of Sinhalese Kings situated in this area, and even today many of the inhabitants of this area perform various rituals connected with the temple of the Sacred Tooth Relic of Lord Buddha in Kandy.

The Victoria reservoir will inundate all those lands upstream lying below the 438 meter (1440 ft.) contour. It will spread across 5 Assistant Government Agents'

Divisions, namely, Meda-Dumbara, Kundasale, Uda Hewaheta, Patha Hewaheta and Maha Nuwara Gangawata Korale, all located within the Kandy District. The urban areas such as Teldeniya, Kundasale, Nattranpothe and Gurudeniya will be finally submerged and in addition to these thickly populated areas which have been affected, by now, a considerable extent of fertile paddy lands located in the valley bottom also are being inundated.

Evacuation of People

It should be mentioned that at no time in the history of Sri Lanka had there been such a massive evacuation of people within a short-time without any incident or any adverse confrontation with the people for the purpose of building a reservoir project. Considering the eco-socio-geographical fabric of the area, which has evolved over the centuries, it is one of the greatest achievements that a Government has made by evacuating these people without any incident within a short period of 2½ years and settled them in areas of their choice, namely, the downstream areas and in Kandy District. The evacuation and settlements had been a success mainly due to the democratic process of evacuation and settlement methods adopted by the Government with a deep understanding of their problems and aspirations.

Method of Evacuation and Re-settlement

In early 1981 considerable amount of time was spent on motivation of people who had to be evacuated by explaining to them the purpose of the project and the benefits accruing to the evacuees as well as to the whole country. A large number of public meetings were held at various places within the area and opinion leaders selected from village areas were also utilised to give the correct facts to the general public, as there was tremendous opposition by those who were opposed to the project due to political and personal reasons. Motivated youth leaders were also involved in this programme which finally became a part and parcel of the development programme carried out under the project, such as clearing of the reservoir bed, reforestation and soil conservation of the area, etc. The shoreline which runs 86 miles along the 1440 ft. contour was marked and continuous dialogue was established between the Grama Sevaka Niladharies and the general public. All houses evacuated by the Victoria Project were numbered and a full survey of the people and the private property affected by the reservoir project was carried out. The data collected was documented in a summary form and separate files were maintained for each family with all the available data relating to their families. After this extensive study of the socio-economic background of the people, they were given the choice of selecting the places where they wished to be re-settled.

The exact number of families to be evacuated was difficult to ascertain outside the reservoir bed area, mainly due to the construction of roads, new towns and opening of new work sites. However, the survey report which gives all information

regarding the demography, activity, status, employment and income details relating to properties affected, the nature of compensation they expect from the Government and settlement areas given by them were very useful for the planning of the re-settlement programme.

The results of the survey in 1981 reveal that there was a total of 5,925 family units affected by the Victoria Project and due to the nature of the project the people affected directly or indirectly were more. The total number of people who would be affected is in the region of 35,000.

The information collected on the geo-cultural origin of the Chief House-holders showed that the majority (72%) of them were from the villages or townships where they were residing at the time of the survey. The remaining 28% affected by the reservoir were considered as people who were settled in the area within the last 30 or 40 years. The other very important significance was that nearly 25% of the chief occupants of the houses were illiterate. The analysis of the information also revealed that 94.7% of the families enjoyed citizenship by descent, and nearly 75% of the families affected by the Project belonged to the Kandyan Sinhalese stock. About 10% were low-country Sinhalese, 7% Muslims and 6% Sri Lankan Tamils, and the remaining 2% were Malays, Burghers etc. The majority of the Sinhalese were in the valleys, and they were essentially small farmers, while the Muslims were predominantly in towns and the Tamils were in estates or in villages adjoining the estates. The majority of the families affected were Buddhists (84.94%), while 6.2% were Hindus and 7.3% were Muslims.

The age of distribution characteristics of the population directly affected by the project were also very interesting. Nearly

38% of the population affected were school-going children, and the working population was 55%. Nearly 62% of the people affected belonged to the unmarried category, showing that the vast majority of the population affected were young. It was also alarming to note the rate of illiteracy of the chief householders. Nearly 25% of them had never been to school and they earned their livelihood by farming or by working as agricultural labourers. There were 16 schools affected by the reservoir, 18 Buddhist temples, 5 Mosques and 3 main Hindu Temples and several small Hindu temples.

The average householder's annual income level of Rs. 10,884 was favourable compared with the rural sector average income of the Island, and for most of them their income was from agriculture. However, there were 21,149 persons earning a monthly salary/wage and they constituted nearly 10% of the population affected directly by the project. Most of the wage earners fell within the income category of Rs. 300 to Rs. 600 p.m. and nearly 90% of the wage earners had incomes below Rs. 900/- per month.

Private Properties Affected

As a result of the inundation of Victoria, out of about 9,000 acres which are affected nearly 6,592 acres are considered as owned by private land owners or are under Government Grants on permits, and encroachments. Out of this nearly 1,343 acres were considered as paddy lands. One of the major problems faced in the evacuation and re-settlement programme was the assessment of compensation for acquisition of private and Government owned lands. The original survey before this mass evacuation programme was initiated indicated that for compensation for lands the Government will have to spend around Rs. 336 Million in terms of

mid – 1981 prices. By the middle of the year 1984 major work on acquisition and compensation had been completed and nearly Rs. 310 Million had been paid to the property owners. The quick action on the acquisition and payment of compensation facilitated the evacuation programme. In addition to the payment of compensation the property owners were also permitted to remove the salvaged materials of the houses as well as the trees on their lands free of charge, and each family was provided with two lorries to take away their salvaged articles and belongings to wherever they were resettled. The encroachers were also encouraged to vacate by giving them Rs. 3,000/- each as a settlement allowance in addition to various other benefits they enjoy under the settlement programme. It should be noted that one of the biggest problems in the Dumbara Valley is land hunger. In the inundated area, due to historical reasons, there were instances where 8 to 10 families were living on 25 perches of land, while for 2 or 3 acres of land there were 50 to 75 claimants. In one particular case there were 100 claimants for 2 acres of land, which fact showed the complicated nature of ownership.

Settlement Options

In accordance with the policy followed by the Government all evacuees were given the freedom of selection of alternate sites for their new homes. Accordingly, 67% of the people opted to settle down in the Mahaweli Downstream Development areas, namely Systems C, B & H. Upto the end of August 1984, 3,556 families have been settled in the downstream areas – 2,633 families in System C, 500 in System B and 423 in System H. Those who were used to urban life or have had interests in Kandy District, numbering 1,250 were settled in Kandy District. By the end of

August 1984, 5,192 families were settled from the Victoria Area. (Please see page 24 for details) There are another 280 traders who are being allocated shops in three new towns, namely Kundasale, Rajawella and Karaliyadda.

The evacuees who were settled in the downstream development areas were mostly Sinhalese. Only 37 families from the Alutwela village opted to settle in the downstream development area and they were settled in System C. In general almost all Muslims and Tamils preferred to be in Kandy District, and they were settled in estates acquired for the purpose namely, Kolongahawatte, Ahaspokuna, Galambalamawatte, Pallekelle and Hara-gama Estates.

Re-settlement Downstream

In the downstream areas each settler was given $2\frac{1}{2}$ acres of paddy land and half an acre of highland. The highland homestead is given in a hamlet, whereas the irrigable lands are situated away from their main dwelling centre. In Kandy District the extent of land given to each individual varied, depending on the extent of property owned before acquisition and the period of residence in Kandy District. It should be noted that out of those who opted to settle down in Kandy District, nearly 75% of the people were living in their own lands and nearly 15% were living in L. D. O. allotments and encroachments on Government, while 10% of the evacuees who opted to be in the Kandy District were living in rented houses. Those who depended on agriculture for their living were given extents of land ranging from half an acre to $1\frac{1}{2}$ acres depending on the terrain of the new land, situation etc. The others were given extents of land to put up the dwelling houses only, and the extent of the land given under this category ranged from 20

perches to 40 perches. It should be noted that many of them preferred to have even a small plot of land to put up a house if it was close to a road. (For details please see page 24).

The settlement of evacuees from Victoria reservoir area is not confined only to those who were living within the reservoir bed area. A large number of families were evacuated as their lands were needed for construction of new roads in place of those going under water. Those living within the acquisition line had to be evacuated first. In the process of construction of roads, particularly along the hilly slopes, some families living almost a quarter mile away from the newly constructed roads, were also evacuated, due to danger from land slides or rolling boulders. Others who were depending on agriculture for their living had also to be evacuated as the water courses carrying water to their fields had to be diverted elsewhere. There were also families living in critical areas bordering the new reservoir who had to be evacuated. Those families who were living within the worksites and areas which are being developed as towns also had to be evacuated and relocated. The evacuation and re-settlement problems have become very complicated in view of the people's preferences in the choice of new homes, in accordance with their family backgrounds, ethnic groups, castes and sometimes according to their prejudices. The programme of evacuation and re-settlement was carried out without disturbing their cultural background. The majority of these people follow various customs, rites and ceremonies. During the evacuation and settlement they were given every facility to perform the various forms of rituals, customs and practices and ceremonies. There had been days when over 200 lorries have been evacuating families. But during the two years of mass

evacuation and re-settlement in the Victoria Project area there was not a single case of accident or death or even a case where the Police had to be summoned to evacuate or to control unruly crowds. It is

through sheer persuasion and by winning over the people that the whole evacuation programme was completed which is a remarkable achievement to have been accomplished within only 2½ years.



PARTICULARS OF RE-SETTLEMENT OF FAMILIES UNDER VICTORIA PROJECT

| | | | | |
|--|----|----|----|--------------|
| <i>1. Settlement in Development Areas</i> | | | | |
| System C | .. | .. | .. | 2,633 |
| System B | .. | .. | .. | 500 |
| System H | .. | .. | .. | 423 |
| | | | | <u>3,556</u> |
| <i>2. Settlement in Kandy District and for Agricultural Purposes</i> | | | | |
| Kolongahawatte | . | .. | .. | 13 |
| Ahaspokunawatte | .. | .. | .. | 19 |
| Ambakote/Aluthwatte | .. | .. | .. | 188 |
| Haragama Field No. 3 | .. | .. | .. | 24 |
| Haragama Field No. 4 | .. | .. | .. | 72 |
| Haragama Field No. 7 | .. | .. | .. | 62 |
| | | | | <u>378</u> |
| <i>3. Settlement in Kandy District for settlement purposes only</i> | | | | |
| Balagolla estate | .. | .. | .. | 470 |
| Rajawella | .. | .. | .. | 395 |
| Kolongahawatte | .. | .. | .. | 87 |
| Ahaspokuna | .. | .. | .. | 41 |
| Ambakote watte | .. | .. | .. | 48 |
| Ambagahalande | .. | .. | .. | 131 |
| Haragama Field No. 3 | .. | .. | .. | 23 |
| Haragama Field No. 4 | .. | .. | .. | 4 |
| Haragama Field No. 7 | .. | .. | .. | 39 |
| | | | | <u>1,238</u> |
| <i>4. Settlement in New Towns</i> | | | | |
| Rajawella New Town | .. | .. | .. | 13 |
| Kundasale New Town | .. | .. | .. | 3 |
| Karaliyadde New Town | .. | .. | .. | 5 |
| | | | | <u>20</u> |
| Grand Total | .. | .. | .. | <u>5,192</u> |

Kotmale Multi-Purpose Project

The Kotmale Oya flows through the rural up-country of Sri Lanka passing ancient villages steeped in history and tea plantations of a more recent era. The tranquility of this river valley has been changed recently with the construction work of the Kotmale Hydropower Reservoir. It is the uppermost project in the cascade of major headwork projects being undertaken under the Accelerated Mahaweli Programme. Financial assistance for the project has been provided by the Government of Sweden.

The Project is intended to develop the hydro-electric potential of a major tributary of the Mahaweli Ganga, namely the Kotmale Oya. The first stage of the Kotmale dam now under construction will impound the waters of the Kotmale Oya and form a reservoir of capacity 174 million cu. metres (141,000 acre-feet). The dam is located about 6.6 kilometres above its confluence with the Mahaweli ganga. The water stored in the reservoir will be used for generation of electricity in an underground power plant after which the water will be led into the Mahaweli ganga. A system of tunnels about 6.6 km (4.2 mls) in length convey the water from the reservoir to the machine chamber. In the machine chamber there are at present two 70 mega-watt Vertical Francis turbines coupled to generators to provide electricity. In 1986 a third similar machine will be added.

The primary function of the Kotmale Project is the generation of electric power. Additional benefits will arise from an increase in the amount of irrigation water that would be available at Polgolla for diversion to the North Central Province due to the regulation of flows by the Kotmale reservoir.

Preliminary studies regarding the Kotmale Project were carried out by the United States Operation Mission for the U. S. A.I.D. This was followed by the U.N.D.P./F.A.O. – Irrigation Department joint "Survey" of the Land & Water Resources of the Mahaweli Ganga, for irrigation and hydropower development which issued their final report in 1968. A feasibility study of the project was carried out by Water and Power Development Consultancy Service (India) Limited from 1973 to 1976. For the final phase Sir William Halcrow and Partners (U.K.) in association with Messrs Kennedy and Donkin (U.K.) and the Central Engineering Consultancy Bureau of the Ministry of Mahaweli Development prepared the final designs and provided Consultancy Services for the execution of the project.

Location and Access

The dam site is at Kadadora located about 6.6 km (4.1 mls) upstream of the confluence of Kotmale Oya with Mahaweli Ganga. The power house is underground and situated in the belly of the Atabage

Mountains, about 6.4 km (4 mls) downstream of the Kotmale Oya – Mahaweli Ganga confluence. The project headworks lie on the right bank of the Mahaweli Ganga and is partly in the Kandy district and partly in the Nuwara Eliya district. Access to the main project headworks can be through two routes. One is from the new access road constructed from the Gampola–Nuwara Eliya road just outside Gampola town, which passes close to the underground power station and joins the Ulapane–Pussellawa road. The other is through the latter road from Ulapane which passes close by the right abutment of the dam.

The Kotmale Oya has its beginning in the South Central massif at an elevation of 2134 m. (7000 ft.) and is about 70 km (43.3 mls) in length draining a total area of 58,534 ha. (226 sq. mls) and dropping 1,585 m (5,200 ft.) before meeting the Mahaweli Ganga. Rainfall data from 1907 onwards are available for this region.

Geology

The Kotmale area has had a history of earthslips, landslips and other geological disturbances. Owing to this great care had to be taken in the design of the various features of the project. Soon after construction work was awarded and during the early stages of the dam construction, when excavations of the riverbed were in progress, the presence of a limestone layer underneath the bed rock below the dam and extending up to the reservoir, was discovered. These and other adverse features led to a thorough investigation of all the geological features in order to see whether there are practical problems like landslides above the reservoir leakage of water through the dam foundation into adjoining valleys, earth tremors, etc. which could seriously affect the stability of

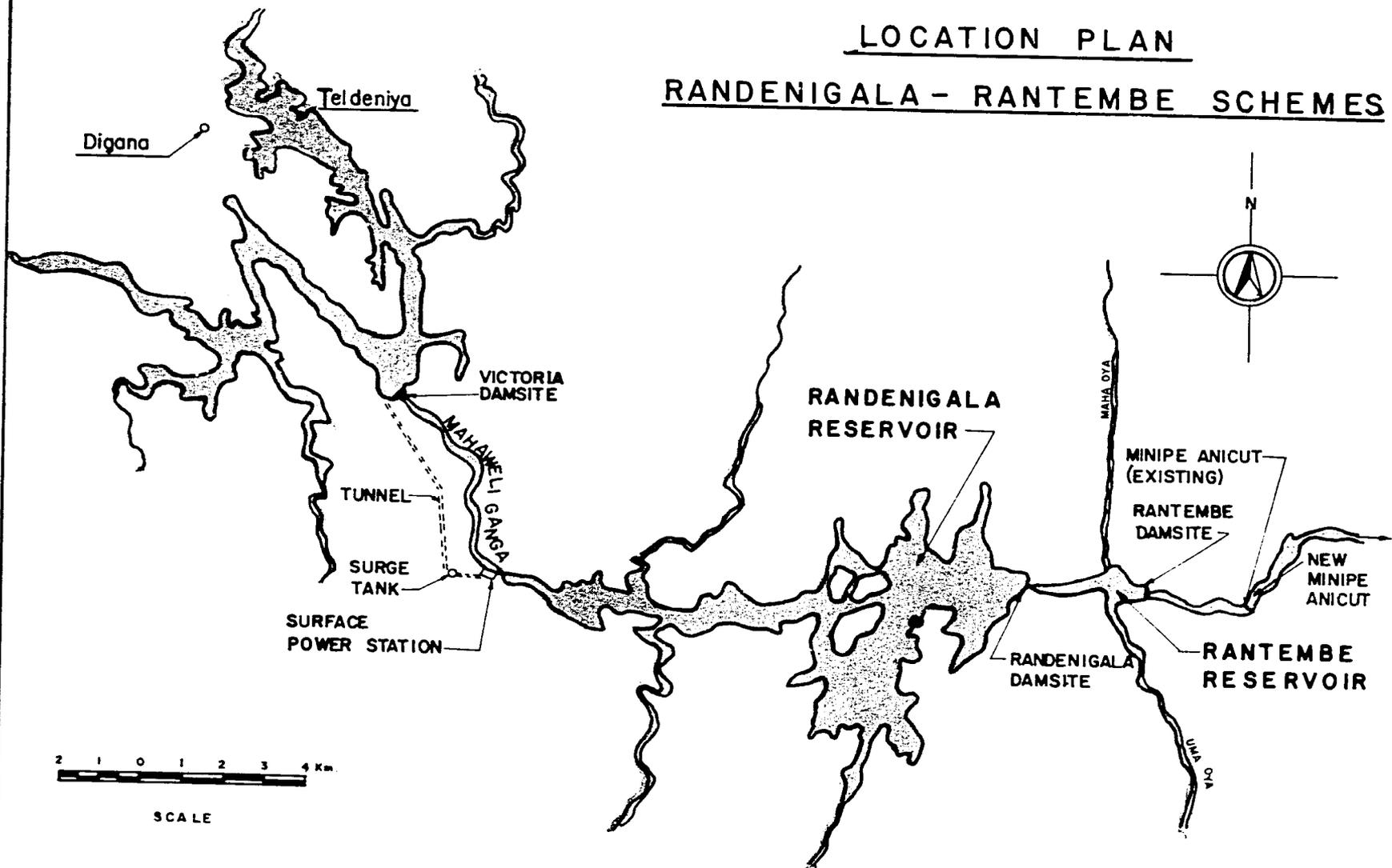
the project. A special panel of internationally renowned experts was appointed by the Ministry of Mahaweli Development, to examine all the geological data available, carry out further investigations and advise on the adequacy of the design proposed by the Consultants. The panel identified a variety of adverse geological features, such as unstable soils and rock masses in the reservoir area, solutioned and cavernous limestone in the reservoir bed and below the dam site, deep and irregular weathering of rock associated with strong lineaments representing faults. The panel considered that the problems could be handled within reasonable costs by adjusting the design in progress at that time, with some additions and modifications. Most of the recommendations have been incorporated into the design and the panel's suggestions, regarding further investigations and monitoring of various aspects have been carried out or are being continued. These changes and delays increased the cost of the dam appreciably.

Project Features:

The original proposal was to have the dam at a crest elevation of 735 m (2411 ft.). However on the recommendation of the Panel of Experts the dam had to be shifted about 300 m (980 feet) downstream in order to locate it on better foundations. Due to this change from the original site it had become necessary to build the dam to a lower crest elevation of 706.5 m (2317 feet) in order to limit the expenditure to be kept within the available resources.

The dam has been constructed out of **rockfill** obtained from two quarries at the site on either banks above reservoir level. The rock had been laid on the cleaned river bed in layers and compacted by heavy machinery, including vibrating rollers. The dam has been made impervious

LOCATION PLAN
RANDENIGALA - RANTEMBE SCHEMES



2 1 0 1 2 3 4 Km.

SCALE

C.E.C.B.

2602



The Hon. Minister of Lands and Land Development and Mahaweli Development, Mr. Gamini Dissanayake ceremoniously commenced the diversion of the Mahaweli Ganga for the construction of Randenigala Dam on 30.3.84.

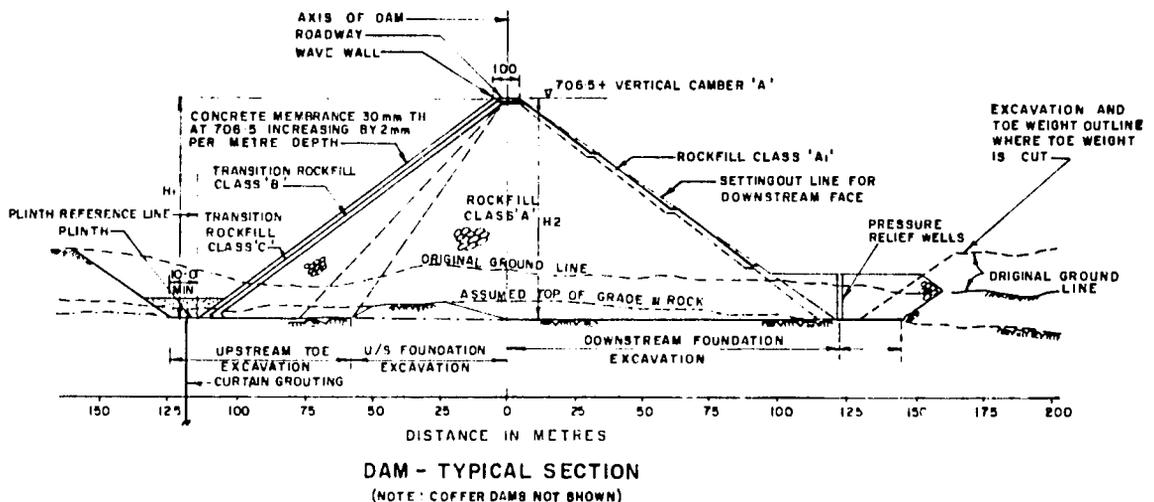
Mr. Gamini Dissanayake meets the Engineers and other Staff of Randenigala Project and congratulate them on their work



by the construction of a reinforced concrete membrane on the upstream face of the dam. This membrane is of thickness 300 mm (1 ft.) at the crest and increasing to 474 mm (1.6 ft.) at the bed level plinth. The rock underneath the dam has been made impervious by a grout curtain of cement grout injected from the surface. In addition to seal off the limestone bed under the dam foundations a grouting tunnel had been constructed beneath the dam and grout had been injected across the limestone layer. In order to commence work on the dam the river had to be diverted. An upstream cofferdam which would not be overtopped by floods up to 1 in 15 year frequency was built and the river water was diverted to flow through two 9.2 m (30 ft.) diameter concrete-lined tunnels excavated in rock on the right bank. These tunnels were capable of discharging a 1 in 100 year flood of

1,700 cumecs (60,000 cusecs). One of the tunnels has now been permanently plugged with concrete (after the construction of the dam) whilst the other serves as the intake tunnel to the Bottom Outlet. The Bottom Outlet is an emergency outlet to release water from the reservoir and thereby lower its level or as an irrigation by-pass without developing power. Water can be led through the second diversion tunnel which is the bottom outlet into a control chamber provided with valves to discharge up to 90 cumecs (3,200 cusecs) from the reservoir.

Provision for flood discharge is over a gate-controlled chute spillway at the left abutment of the dam. The spillway control structure has 3 radial gates 14 m (46 feet) wide by 15 m (49 feet) effective height, that are programmed by computer to open and release flood waters. It



has been constructed to discharge a 1 in 1000 year maximum flood of 5500 cumecs (196,000 cusecs) with only 2 of the 3 gates open. A flip bucket at the lower end of the concrete lined chute will throw the discharge clear of the river banks into the centre of the river bed, to prevent scouring of river banks.

The intake to the tunnel carrying water to the power station is located on the right bank immediately upstream of the dam. At its entrance is a screen which could be raised above the water level for cleaning. About 165 m (540 feet) downstream of the intake is found a bulkhead gate located in a vertical shaft. By lowering this gate the tunnel can be dewatered for inspection of the tunnel.

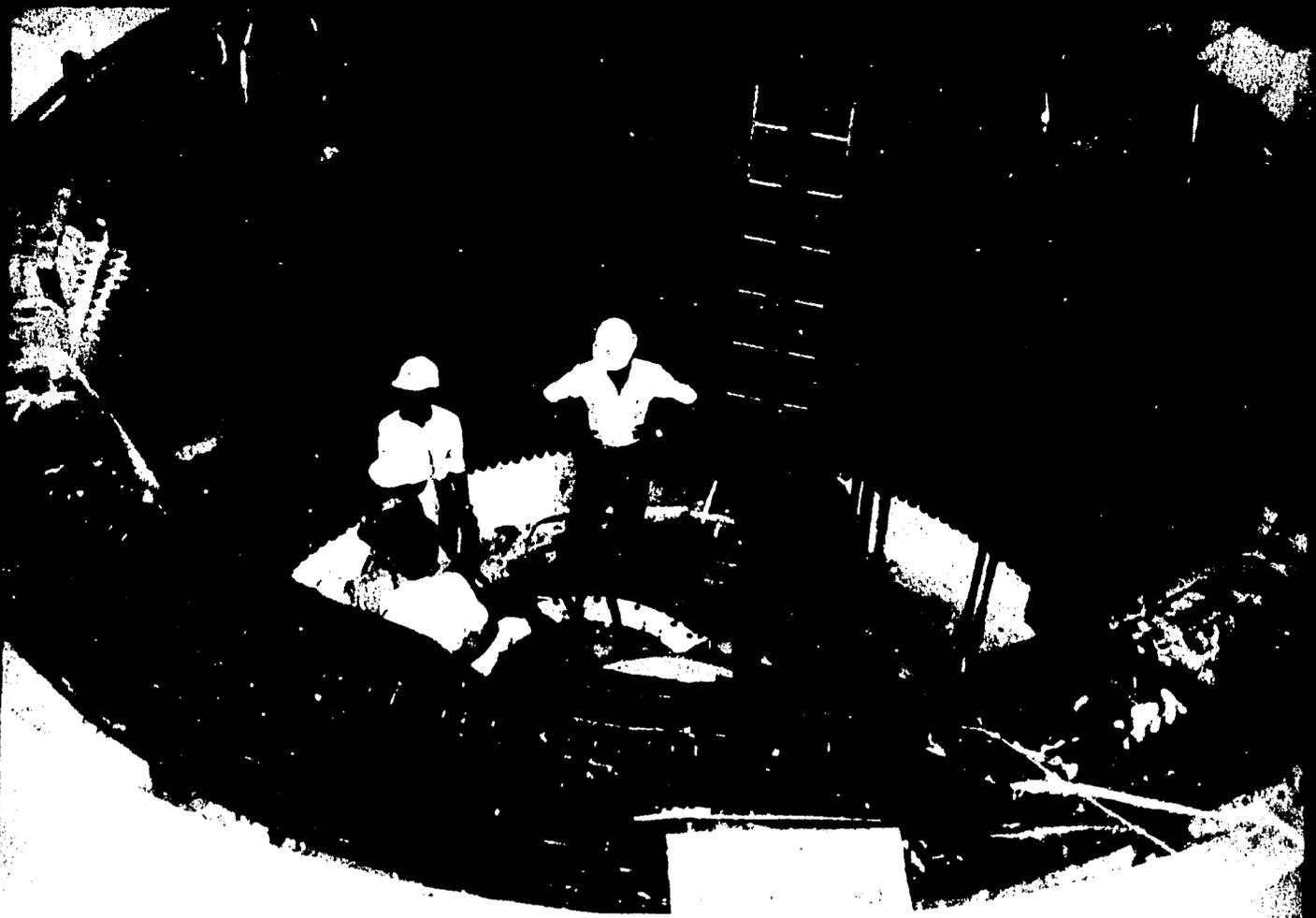
The first part of the tunnel system carrying the flow from the reservoir is a 6.4 m (21 feet) equivalent diameter concrete lined horse-shoe shaped low pressure tunnel. This is 6.6 km (4.1 miles) in length up to the upstream surge shaft, which protects the turbines from undue pressure shocks due to flow variations in the tunnels. The surge shaft is a 15 m (49 feet) diameter concrete-lined vertical shaft constructed directly over the tunnel and connected to it by an orifice. The surge shaft has a gate by means of which the lower portion of the tunnel leading up to the power station can be dewatered. In this area are found the two downstream tunnel construction adits, one of which has been plugged with a steel bulkhead gate which can be opened when the tunnel is empty for inspection. From the upstream surge shaft water is conveyed to the turbines in the power station by a 400 m (1300 feet) near horizontal concrete-lined tunnel and a 120 m (390 feet) long circular 5.5 m (18 feet) diameter concrete-lined high pressure shaft steeply inclined. The bottom half of the high pressure

shaft is steel lined. Near the power station the water is diverted into three pipes of 2.1 m (6.9 feet) diameter that supply the turbines.

The power station which houses the electricity generating equipment is an underground cavern 67 m (220 feet) long by 20 m (66 feet) wide by 38 m (125 feet) high. This is the first underground power-plant in Sri Lanka. The roof of the cavern is the shape of an arch and the rock is secured in place by rock-bolts and shotcrete. The near vertical sides are unlined but rock-bolted for safety. This excavated chamber houses 2 of 67 Mega Watt generating units driven by vertical Francis Turbines. In 1986 a third similar unit will be installed. The chamber houses apart from the generators and turbines a 160 Ton overhead travelling crane, 3 turbine inlet valves, drainage & dewatering systems, control boards, an office for maintenance staff and ancillary equipment for the safe operation of all the machinery installed inside.

The main electrical cables from the generators and auxiliary cables are carried up to the switchyard which lies on the surface above the power station cavern through a cable cum ventilation shaft. This is a vertical shaft excavated in rock located towards one end of the machine chamber. It is 8.1 m (26.5 feet) in diameter and 200 m (656 feet) in height. The ventilation of the machine chamber is provided by air forced down ducts provided in this cable shaft. There is a hoist in this shaft for inspection and maintenance of the cables and to provide an emergency exit from the power station.

Normal access to the power station is gained from a separate access tunnel 490 m (1650 feet) long which has its entrance portal close to the bridge across the Atabage Oya on the newly constructed



Turbines being fixed in the underground Power House of Kotmale Project.

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access road. There is yet another tunnel from the machine chamber. This is the tailrace tunnel and it conveys water after passing through the turbines to the Mahaweli Ganga. It is 6.4 m (21 feet) in diameter and 635 m (2080 feet) in length. This tunnel is designed to flow full and has a downstream surge chamber to limit pressure shocks due to sudden variations in flow. At the downstream of each turbine draft tube gates are provided to isolate the machines from the tailrace for maintenance purposes.

The power generated by the machines in the underground chamber is transmitted to the national grid through a 220 KV Substation at a switchyard located on the surface above the machine chamber. This switchyard accommodates transformers and switchgear for the generators and the transmission lines to Colombo through Biyagama. The power lines from Victoria are also being routed through this sub-station. The control building housing the power station, control room and offices for the project and the ventilation building housing the ventilation equipment are all located in this switchyard.

Organisation of Construction

In accordance with the agreement between the Governments of Sri Lanka and Sweden made in 1978 the civil engineering of the project was organized through a series of negotiated contracts with the Swedish construction firm Skanska Cementgjuteriet.

The first contract signed in August 1979 was the Initial Works Contract for the construction of Engineers' and Contractors' camps, access roads, diversion tunnels, quarry investigations, access tunnel to the underground power station etc. Most of this work was completed by the end of 1982. The next contract signed in Dec.

1979 was for the construction of Underground Works such as the tunnel, the underground power station, the surge shafts, tail race tunnel and ancillary works. All these works were completed by the end of 1984 except for the lifting arrangement for the upstream Surge Shaft gate. The third contract signed in April 1982 was the reservoir works contract in which the main items of work were the cofferdam, concrete faced rockfill dam, spillway, and the bottom outlet.

The contractor was able to complete construction work on the rockfill dam ahead of schedule, and the "topping up" was ceremoniously completed on 31st March 1984. The construction of the upstream membrane commenced in May 1984 and was completed in October 1984. There were some delays at the beginning on spillway construction but all work on the contract will be completed and the spillway gates kept in the open position at the end of December 1984.

The electro-mechanical features of this project, such as the power plant turbines, generators and ancillary equipment; switchyard equipment such as transformers and switchgear; tunnel and spillway gates; bottom outlet valves and gates were obtained under 9 contracts through another well-known Swedish Contractor ASEA. Most of the equipment are of Swedish manufacture though ASEA obtained some steel gates from the French manufacturer NEYRPIC and a few small items from Switzerland.

The spillway gates measuring 14 m (46 feet) wide by 15 m (49 feet) high are the largest ever to be erected in Sri Lanka. By the end of 1984 most of the electro-mechanical equipment will be erected. At the reservoir area two spillway gates have been erected and capable of operation while the third is being erected. The

valves and gates in the Bottom Outlet control chamber and the tunnel intake gate have been erected and are operational. At the Power Station work is proceeding on erection and testing of the generators. The first generator is due for commissioning in February 1985 and the second in April 1985. All work in the switchyard has been completed and the transmission of power from Victoria through the Kotmale switchyard was achieved in September 1984.

Towards the end of 1983 the civil contractor SKANSKA submitted a proposal for the accelerated completion of the reservoir works so that impounding of water could commence in November 1984, four months ahead of the target date. The Government accepted this proposal after which the Contractor stepped up progress to achieve this target. The main advantage of the proposal was that early completion of the dam enabled the impounding of the 1984/1985 monsoonal flows for power generation in March 1985. Otherwise by the latter date the flow in the river would be low and insufficient.

The Government decided in 1984 to instal the 3rd generator also at the Kotmale Power Station. The electro-mechanical contractor ASEA submitted a proposal which was accepted by the Government and a firm order was placed for the manufacture and installation of the third machine.

Programme for 1985

Most of the work on the Kotmale project was completed in 1984. The work carried over to 1985 on the civil construction side are completion of wave-wall and roadway on top of the dam, surfacing of the access roads in the vicinity of the dam and power-station, additional grouting, backfilling to the concrete spillway chute wall and other minor works. The electro-

mechanical contractor ASEA has to complete erection and testing of generators 1 and 2 which are scheduled for commissioning in Feb. and April 1985 respectively. At the dam ASEA has to complete erection of the 3rd spillway gate and complete the electrical circuitry so that the spillway gates can be raised or lowered by computer or by push button manual controls.

The contractors Skanska and Asea employed over 200 Swedish nationals during the peak construction period. The contractors staff were housed in a well laid out camp comprising 70 houses, a school for young children, club-house with Swimming pool, tennis courts and other recreational facilities. The "Engineers" camp which housed the staff of the Consultants was built a short distance away and accommodated 18 foreign engineers, 24 Sri Lankan engineers, 20 technical officers and several other grades of staff. The labourers were housed in two camps in the vicinity of the work sites. During the construction period the total employment created was about 4500 men.

Kotmale Project Peripheral Development

The Kotmale reservoir lies in a populated region and it inundates several important roads and villages. It has a water surface area of 600 ha. (1500 acres) at its present full supply level. However, road deviations etc., have been done above the final reservoir level.

The important roads that go under water and have to be diverted to a higher elevation are on the right bank of the Kotmale Oya, the Ulapane-Pussellawa road and on the left bank the Nawalapitiya - Sangilipalama road. A section of 6 kms (3.75 miles) of the Ulapane -Pussellawa road from Kadadora to Maaswela is being reconstructed by the CECB. At present the road platform formation has



Kotmale Reservoir started filling up after the impounding on 17.11.84.

The Spillway of the Kotmale Reservoir has now been completed. It is the largest spillway of all Mahaweli Headworks.

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been completed and work is in progress on the construction of drainage crossings and metalling and tarring.

The work on the left bank is being done partly by the CECB 12 kms (7.5 miles) and partly by the State Development and Construction Corporation, 15 kms (9.4 miles). This work includes the construction of 3 major bridges across the Kotmale Oya, Puna Oya and Pundalu Oya and six minor bridges. Work on platform formation is nearing completion and work is expected to be completed in early 1985.

In addition to the roads the reservoir inundates 8 Buddhist temples, several villages having a total population of 3200 families and the Sangilipalama town. The displaced persons have been provided with new lands, some in the neighbouring areas, and some in the Mahaweli irrigation areas at Kalawewa and Maduru Oya. In 1984 an extent of 150 ha. (380 acres) of land was acquired from the Doragolla estate to settle 120 families. Resettlement could not be completed well ahead of time due to the difficulties the Government experienced in obtaining suitable land in the vicinity of the project

Part of Sangilipalama town gets inundated even with the reservoir at the first stage lower water level. An extent of land 42.6 ha. (108 acres) has been obtained at a higher elevation about 6.5 km (4 miles) away and the new town of Sangilipalama has been planned. Public buildings to be provided are a school, hospital, bus station, sub-post office and handloom centre. There will be about 35 shlops and allotments for about 75 households. The town will have pipe-borne water service, electricity and other amenities. By the end

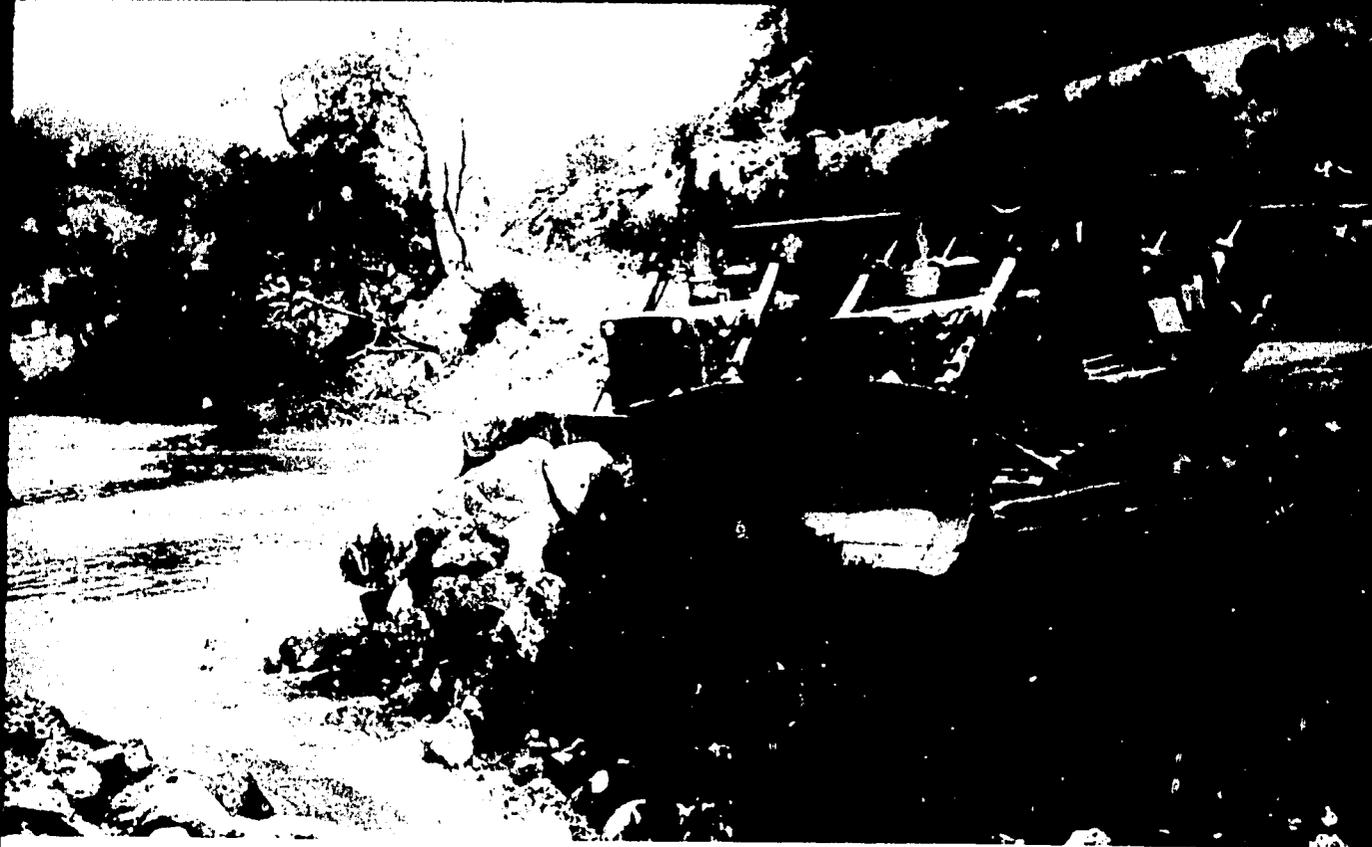
of 1984 all the roads in the new town will be constructed and temporary buildings put up for the school pending the construction of permanent buildings. It is expected to complete most of work in 1985.

Another new township is being created at Doragolla similar to Sangilipalama to be undertaken simultaneously. Access roads to the area are now being constructed.

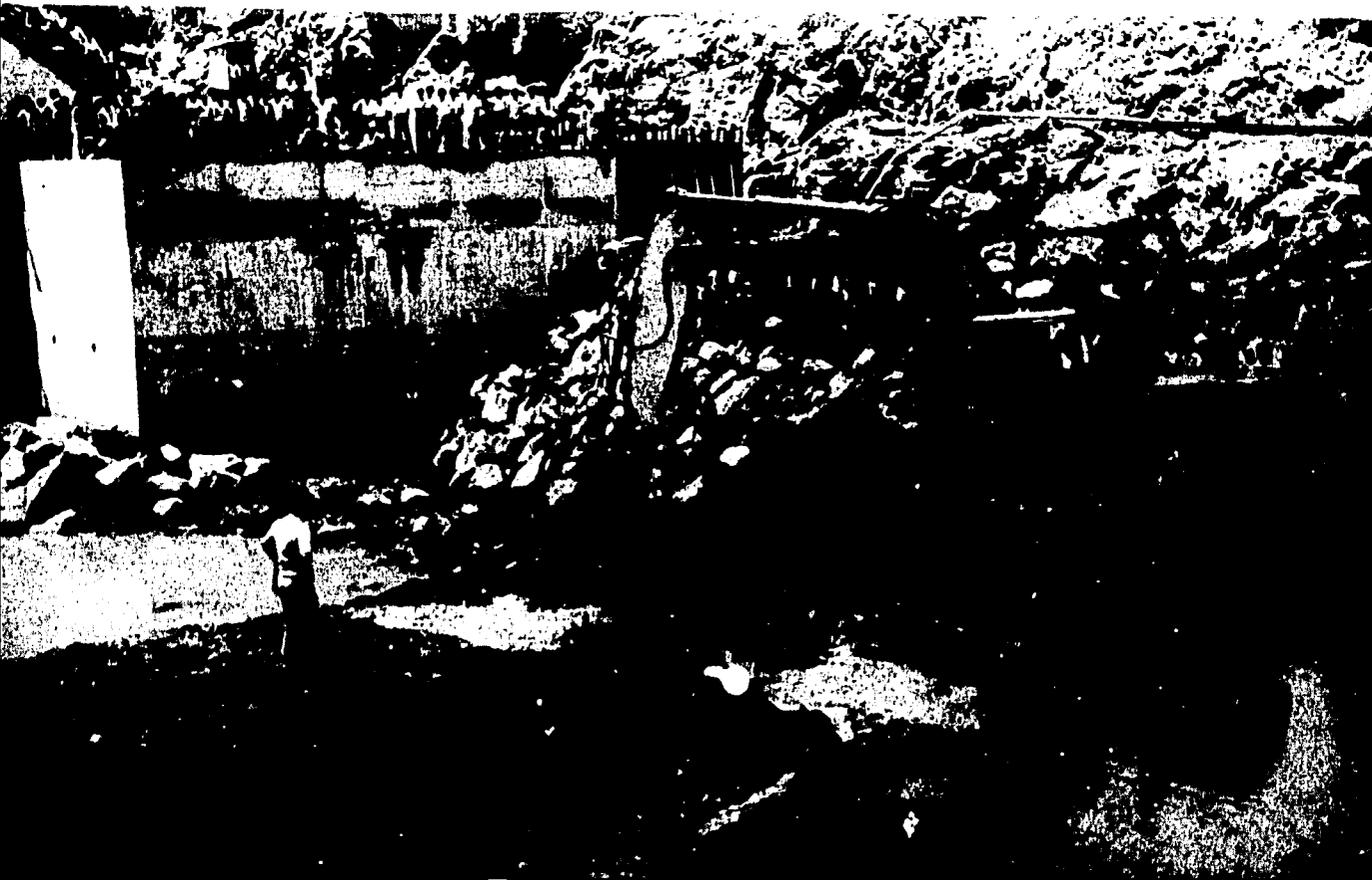
Mahaweli Chaitiya

As the Kotmale Project was one of the major Headworks to be undertaken under the Mahaweli Programme and as about eight Buddhist temples would get submerged when the reservoir fills up, it was considered appropriate that a religious monument, symbolic of the hopes and aspirations of the vast majority of people, who would be affected, should be constructed within sight of the reservoir itself. The foundation stone for a Chaitiya was laid by His Excellency the President in March 1983. The construction work is well in hand with the work on the piled foundation and lower ring beam completed and upper ring beam in progress. This Chaitiya is of unique design and the body of it above ground level is a thin walled concrete shell structure. At its base the diameter is 72.5 m (238 feet) whilst the total height is 83 m (275 feet). The hollow interior of the Chaitiya will accommodate a meditation hall and above it a circular promenade with murals decorating the inside of the shell.

The Chaitiya work is being done entirely by the CECB under the personal guidance of its Chairman. Much of the cost of the Chaitiya is expected to be met from public donations.



Diversion of the Manawatu Ganga for the construction of Randenigala Dam took place on 30.3.84 Bull-dozers at work closing up the river and (below) creating the diversion.



Randenigala Multi-Purpose Project

The Randenigala Project is the last of the Major Multipurpose Projects undertaken in the Accelerated Mahaweli Programme. It is the largest reservoir under the Mahaweli Programme, and it 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 is expected to generate about 20% of the country's present annual electrical energy requirement and will act as the most important base reservoir for the water management of Systems C and B now and System A and transbasin areas later.

Project Features

The project chiefly consists of the construction of a 94m (308 ft.) high, 458 m (1590 ft.) long rock-fill dam across Mahaweli, creating a reservoir of 860 million Cu.m. (697,000 ac. ft.). The power house on the left bank immediately downstream of the dam will have an installed capacity of 126 MW. A steel lined 6.2 m (20 ft.) diameter, 270 m (886 ft.) long tunnel through the dam will convey water to the Power House to run the turbines located just below the dam. The gated chute spillway is 48 m (157 ft.) wide, about 232 m (761 ft.) long and is capable of discharging the probable maximum flood of 8085 cumecs (285,500 cusecs).

The irrigation outlet will be through a 9.6 m (31.5 ft.) diameter, 375 m (1,230 ft.) long concrete lined tunnel, which along with another similar tunnel is presently used to divert the river during construction of the dam.

Finance:

As at the end of June 1984, work to a value of about DM 150 Million (about Rs. 1320 Million) in foreign currency and about Rs. 340 Million in local currency has been performed on Randenigala Project. The Federal Republic of Germany has granted a soft loan to the value of DM 400 Million on favourable terms for Randenigala Project.

Consultancy Services:

The Consultant for the Project is Joint Venture Randenigala (JVR), a joint venture of the consultancy firms, Salzgitter Consult GmbH, Agrar-Und Hydrotechnik GmbH and Electrowatt Engineering Services Ltd. along with the Engineers of the Central Engineering Consultancy Bureau (CECB).

By the end of June this year the Designs for Diversion works, are completed and designs for the Power House, Control Building and Rockfill Dam are in progress and nearing completion. Most of the designs for Spillway, Bottom & Irrigation Outlet and Switchyard will be over by the end of the year. Design of the Outlet Channel, final part of the spillway chutes,

Power Intake structure and roads will be mainly carried out in 1985. The Construction works have been closely following the design.

Construction Works

Randenigala Civil Contractors (RCC), a joint venture of the three construction firms Dyckerhoff+Widmann, Bilfinger & Berger and Alfred Kunz of Federal Republic of Germany was awarded the Civil Works contract which is the main component of the project. The Civil Contractor mobilised at site in early September 1982. The site installation works such as access roads, temporary bridges, houses, offices, electricity and water supply were completed last year.

By the end of June this year, rock and soil excavation for Diversion Outlets, Approach Channel, Intake Structures as well as the drilling of the two diversion tunnels and concrete lining of Tunnel No. 1 was completed. Excavation work for Power Intake and Waterways and the Power House and most of the first stage concreting were also done.

The Hydromechanical Contract was awarded to Maschinenfabrik Augsburg-Nuernberg AG (M.A.N.) of the Federal Republic of Germany in April last year. The works include the detail design, manufacture and installation of the Tainter Gates for the Spillway, Revision Gate, Trash Rack, Portal Crane, Steel-lined Penstock and pumping installations etc. Designs for the installations such as Portal Crane, Steel design of Penstock, Intake Trash Rack, Tainter Gate, Raking Machine and Stoplogs are under way. The work has started on Tainter Gates, Portal Crane and Draft Tube Gate in Germany. The foundation and installation work on the prefabrication work on site is complete.

In March 1983, the firm Escher Wyss of the Federal Republic of Germany was awarded the Mechanical Contract to supply and instal the two turbines and ancillary equipment. The design of water level measurement equipment was finalised. First turbine "runner" was inspected at the workshops of Thyssen/Hattingen in the presence of the Consultant. Design of the 200 ton Power House Crane was accomplished and the first girder was delivered to Colornbo by mid August this year.

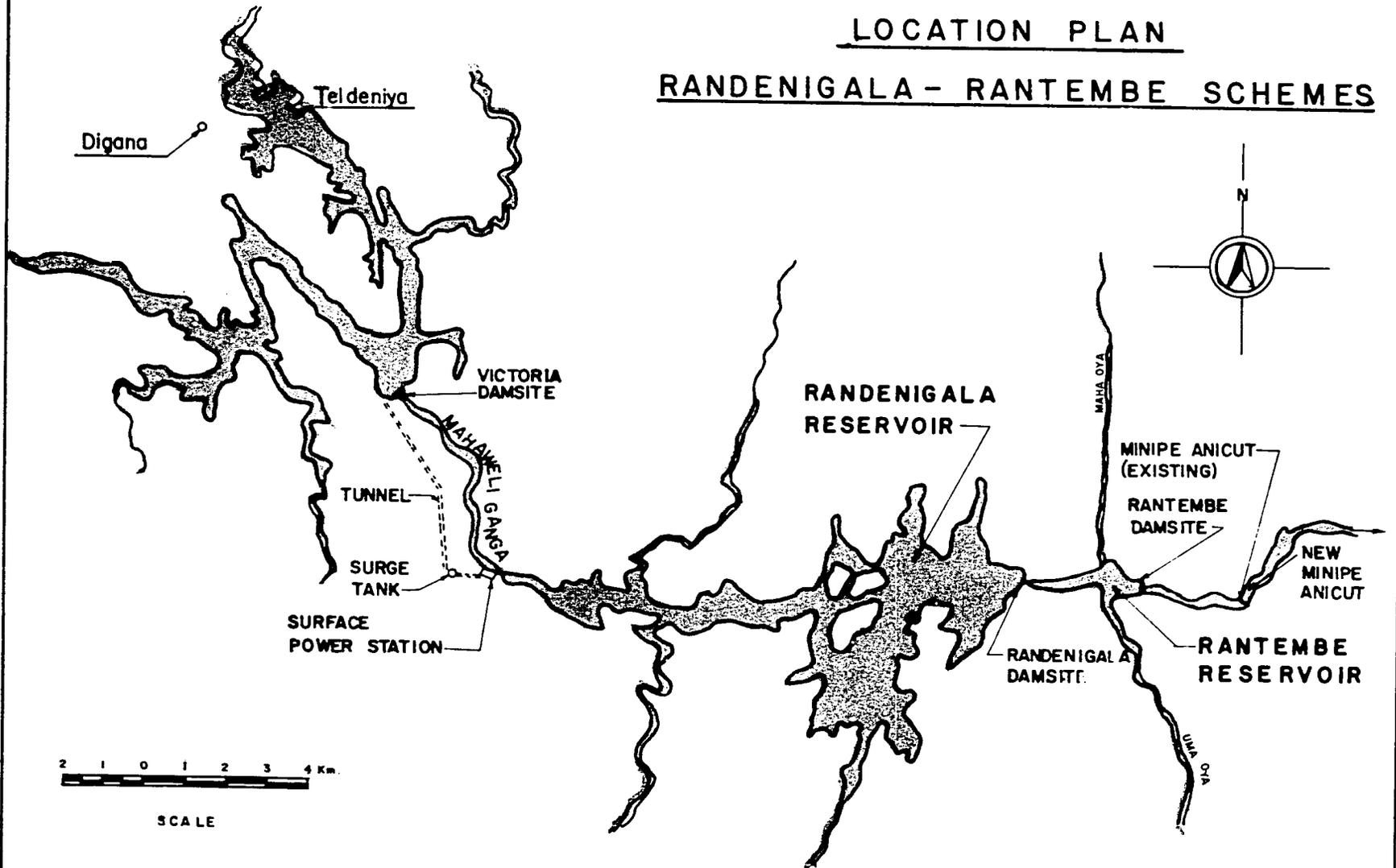
Electrical Equipment Contract for the supply and installation of Generators, Switchgear and 220 KV Transmission Line from Victoria, Randenigala-Rantembe was awarded to Brown Boveri & CIE Aktiengesellschaft (BBC) of Germany. Approval procedure for the generator design is under way.

Already 4 power transmission towers have been erected and 12 foundations concreted. Excavation is being done for the foundations of 12 other towers. Placing of grounding system for the Switchyard at Rantembe and the Power House at Randenigala is continued. RCC is Co-ordinating all construction and erection activities as Main Contractor.

Preliminary Works:

A camp consisting of 78 houses, offices and other buildings is complete with water, electricity and telephones. The work was carried out by local Contractors. The design and supervision was carried out by the CECB. Land acquisition is being done by the Mahaweli Authority with the assistance of the CECB and the Department of Surveys. The settlers are being moved out, having paid compensation and resettled in the already developed areas such as System C, under the Mahaweli Programme.

LOCATION PLAN
RANDENIGALA - RANTEMBE SCHEMES



Digana

Tel deniya

VICTORIA DAMSITE

TUNNEL

SURGE TANK

SURFACE POWER STATION

MAHA WELI GANGA

RANDENIGALA RESERVOIR

RANDENIGALA DAMSITE

MINIPE ANICUT (EXISTING)

RANTEMBE DAMSITE

NEW MINIPE ANICUT

RANTEMBE RESERVOIR

MAHA OYA

UWA OYA



SCALE



The Hon. Minister of Lands and Land Development and Mahaweli Development, Mr. Gamini Dissanayake ceremoniously commenced the diversion of the Mahaweli Ganga for the construction of Randenigala Dam on 30.3.84.

Mr. Gamini Dissanayake meets the Engineers and other Staff of Randenigala Project and congratulate them on their work.



Current Activities:

Excavation for the Spillway Approach Channel and Weir, Grouting Gallery, Core Trench and Abutments, is continued. Filling the downstream side of main dam and the incorporated coffer dam with rockfill is in progress. Placing concrete in Diversion Tunnel No. 1 Intake Tower, Spillway Flip Buckets, HV Cable Gallery, Power House, is being done. Civil works for the Switchyard and Control Building located at Rantambe is nearing completion. Drilling and Grouting for the dam is continued. 72 pre-bent steel shells for the penstock have been delivered to the site and the first penstock part is placed in its final position.

Works for the 220 KV Transmission Line are progressing on schedule.

Construction of a service road for the Project, connecting Victoria Dam Site to

Randenigala is under consideration. In this regard, a preliminary survey is under way.

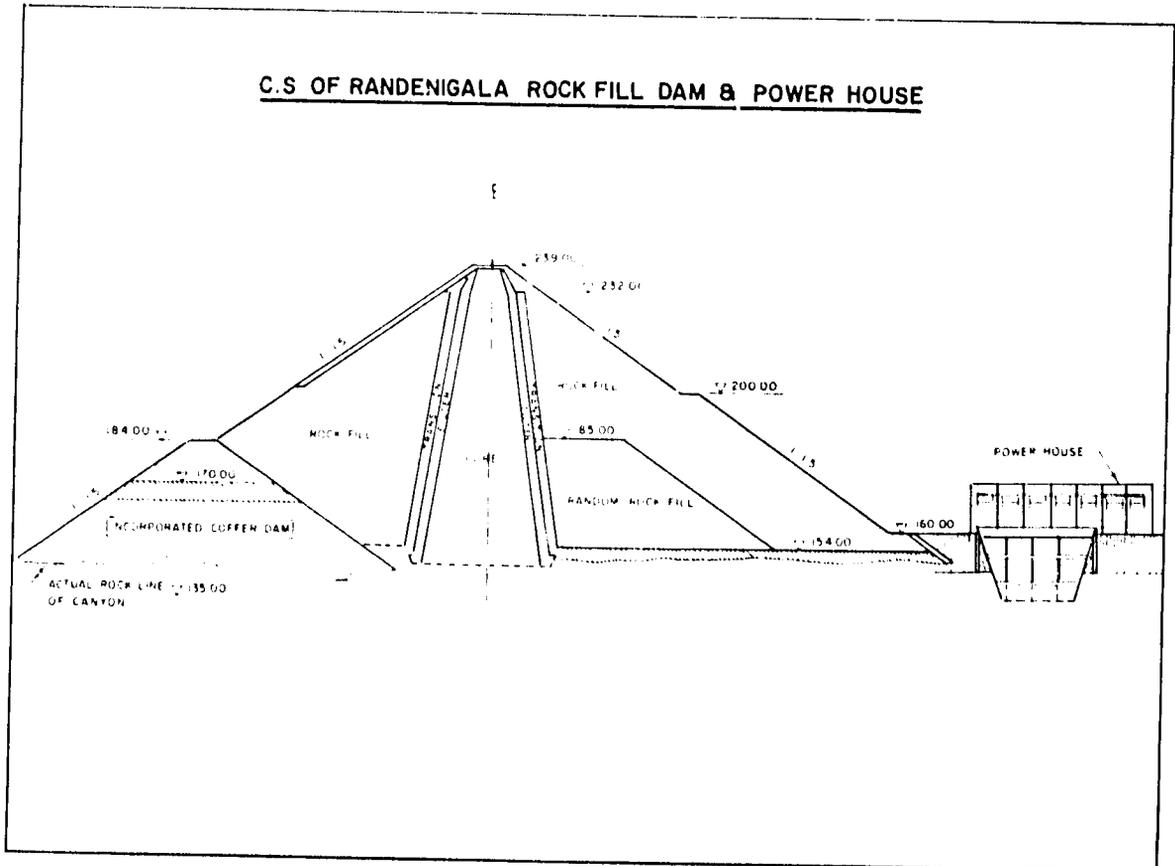
The State Timber Corporation (STC) is engaged in extracting timber from the Reservoir Bed Area.

By end of June 1984, about 2000 Sri Lankans have been employed on Randeni-gala work site along.

Future Programmes:

Construction work for Power Intake and Waterways, Spillway and Dam Embankment will continue through the year 1984 to end of 1985. Beginning of 1986 all civil works will be substantially completed.

Hydromechanical, Mechanical and Electrical works will be co-ordinated according to the progress of the civil works. The commissioning of the Project is scheduled for mid 1986.



Reservoir Impounding

Randenigala reservoir will have surface area of 23.5 sq. km. (5,807 acres) but will inundate only 2.8 sq. km. (692 acres) of cultivated land. The population within the reservoir area is only about 2000. 103 families have been already resettled in System C and another 200 families were moved out by end of 1983.

No important archaeological monuments or buildings of any significance were found in the reservoir bed.

Survey department has commenced work on the demarcation of reservoir acquisition boundary. State Timber Corporation is taking action to exploit the timber in the inundation area.

Project Benefits – Irrigation

The Randenigala reservoir will regulate the water releases of the Victoria reservoir and will provide supplemental irrigation benefits to Systems A, B and C, with the subsequent development of new Systems in the overall Mahaweli Programme.

Flood Control Benefits:

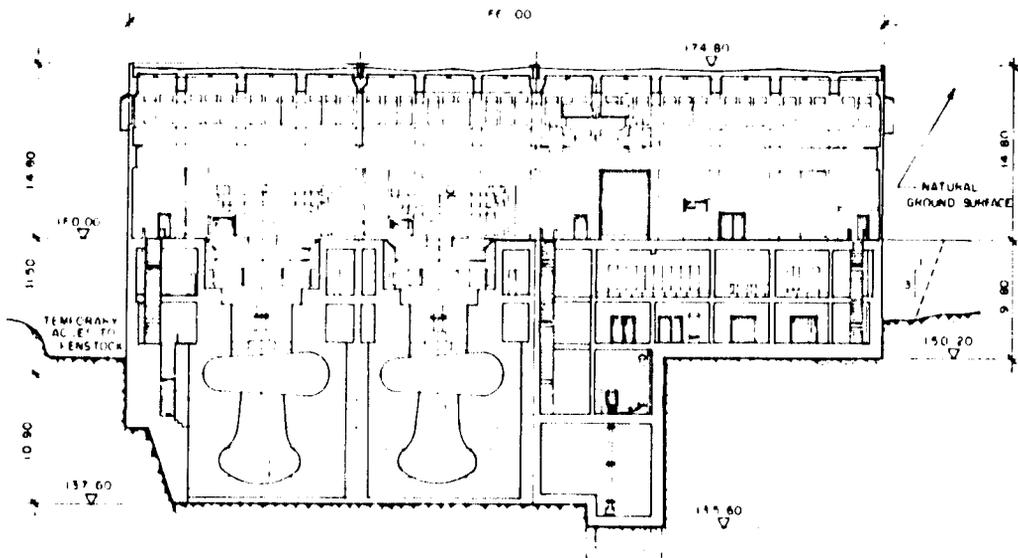
Flood control benefits of the Randenigala reservoir will be very substantial and would specially alleviate flooding problems in System A.

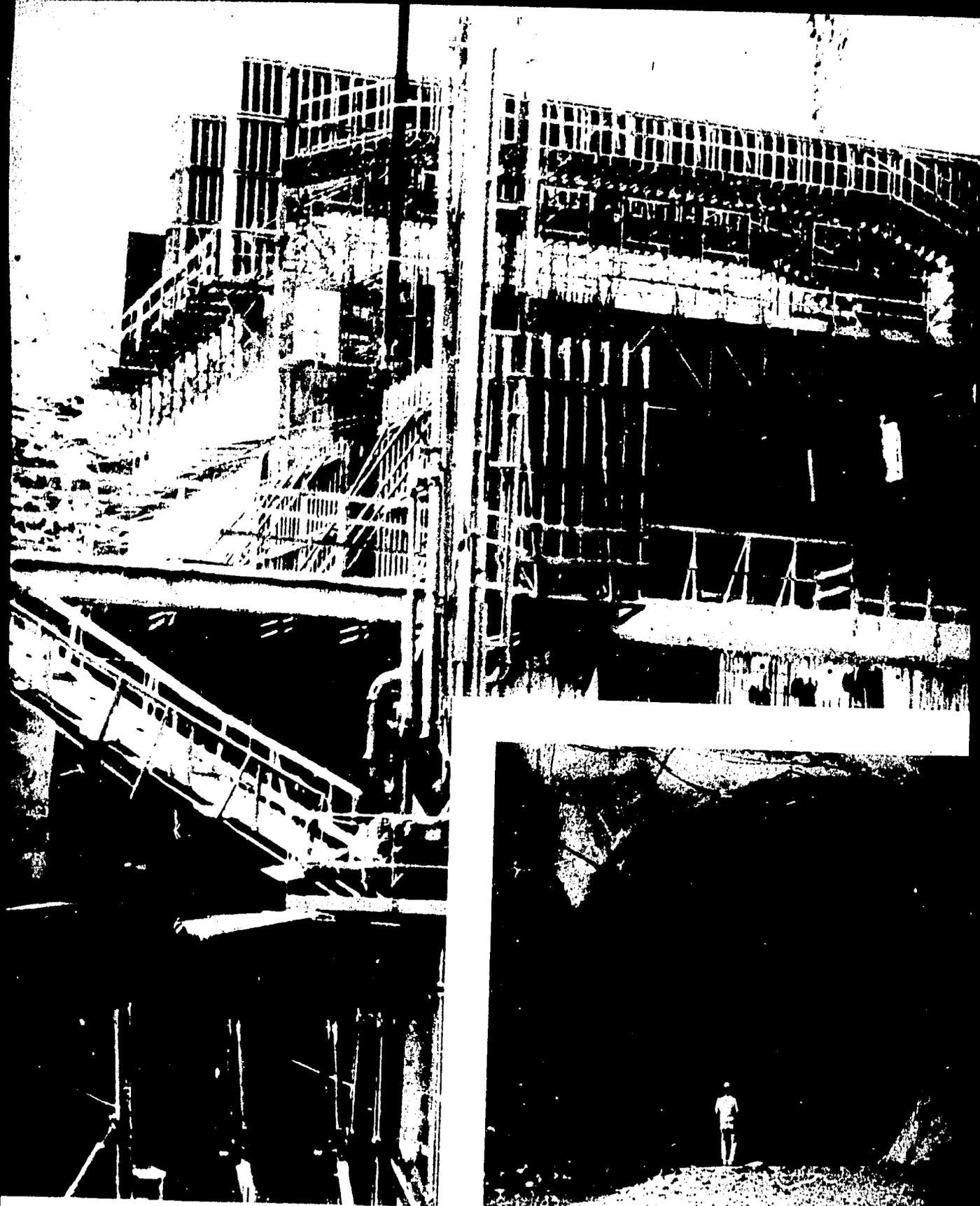
Power Benefits:

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

During the construction period employment will be provided to over 2000 Sri Lankans.

LONGITUDINAL SECTION OF RANDENIGALA POWER HOUSE





The Power House of Randenigala Project is now under construction. The in-take Power Tunnel appears in the in-set.

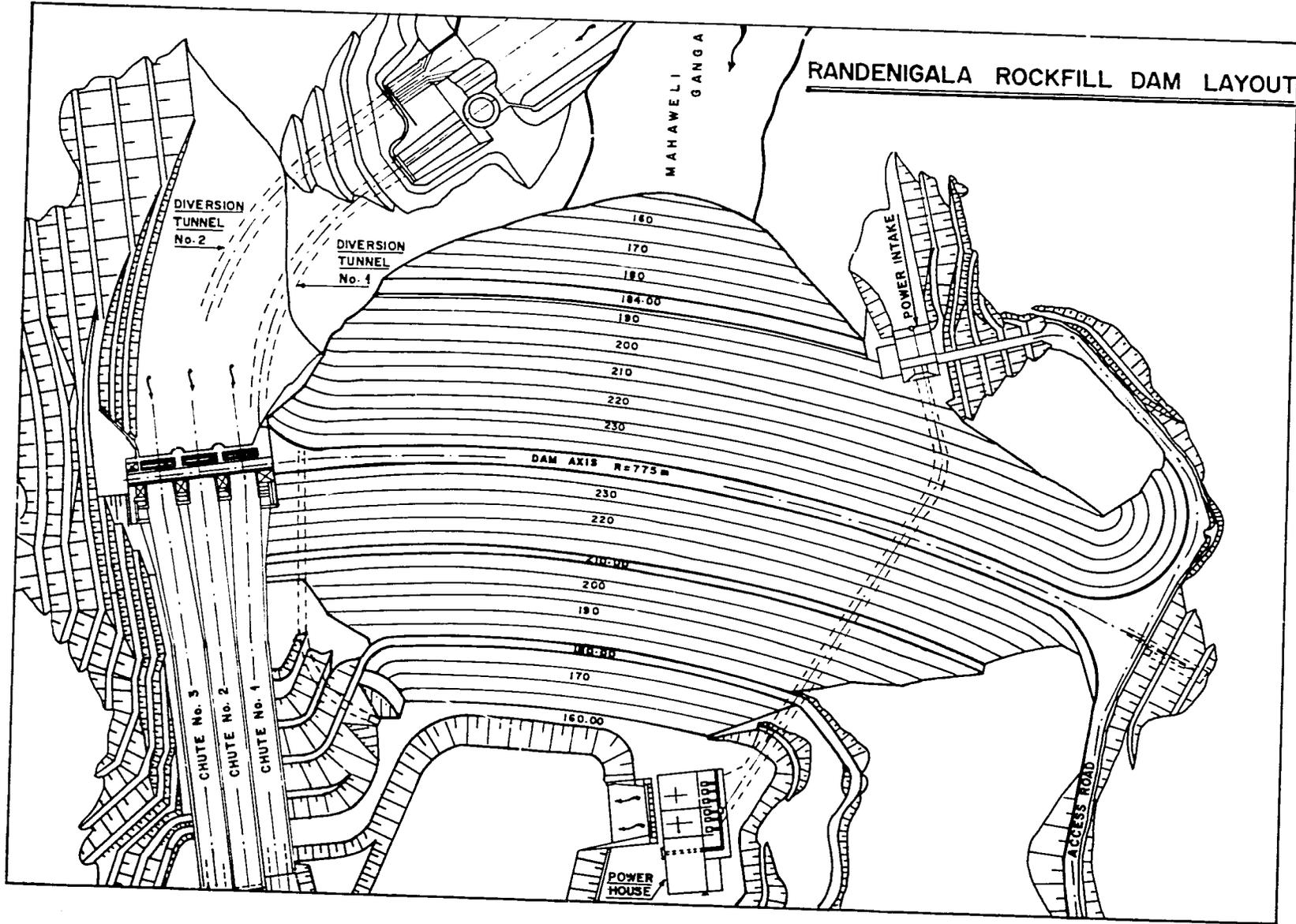


German technicians working along-side their local counterparts in the Randenigala Project. The steel lining for the Power Tunnel is being assembled as shown here.



40

RANDENIGALA ROCKFILL DAM LAYOUT



18



Maduru Oya spills over as a result of the heavy rains earlier this year.

Operation & Maintenance of completed Headworks

The powers vested in the Mahaweli Authority of Sri Lanka are to construct, maintain and operate dams, channels, drainage systems and other irrigation works and structures for the purpose of implementing the Mahaweli Ganga Accelerated Development Scheme.

In order to operate and maintain the Mahaweli Headworks including reservoirs and conveyance canals, structures, which have been constructed at considerable cost, the Headworks Administration, Operation and Maintenance Division of the Mahaweli Authority of Sri Lanka was formed in January 1984.

The functions of this division are the administration, operation and maintenance of all "Headworks" coming within the jurisdiction of the Mahaweli Authority, namely:-

- (a) Multi-purpose project headworks such as Polgolla, Bowatenne, Kotmale, Victoria, Randenigala & Maduru Oya.
- (b) Irrigation projects such as Minipe Right Bank Transbasin Canal, Uthitiya Reservoir, Ratkinda Reservoir, Dambulu Oya Reservoir, Kalawewa and Kandalama Tank.

The operation and maintenance of the hydro-power intakes and tunnels up to tail-race at Bowatenne, Kotmale, Victoria and Randenigala, will be managed by the Ceylon Electricity Board.

In Irrigation Projects, the operation and maintenance of down stream canal systems, distribution of water for irrigation purposes to the fields will be done by the Mahaweli Economic Agency, and in some special cases by the Mahaweli Engineering and Construction Agency and the Irrigation Department.

The Water Management Secretariat of the Mahaweli Authority of Sri Lanka will decide on allocation of water for power supply and irrigation needs, and advise the Headworks Operation and Maintenance Division regarding water releases from the reservoirs and also obtain information regarding water availability, inflows etc.

Operation

Quantified issues of water down this system according to the decisions reached by the Water Management Secretariat, will be carried out by the Headworks Operation and Maintenance Division and is generally known as Operation and Maintenance of the system. Operation and maintenance of irrigation systems are two distinct but largely interrelated activities.

The goal of any irrigation project is to deliver the required amount of irrigation water to the fields in a reliable and timely manner, keeping operational losses and wastage to a minimum.

MAINTENANCE

General

Since heavy financial commitments have been made in the development of these water resources, specially in an era of global recession, the network of reservoirs, tunnels, hydropower plants and canal systems constitute a valuable national asset. Hence proper care needs to be exercised in their maintenance

Written instructions in the form of Maintenance Manuals for maintenance and operation of structures and equipment are usually provided by the consulting agencies.

Maintenance records

In the case of existing works, maintenance reports contain a record of the maintenance of Dam structures and facilities. In addition inspection and maintenance record cards should be kept on large structures such as those with radial gates.

In new works, this kind of record has to be initiated. Each item of equipment should be accounted for in the inventory records and its maintenance reviewed and inventorised periodically, according to the manuals of instructions supplied by the manufacturers.

Maintenance Equipment

The following are some basic equipment that are necessary for maintenance work and for making changes and additions to the system. For a particular system a centrally located repair workshop is best for obvious reasons. Heavy mobile equipment will include cranes, crawler tractors, pumps, backhoes and loaders, road graders, farm tractors and earth compactors, light pickups, jeeps, motorcycles and bicycles can be used for transportation of project personnel. An

efficient communication system, located at key control points, will be an asset to both maintenance and operation work.

Maintenance Materials

Important spare parts for the above equipment, manufacturers maintenance instructions and manuals of as-built drawings must be on site, together with materials required for concrete work, necessary cables, lubricants etc. needed for urgent maintenance and repair work.

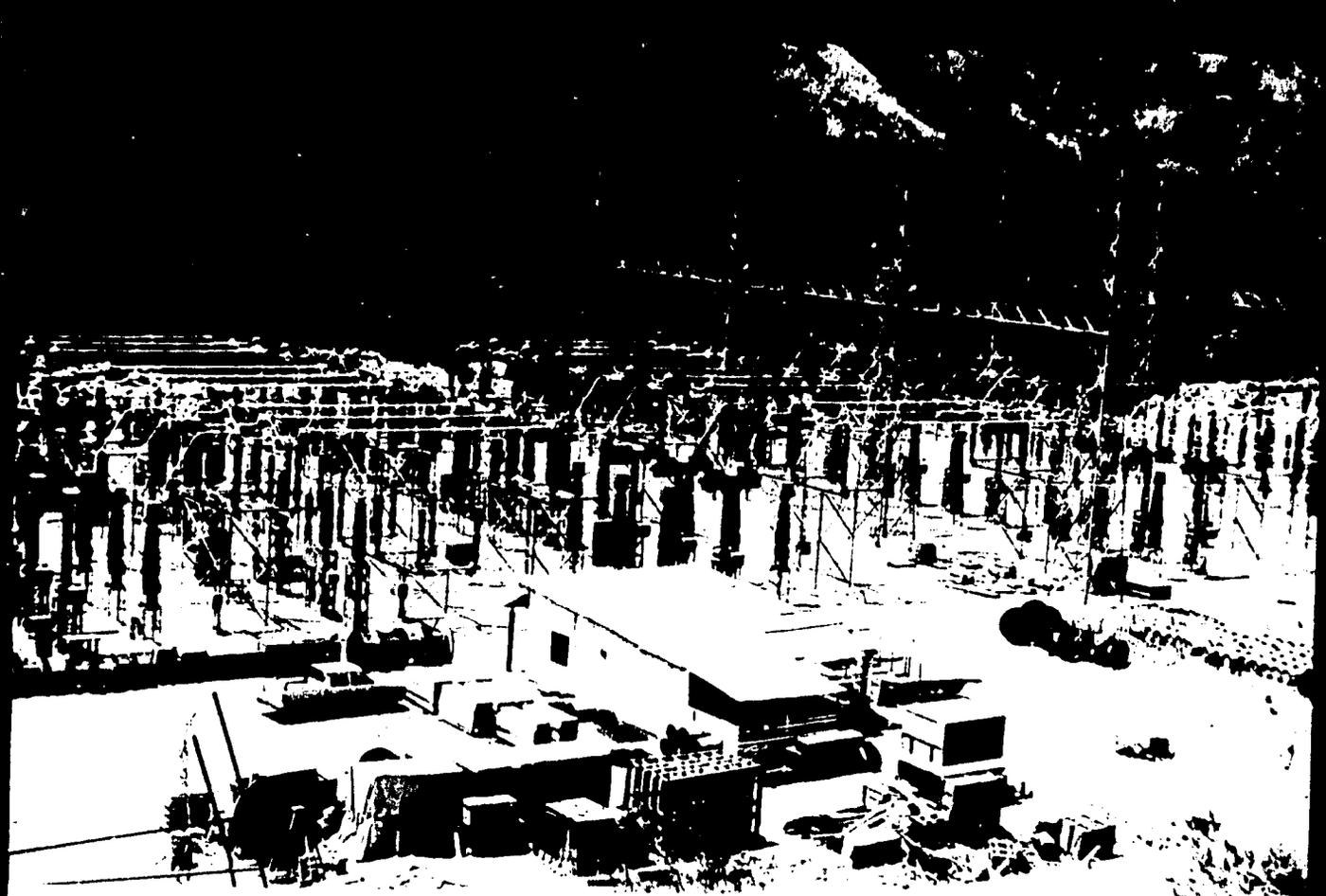
Maintenance of Dams, Structures & Canals

Routine maintenance checks of embankment slopes and crests of earth embankments have to be carried out for evidence of development of unfavourable conditions.

During the first filling of a reservoir the downstream slope of the embankment and the foundation downstream from the embankment should be carefully inspected at frequent intervals for indications of cracks, slides, subsidences, damages to slope protection and seepage. The upstream slope of the embankment should also be carefully inspected after sustained high velocity winds and as the reservoir is being drawn down, for evidence of cracks, slides and damages to slope protection such as displacement of rip rap or other signs of serious erosion. Crest and ramp roads usually are not designed for heavy traffic and should pot holes appear, repairs have to be undertaken immediately. Upstream and downstream slope should be kept free from trees.

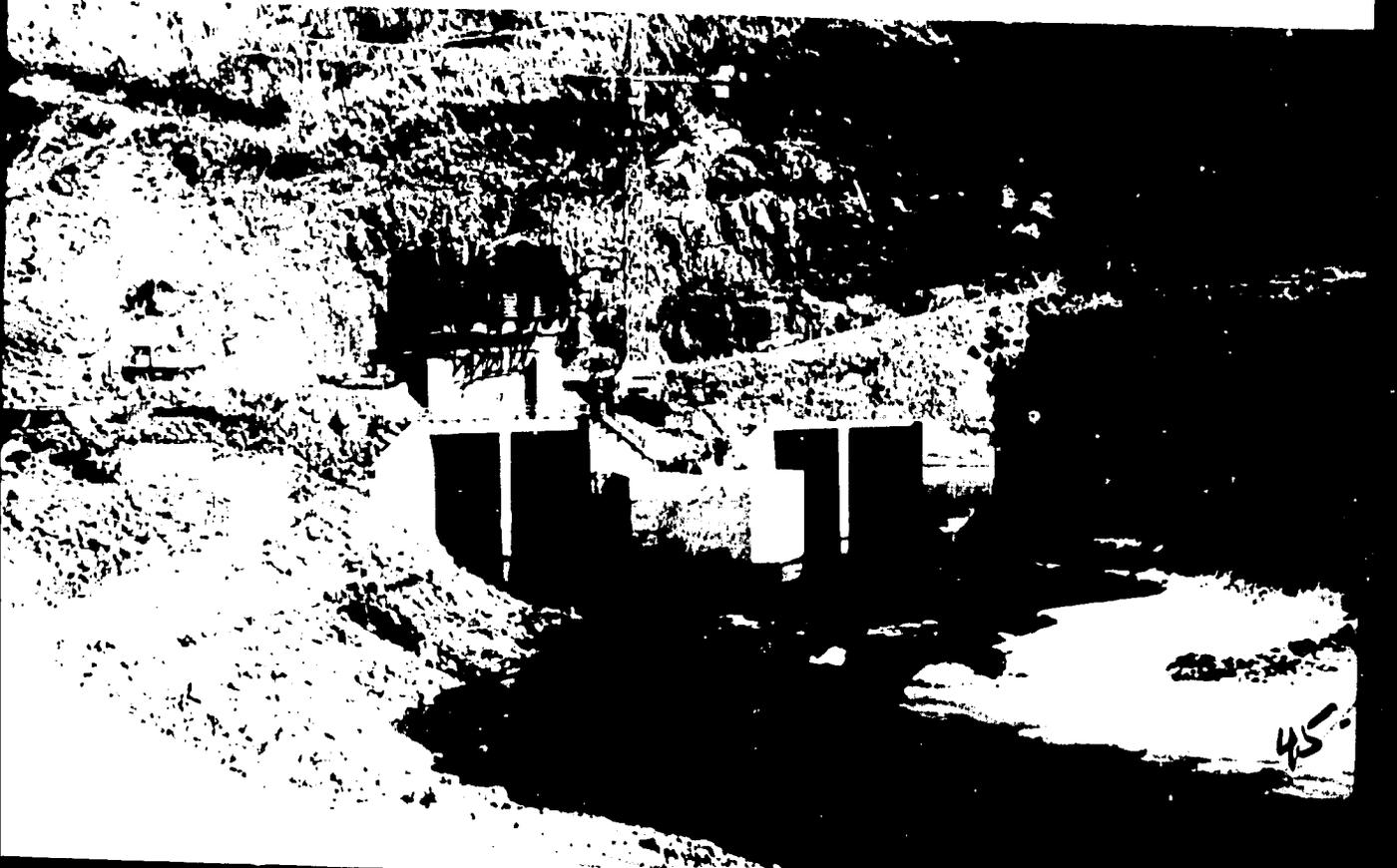
Concrete Structures

Detailed inspections should be made by operating personnel at yearly intervals, or more frequently. A more thorough inspection by a board of engineers is necessary for important structures, such

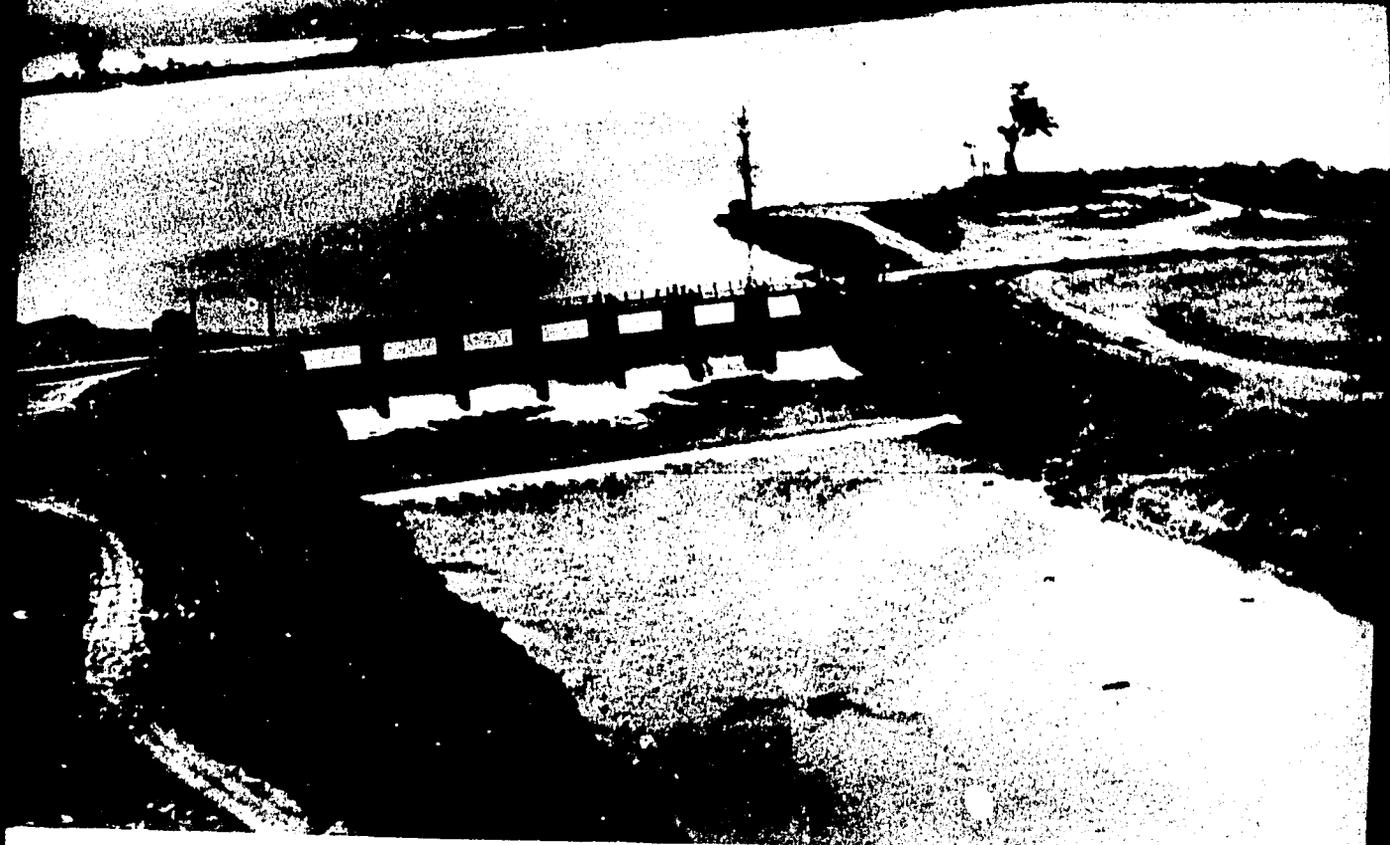


Victoria Switch-yard has now been completed.

Mahaweli enters the Randenigala diversion tunnels.



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▲ *Uihitiya Oya spilling over following recent rains.*

Maduru Oya Dam and Reservoir.



as penstocks, conduits etc. These inspections must be scheduled during periods of low water to check the condition of structures normally submerged and also during periods of maximum water level to check structure behavior under full load.

Inspections

The inspections should cover:

- i. Abnormal settlements, heaving, deflections or lateral movements of concrete structures.
- ii. Eroding of spillway of concrete and opening of contraction joints.
- iii. Deterioration and cavitation of concrete.
- iv. Abnormal leakage through foundations, construction or contraction joints.
- v. Possible undermining of the downstream toe or any other damage.
- vi. Unusual or inadequate operational behaviour.

Concrete-lined canals

Concrete-lined canals should be de-watered periodically and inspected for cracks and ruptures. The cracks are to be sandblasted and cleaned with compressed air and then filled with a special asphalt mastic pumped under pressure. Artificial silting is a method that can be used to seal concrete lined canals. Fine silt or bentonite could be used for this purpose.

Areas with cavities behind the lining in the embankment can be identified by tapping the concrete lining with a small hammer. Cavities should be filled with soil. Weep valves located in the concrete lining should be maintained and repaired or replaced as required and they should be kept clean. Trashracks along the canal way should be cleaned daily by raking and maintained as necessary or else the canal bunds may be breached due to over-topping.

These canals require great care in maintenance particularly in silt removal. Extensive care must be taken when cleaning, so as not to damage the lining. Trees and shrubs should not be allowed to grow on the canal banks especially next to concrete structures or linings as they may crack or move the structures causing embankment failure. Canal ways must be maintained in a clean manner not to disrupt the flow of water in anyway and if necessary should be fenced on both sides to protect from cattle trespass. Growing of grass on canal embankments must be promoted and studies have shown that for every rupee spent on planting grass, several times that amount is saved in operation and maintenance costs.

Weeds

Special emphasis must be made in the control of aquatic weeds, since this is a serious problem in some of the ongoing projects. Aquatic weeds growing in the bottom of canals and those floating on top of the water surface such as *Salvinia* and *Water Hyacinth* clog the canals and restrict the flow of water considerably. They can also cause the water measuring devices to be inaccurate, and breed mosquitoes which spread diseases like *Malaria* and *Filariasis*.

Controlling aquatic weeds

- (a) Manual -- This could be done by hand cutting or manual picking.
- (b) Draining and drying canals -- This method suits concrete-lined canals best, but is an expensive method if de-watering has to be done mechanically within a short time in cases where the canal system cannot be taken out of service for long.
- (c) Chemicals -- Chemicals offer an excellent method in controlling aquatic weeds, but is expensive, and abuse of these chemicals by untrained per-

sonnel could cause great damage to environment. It is therefore recommended that a thorough analysis should be made on site of their possible effects of pollution, detrimental to fish, wildlife, desirable vegetation and water quality.

Radial Gates. These need regular attention by experienced personnel. All gears and bearing should be kept clean and greased. Rust spots on exposed metal should be cleaned and painted. Radial gate wirerope must be examined frequently for broken strands and other damage. Care must be taken when replacing wire-ropes to assure that the ropes are placed on the winding spools. These should be free of dirt and grit and properly lubricated. All radial gates should be operated at least annually and operating handles should be kept locked to prevent unauthorised operation.

Offtakes, sluices etc.

The lifting stems and gear should be covered with protective coatings. Rust spots have to be cleaned and painted. A simple method of indentifying these, such as, painting numbers should be devised. All slide gates should be locked or the wheels be removed to prevent unauthorised operation. Weir blades and guage part have to be kept clean of silt, rocks and trash. Stilling basins should be kept clean of silt, rocks and trash. Stoplogs should be locked up on site. Manufacturers manuals for operation and main-

tenance should be followed for each piece of equipment.

Reservoirs

Facilities should be made available on site, such as a motorised boat to inspect the periphery of reservoirs. Encroachment of the catchment areas by illegal cultivators, loggers or gem miners and the like, should be strictly prohibited as this could lead to felling of trees, adding silt contaminants and pollutants to the water. Fish breeding in the reservoirs would be beneficial as this would provide the rural population with a much needed cheap protein. Maintaining the reservoirs clean, could promote tourism by providing an opportunity for boating, recreation and fishing.

Canal Reservoirs

Other important areas, currently receiving attention, are canal and road reservations.

Shade trees should be planted along these areas in order to provide, not only shade but also for augmenting the national wealth of the country and to increase the aesthetic beauty of the place.

With the denuding of vast areas of valuable virgin forest lands to provide way for development of the Mahaweli areas, timely action is being taken to make it compulsory to plant all reservation areas with suitable trees, as some compensation for the above losses, and to protect the environment.

Downstream Engineering Development

The assured annual water issue from the designed sources of water under the Mahaweli Accelerated Programme is estimated to be capable of irrigating about 130,000 ha. (335,000 acres) of land. The area being irrigated is receiving water issues from –

- (a) Transbasin diversions and Conveyance canals from the Headworks to major tanks serving the development areas, and
- (b) Irrigation Systems served by main distributory and field canals.

The transbasin diversions under the project are at Polgolla and at Minipe. At Polgolla the Mahaweli waters are diverted into the Amban ganga and then from Bowatenne to Kala Oya, to the Anuradhapura city tanks and to Huruluwewa. The water going down the Amban ganga is diverted to System D at Elaheera and Angamedilla. A total of about 53,500 ha. (132,000 acres) of existing paddy lands were benefitted by this diversion and enabled the farmers in these areas to have two assured crops per year. In addition to these existing areas, 25,000 ha. (62,000 acres) of new paddy lands were opened up in System H under Kandalama and Kalawewa tanks and about 25,000 families have been settled.

Minipe Diversion

At Minipe, the Mahaweli is diverted to feed about 6070 ha. (15,000 acres) of existing paddy lands on the Left Bank

(System E) and water is transferred through the recently constructed Right Bank Canal to Ulhitiya–Ratkinda and to Maduru Oya Reservoirs to feed an estimated 60,000 ha. (148,000 acres) of new paddy lands in System C & B. The irrigable area under Maduru Oya Reservoir, known as System B, lies partly in the Polonnaruwa district and partly in the Batticaloa district. System C is the area on the Right Bank of Mahaweli River, North of Minipe in the Badulla district.

Besides the gignatic Reservoir projects which are nearing completion for the storage and diversion of the Mahaweli waters, the development of new lands for irrigated cultivation with the settlement of peasant families involves a tremendous volume of Civil Engineering Works. Leading the water from the main Canal system up to the farmers' fields requires a well designed network of main, distributory and field canals with all appurtenant structures, like drainage crossings, road bridges and water-control devices like canal drops, regulators, canal offtakes and farm turnout structures. Again, the social infrastructural development necessary for the massive settlement programme involves the construction of schools, hospitals, post offices, banks and other public buildings together with housing facilities for the staff who will take up residence in the new areas.

A proper road network is being constructed to enable the provision of public

transport facilities and for transport of produce. A properly distributed "Shallow-Well" construction programme is required to ensure soft drinking water to the newly settled farming community, which water supply schemes have to be provided for the various townships that are coming up in the development area.

Irrigation Problems Resolved

In the first-stage of the design of each irrigation System, the following main problems have been resolved.

- (a) Determination of the boundaries of the irrigable areas under command of the various systems.
- (b) Establishment of the net irrigable area.
- (c) Determining the methods and providing irrigation facilities to new lands and improving existing irrigation systems.
- (d) Determination of the tentative cost of the main canals, branch canals, secondary and tertiary irrigation network, and the preparation of lands for irrigation development.

The Provision of drainage facilities for each system, is very necessary in order to –

- (a) Prevent salinity problems caused by stagnant water, and
- (b) Provide adequate drainage across irrigation canals, particularly at their conjunctions with the natural drainage lines, in order to protect irrigation canals from damage by storm water.

In the resulting stages of development of each System, detailed designs, plans and construction schedules have been drawn up in respect of the necessary irrigation infrastructure and the corresponding social infrastructure. The relationship between the settlement programme and

the related programme for the development of the irrigation and social infrastructure has to be carefully worked out so as to cause little or no hardship to the settlers. The settlers are brought into their new lands one year ahead of the due date to be provided with irrigation facilities, so that they can participate in the construction of the irrigation canals as well as do their own preparation work on the land.

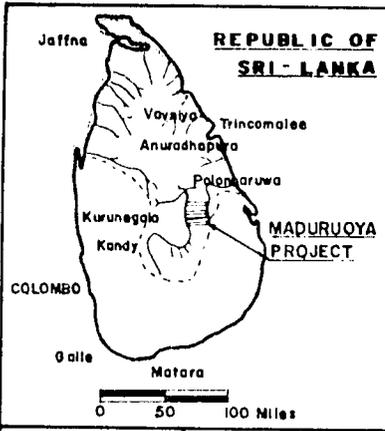
Under the Accelerated Mahaweli programme, an extent of 60,000 ha. (148,000 acres) of new paddy lands is being opened up in Systems B & C for the settlement of about 45,000 families. This work has commenced, and over 10,000 families have been settled in these two systems by the end of 1984, with the necessary infrastructure facilities.

Progress on Downstream Development:

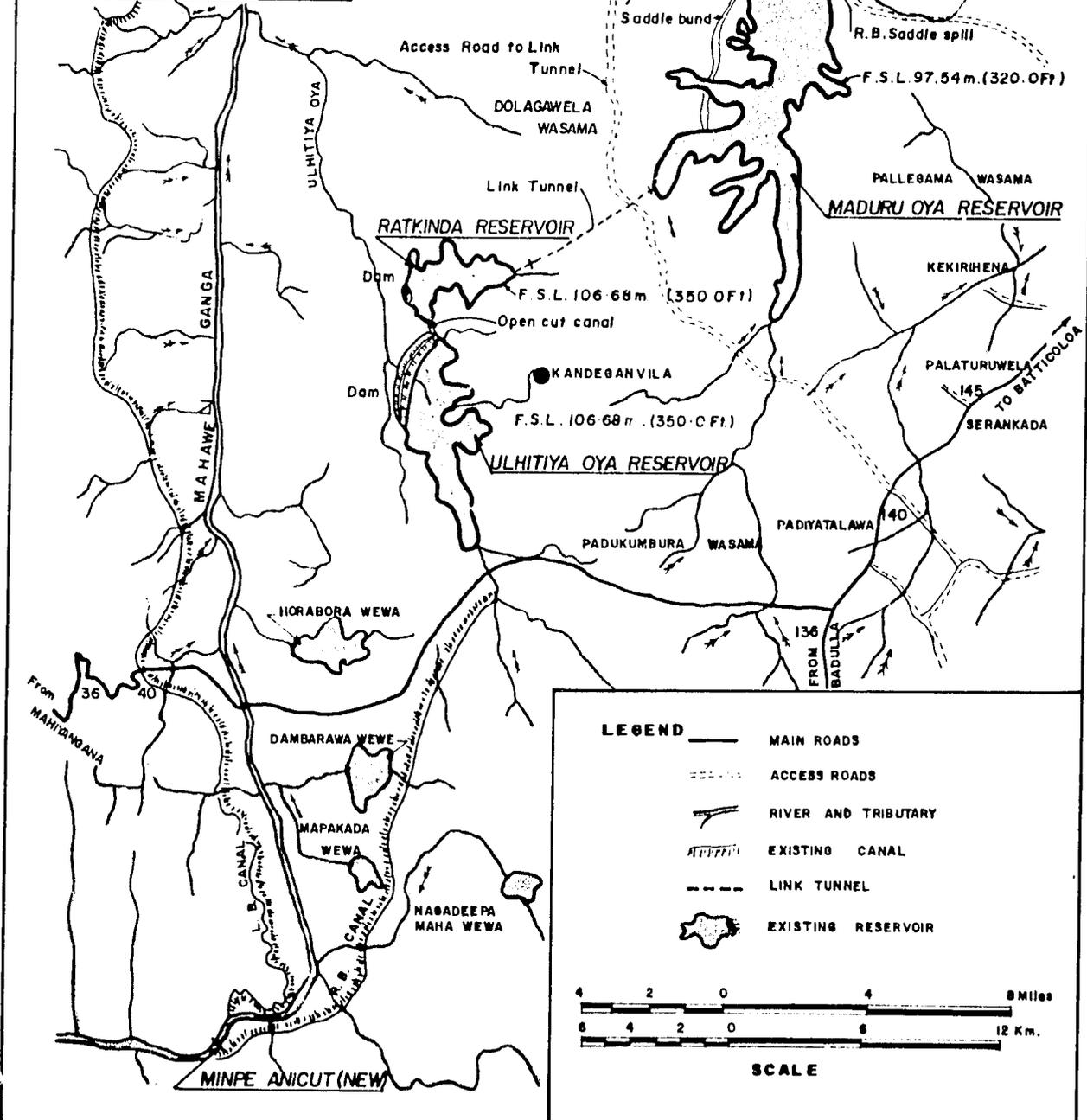
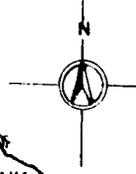
Irrigation and social infrastructure development works are now in progress in both Systems B & C.

The Main Conveyance System which has been completed to feed the Mahaweli waters into these new areas in Systems B & C comprises:–

- (a) The new Minipe Anicut and the Minipe R. B. Transbasin canal, about 31 km in length.
- (b) Twin service reservoirs at Ulhitiya–Ratkinda with a combined spillway.
- (c) 10.90 km Ulhitiya Left Bank Main Canal feeding Zone 2 of System C.
- (d) 17.35 km Ratkinda Right Bank main canal No. 2 feeding Zones 3 to 6 of System C, (under construction).
- (e) 5.6 km Link Tunnel to transfer Mahaweli waters from Ratkinda to Maduru Oya Reservoir.
- (f) Maduru Oya Left Bank canal about 53 km in length, of System B (construction in progress).



SRI-LANKA
MAHAWELI GANGA
DEVELOPMENT PROJECT
MINIPE RIGHT BANK CANAL



LEGEND

- MAIN ROADS
- - - ACCESS ROADS
- ~ RIVER AND TRIBUTARY
- ▬▬▬ EXISTING CANAL
- - - LINK TUNNEL
- ◊ EXISTING RESERVOIR

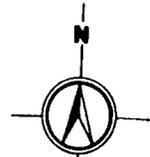
4 2 0 4 8 Miles

6 4 2 0 6 12 Km.

SCALE

SD

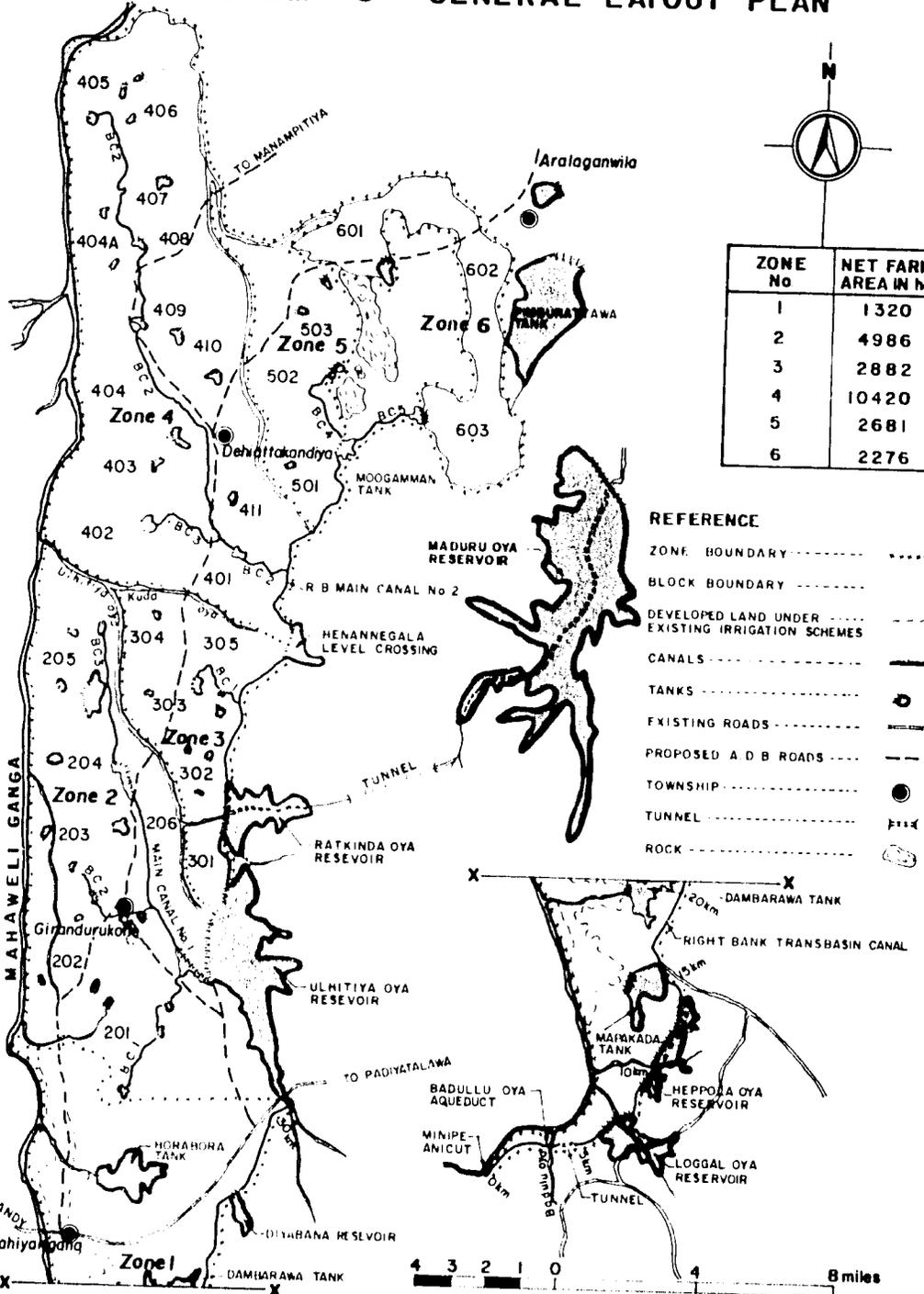
SYSTEM 'C' GENERAL LAYOUT PLAN



| ZONE No | NET FARM AREA IN ha |
|---------|---------------------|
| 1 | 1320 |
| 2 | 4986 |
| 3 | 2882 |
| 4 | 10420 |
| 5 | 2681 |
| 6 | 2276 |

REFERENCE

- ZONE BOUNDARY - - - - -
- BLOCK BOUNDARY - - - - -
- DEVELOPED LAND UNDER EXISTING IRRIGATION SCHEMES - - - - -
- CANALS - - - - -
- TANKS - - - - -
- EXISTING ROADS - - - - -
- PROPOSED A D B ROADS - - - - -
- TOWNSHIP - - - - -
- TUNNEL - - - - -
- ROCK - - - - -



BBG

506

- (g) The Maduru Oya Right Bank canal about 41 km in length, of System B (completed up to NDK Dam).

Besides the above Main Items of "Headworks", the secondary conveyance system comprises a large number of Branch, Distributory, and (tertiary) field canals. There is also a large volume of work involved in jungle clearing and on-farm land development, before water can be utilised for cropping.

Main Trunk Roads in Systems B & C

A network of 159 km of Main trunk roads in the project area has also been planned and undertaken for a phased implementation with financial assistance from the Asian Development Bank. This is in addition to the large number of farm-to-market roads and hamlet roads that are being constructed in the project area in Systems B & C. Some of these roads are new roads whilst the others are existing tracks to be upgraded and paved. All these roads will eventually form an integral part of the national road network and will facilitate the efficient movement of produce and people in and out of the region. This work is now in progress.

The Main Trunk roads that are coming under this programme are being constructed with finances from the Asian Development Bank:-

- (1) Mahiyangana-Angunuwara Wewa
- 10 km
- (2) Maduru Oya-Maha Oya- 24 km
- (3) Welikanda - Trikonamadu
- 22 km
- (4) Angunguwara Wewa - Ulhitiya Oya
- 13 km
- (5) Aralaganwila - Maduru Oya
- 19 km
- (6) Mannampitiya - Ulhitiya Oya
- 51 km

- (7) Dehiattakandiya - Aralaganwila
- 19 km

Irrigation Systems (Downstream Development)

System B

The irrigated areas in System B will receive water through LB & RB canal systems from the already completed Maduru Oya Reservoir. **The Left Bank Main Canal** is about 55 km in Length and would provide water to some 23,000 ha. (56,000 acres) of new land. The Right Bank Main Canal is about 41 km. in length and will irrigate about 15,000 ha. (37,000 acres) of new land.

The contract for the construction of the Main and Branch canals in the Left Bank area was awarded to a Joint Venture Zacry-Dillingham of U. S. A. This contract is for the construction of about 55 km. of Main canals and about 85 km of Branch Canals together with appurtenant structures. All these canals will be concrete lined. Under Phase 1(a), about 25 km of Main canals and about 35 km of Branch canals are being constructed. This work which commenced in July 1982, and Under Phase 1(b) about 30 km of Main canals and about 50 km of Branch canals are being constructed. All work on this contract is expected to be completed by March 1986. The total cost of these canals would be nearly US.\$ 100 million. **The Right Bank Main canal** and Branch canals will be nearly 100 km in length and will irrigate about 14,000 ha. (35,000 acres). A detention reservoir was created at the confluence of Nagolla, De & Kadiunne Elas at what is called the NDK Dam and the RB Main canal to it from the Maduru Oya R.B. sluice, 2.3 km in length, have already been completed. Work on the rest of the RB Main canal and Branches is being given out on contract and work is due to start early in 1985.

Left Bank of System B

This area is divided into Zones 1 to 5. Development activities in Zone 5 began in 1982 and are now nearing completion. About 1500 ha. (3,700 acres) in this zone have been settled with new farmers and will receive irrigation water for the first time for Maha 1984/85. All the internal roads within the zone have been completed and over 200 social infrastructure buildings provided.

The construction work in Zone 1 which is the largest Zone, covering over 6000 ha. (15,000 acres) is in progress. Preliminary work for construction activities in Zones 2 & 3 have been completed and work has started on the new roads and buildings. In Zone 4, detailed designs are in hand and construction work will commence in 1985.

In the Left Bank area the farm to market and hamlet road network envisages a total length of 648 km in addition to the 36 km of the new MAIN trunk roads. About 51 km of existing roads will be upgraded. 84 primary schools, 30 junior secondary schools, 1 senior secondary school, a district hospital complex, 5 central dispensaries, 42 midwife clinics, and other public buildings such as Post offices, Police Stations, Markets, etc. are being provided along with the required housing for staff. Manampitiya, Welikanda and Aralaganvila are existing towns on the left bank and these will be upgraded.

Right Bank of System B

The Right Bank region covers an area of 48,000 (118,000 acres) of which it is expected that about 15,000 ha (37,000 acres) would be under paddy. To service the corresponding settlement area, about 400 km of new roads will be constructed, in addition to 17 km of Main trunk roads.

There will be 56 primary schools, 13 junior secondary schools, 1 senior secondary school, 1 rural hospital, 5 central dispensaries, 28 midwife clinics, and other public buildings together with the necessary housing for staff. A new township will be established at Meyanakolla in Zone 8. Welikande will be the main central town in System B with main road, railway and other facilities.

System C

System C comprises about 66,000 ha (162,000 acres) of which about 23,000 ha (56,000 acres) is the new irrigated area for agriculture. The water requirements of System C will be met through the L.B. canal under Ulhitiya and RB canal No. 2 under Ratkinda reservoir. The R.B. Main Canal No. 2 (from Ratkinda) and the Branch canals are under construction by the Joint Venture Contractors, Hazama-Gumi, Toda, C. Itoh, of Japan.

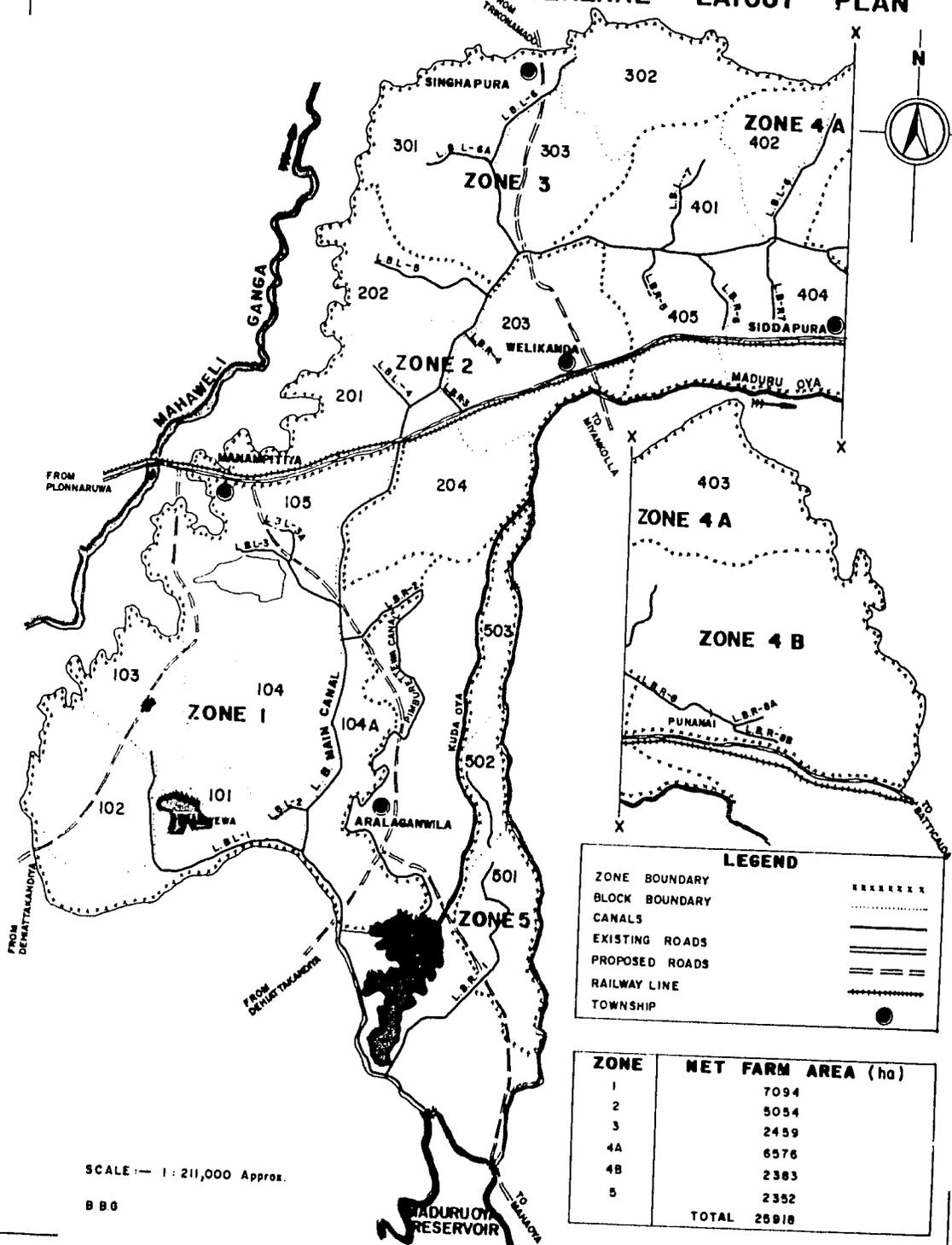
In System C, Mahiyangane in zone 2 the existing township and two more townships are being established. Giranduru Kotte in Zone 2 is now functioning and Dehiattakandiya is coming up in Zone 4

Zone 2 (under Ulhitiya LB)

The irrigable extent developed in this Zone is about 4200 ha (10,300 acres) and the full extent will be under cultivation by Maha 1984/85

40 km of Main and Branch canals and 350 km of Distributory and Field canals have been completed in this Zone. In addition, about 500 buildings for schools, hospitals, medical centres and other public purposes, have been completed. A new township has been constructed at Girandurukotte comprising a Development centre, a hospital, a senior secondary school, a police station, banks, shops etc. 35 km of new roads providing access to

SYSTEM 'B' - LEFT BANK GENERAL LAYOUT PLAN



SCALE: 1:211,000 Approx.

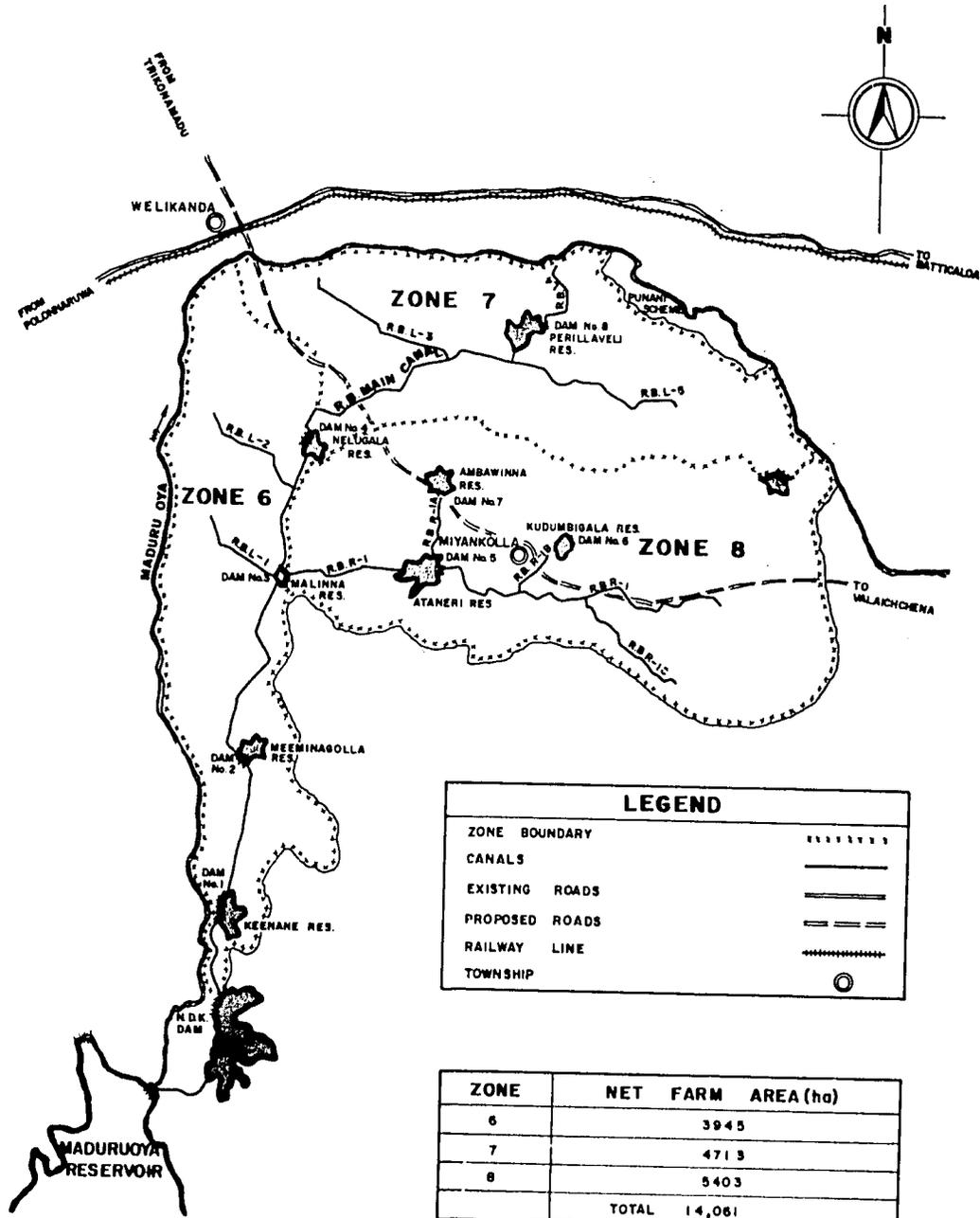
B B G

| LEGEND | |
|----------------|-------|
| ZONE BOUNDARY | ----- |
| BLOCK BOUNDARY | |
| CANALS | ————— |
| EXISTING ROADS | ————— |
| PROPOSED ROADS | ——— |
| RAILWAY LINE | ————— |
| TOWNSHIP | ● |

| ZONE | NET FARM AREA (ha) |
|-------|--------------------|
| 1 | 7094 |
| 2 | 9054 |
| 3 | 2459 |
| 4A | 6576 |
| 4B | 2383 |
| 5 | 2392 |
| TOTAL | 26918 |

524

SYSTEM 'B' - RIGHT BANK GENERAL LAYOUT PLAN



SCALE - 1:211,000 Approx.

B.B.G.

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the new villages and hamlet, have been metalled and tarred.

Zone 3

The irrigable extent developed in this Zone is about 2800 ha (6800 acres) and all work on canals, and roads will be completed by the end of 1984. Of the 5 "blocks" comprising zone 3, one block (Block 302) comprising 733 ha (1800 acres) was taken up as a "Pilot Demonstration Farm", funded by the Japanese Government and constructed by Toda Constuction Company. There are new methods introduced for the construction of irrigation canal systems in this block now completed and the farm is now operational.

Zone 4

This is the largest Zone in System C and comprises about 10,000 ha (25,000 acres) of irrigable Land. It is divided into 12 Blocks. Construction work on irrigation canals, roads and buildings is in progress in Blocks 401, 402, 403 and 411. All work in these blocks comprising a total extent of about 4000 ha (10,000 acres) will be completed by end of 1985. In the remaining blocks, construction work on roads and social infrastructure buidings has already commenced. Work on the construction of the canal system will commence in early 1985.

Zones 5 & 6

Surveying activities and preliminary design work is underway in these two zones. Work on detail surveys final designs and preparation of contract documents in respect of Zone 5 is due to commence in October 1984.

System H

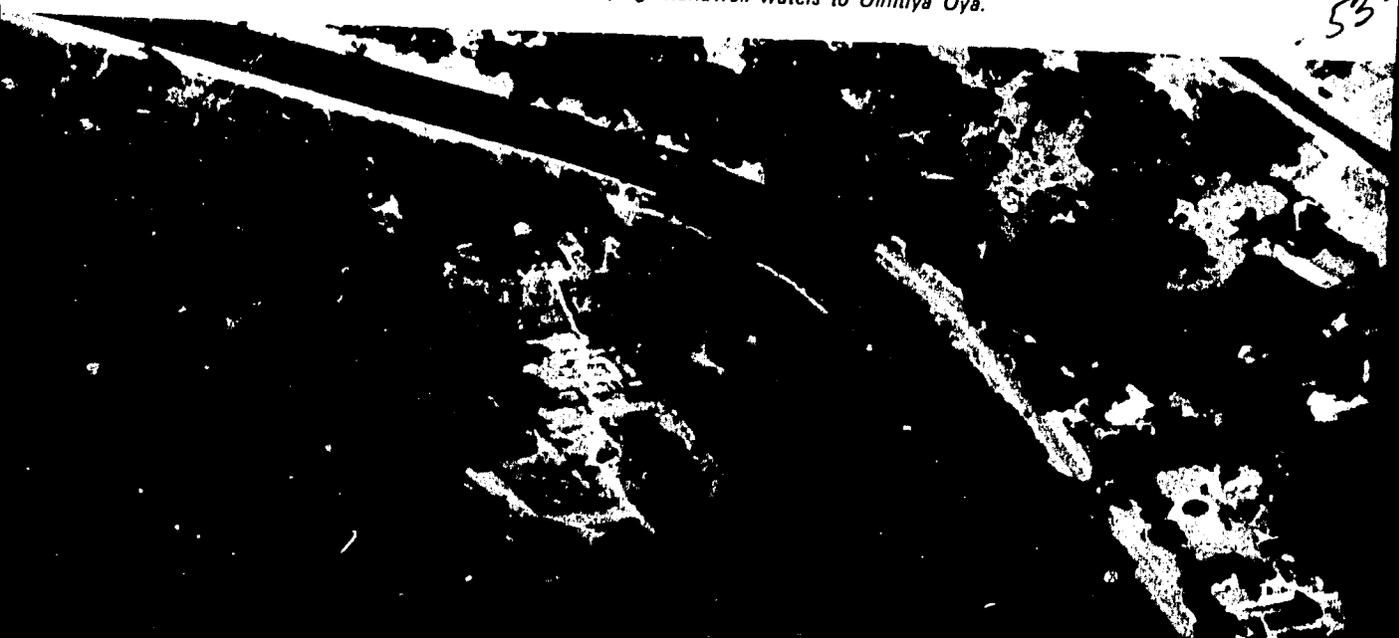
All work in this System under Kalawewa have been completed earlier. A total of 175 km of Main and Branch canals, about 1900 km of Distributory and Field canals had been constructed to irrigate about 23,000 ha (56,000 acres) of new lands under Kalawewa, Kandalama and Dambuluoya reservoirs and settled with over 22,400 farm families.

81 km of new roads were constructed to connect the new hamlet and village centres, and over 2000 new buildings had been constructed to provide for social infrastructure.

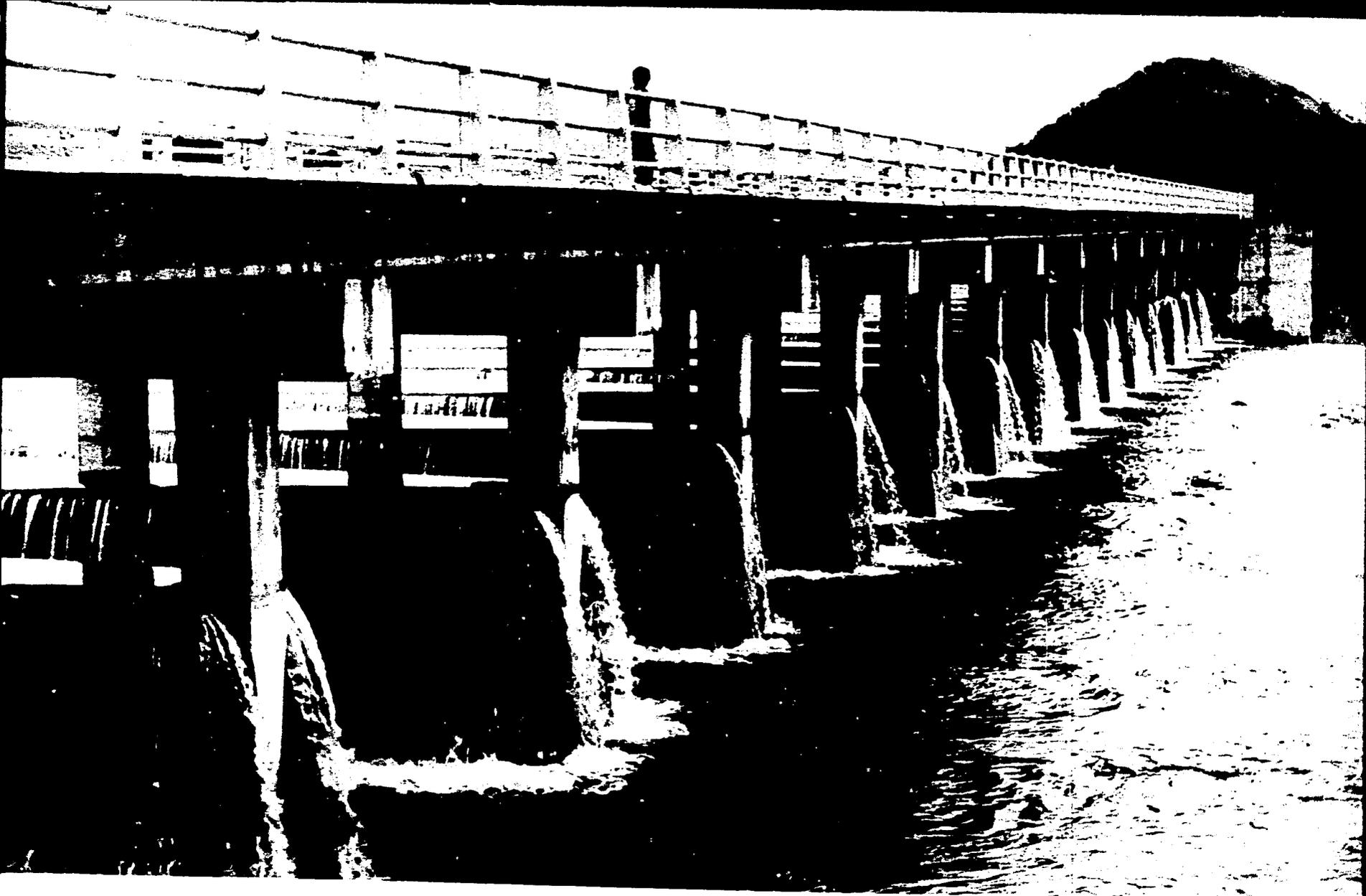
Several townships have been established to serve System H, some of which were existing as villages before, namely Galnewa in H₁, Meegallewa in H₂, Talawa in H₄, Nochchiyagama and Tambuttegama in H₅, Maduttugama in H₇ and Gal-kiriyagama in H₈.

System H serves as a model for the vast development taking place in Systems C & B.

Minipe Right Bank Canal winds its way carrying Mahaweli waters to Ulhitiya Oya.



53



Loggal Oya Anicut and Sluice on Right Bank Canal.

51

Water Management Concepts and Activities at National Level

At present an irrigable area of 108,700 ha (268,500 ac.), in major irrigation schemes is benefitted by the Mahaweli waters. With the completion of the Accelerated Programme, this extent will increase to 210,000 ha (519,000 ac.) approximately. These lands which fall within a number of Sub-systems are served by reservoirs augmented with diversions from the Mahaweli. The individual farm lots are typically 1 Ha (25 ac.) in extent, and in Maha almost the full acreage is cultivated with rice. During Yala, the extent of cultivation is restricted, depending on the carry-over storage available at the end of the Maha season and the anticipated diversions from Mahaweli. Rice is still the dominant crop ever in Yala, though on well drained R. B. E. soils upland crops like chillies, cowpea and green gram are grown.

Water Management Panel

The Mahaweli Authority of Sri Lanka has established a policy making body – Water Management Panel (WMP), responsible at National Level for achieving optimum benefits from both irrigation and hydropower generation in the Mahaweli Programme. The WMP which is also responsible for the overall cultivation programmes in the areas served by the Mahaweli Programme is advised and serviced by a technically specialized Water Management Secretariat (WMS) constituted within the M.A.S.L. The W.M.P.

has the following membership – Director General MASL (Chairman), Executive Director (Engineering) MASL, Executive Director MEA, Director of Irrigation, Director of Agriculture, Secretary to the Ministry of Agricultural Development and Research, Chairman CEB, the Government Agents of Anuradhapura, Polonnaruwa, Kandy, Trincomalee, Matale, Kurunegala, Badulla and the Director, Water Management Secretariat MASL (Secretary of the Panel).

Concepts and Activities

Water Management in the Mahaweli Programme has to be viewed at three different levels – System (Macro) Level, Sub-system (Micro) Level and Farm Level. The concepts and activities at each of these levels have a different focus, but they all have the common objective of ensuring a reliable, timely, efficient and predetermined supply of water to the farmer.

System (Macro) Level

Water Management in the "Macro System" at National Level relates to the planning, operating and monitoring of the releases from multi-purpose reservoirs, diversions to different Sub-systems and bulk issues from major irrigation tanks. For optimization of benefits from both irrigation and hydro power, the System has to be operated as an integrated whole.

Each year, the Water Management Secretariat draws up two Seasonal Operating Plans (S.O.P.P) for the half year periods 1st October – 31st March and 1st April – 30th September, corresponding to the two cultivation seasons of Maha and Yala. These not only contain the planned cropping schedules, diversions and irrigation issues in the areas benefitted by the Mahaweli waters but also give the projected hydro power generation. Mahaweli water users – CEB, MEA and the I.D. are associated with the WMS in the preparation of S.O.P.P. The MEA and the ID furnish information relating to the proposed cropping patterns after discussion with the farmers, and the CEB gives its requirements of hydro-electric energy at the planning stage the request is made in terms of "energy" from the Mahaweli System. These are incorporated in the S.O.P. with suitable modifications, depending on the expected availability of water. At a meeting of the WMP convened before each cultivation, the S.O.P. is approved after discussion and necessary adjustments. This year, for the first time, power benefits from the Accelerated Programme will be included in the Maha 84/85 S.O.P., with the completion of Victoria reservoir. The operation of the whole Macro System thereafter is directed by the WMS. The operation of the Multi-purpose reservoirs (except for power generation), the diversions at Polgolla, Bowatenne and at Minipe to Systems B and C are carried out by the recently established Headworks Operation and Maintenance Division of the MASL. Diversions at Elahera, Angamedilla and to System E at Minipe are carried out by the Irrigation Department. (Vide Schematic Diagram of the Macro System Water Distribution).

Computer Model

With the completion of each new project of the Accelerated Programme, the planning and operation of the System will become increasingly complex, and these are further complicated by the need to phase electrical output to complement the operation of the other components of the national electrical system – most notably the Kehelgamu-Maskeli Complex (K-M Complex) of reservoirs and power stations and the Kelanitissa thermal power station. To facilitate this work, a computer model referred to as the 'Macro Model' has been developed and installed in the IBM 4331 computer, gifted by the Canadian Government for use in the WMS. The Macro Model uses historical stream flow data at principal points in the Mahaweli System and the adjacent Kelani Ganga system together with demands for irrigation water and hydro-electric power and energy, to evaluate policy options and guide water allocations. Apart from its use as a planning and operating tool, the macro model is used for formulating operating policies for review by the WMP. Some of the issues to be examined in these policy studies are –

- Conflicts between irrigation and hydropower interests,
- Maximizing the productive use of unregulated catchment inflows,
- Large potential benefits from water conservation within the, irrigation areas.

Sub-System (Micro) Level

At the Sub-system level, water management is primarily the responsibility of the organization operating the irrigation system – Mahaweli Economic Agency (MEA) or the Irrigation Department (ID), as the



Rajangana Wewa, which is augmented by Mahaweli waters through Kalawewa, is spilling over after recent rains.

case may be. The activities involved are issues from the reservoirs, distribution through a network of canals, providing adequate drainage facilities and re-use of water from irrigation return flows, etc. There is room for further improvements in all these aspects. The requirement would be to make timely, reliable and adequate water deliveries to the farms with optimum efficiency. It is very essential that operating personnel have accurate data relating to cropping extents, hydrology, tank issues, flows in D-canals and F.C.C. Unless, such data is available, the farmers will not develop the confidence that they are getting their fair share of water. Recently in the H area, a Flow Monitoring Unit has been established for measuring flows, collecting data and processing them. Such activities have to be undertaken on a wider scale in all Sub-systems. Also a "Micro Model" has been developed for the H area and installed in a computer at Galnawa for more effective water management within System H. This model is capable of evaluating the response of the Sub-system to varying levels of irrigation demands and diversion flows from the Macro System. The use of such computer models in other complex Sub-systems too would improve water management.

Effective and regular maintenance of canals and structures (maintenance manuals and schedules are very important in this respect), construction of an adequate number of flow measuring devices, canal regulators and profiles would considerably improve distribution efficiency. Recovery of return flows from irrigation, and the cultivation of upland crops in place of rice on suitable soils, will also help in saving water.

On-farm Water Management

Farm irrigation requirements over a cultivation season are planned on the

basis of meeting the estimated needs for –

- (a) Land preparation
- (b) Evapotranspiration of the crop
- (c) Percolation losses

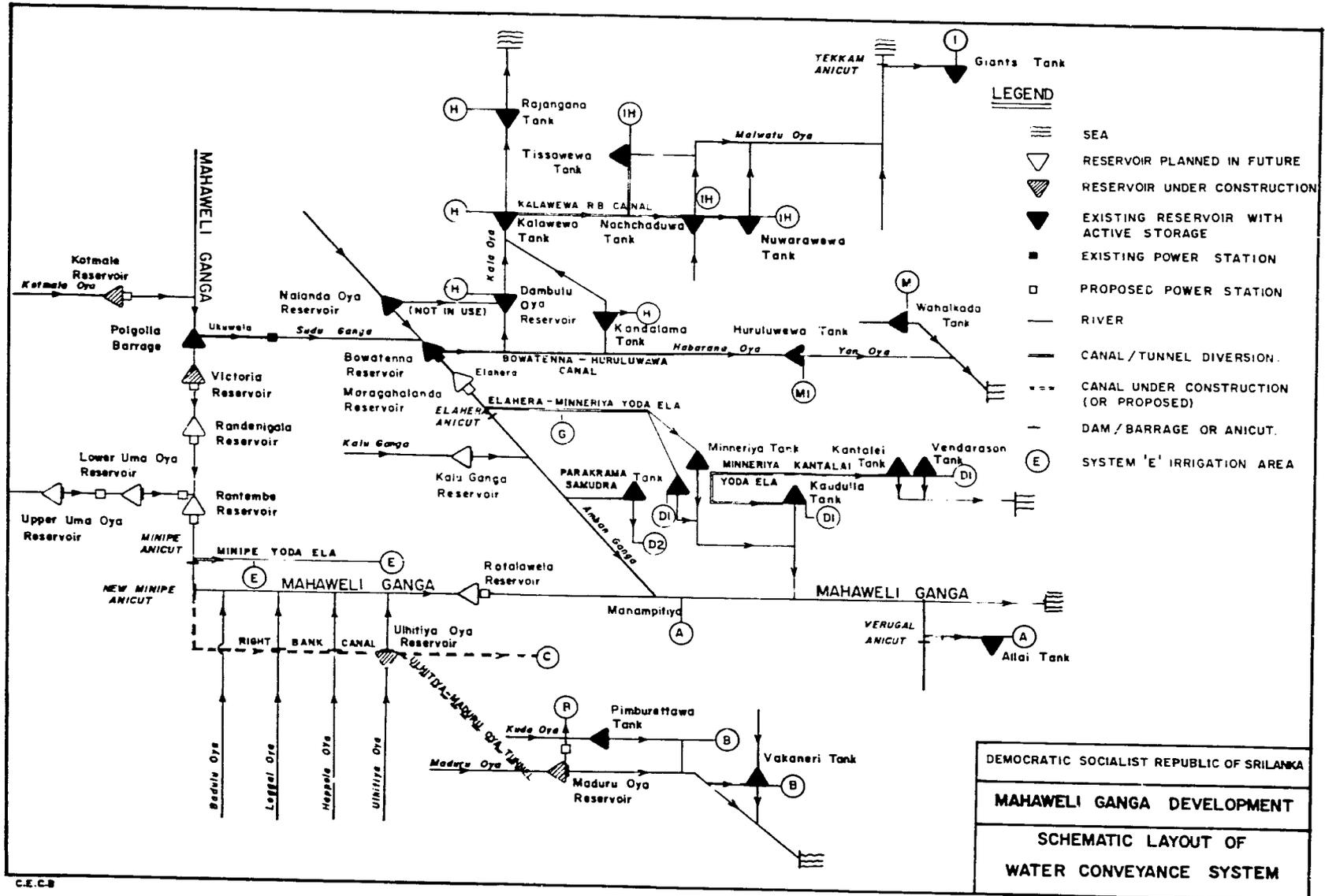
less the anticipated useful rainfall during the season.

Any irrigation water supplied in excess of the actual requirements at a given stage would be wasted, either as additional percolation or surface run-off.

Though farm irrigation efficiencies have shown some improvement in the recent past, further savings in water use are possible under both (a) and (b) above, with the adoption of better irrigation and cultivation practices. Some of the measures that will help in this are –

1. Use of rotational water issue programmes, to have better control over farm deliveries and thereby reduce over-use and wastage.
2. Ensuring that delivery schedules are met without foreseeable shortages thereby instilling confidence in the farmers of a timely and reliable supply of water (This will eliminate the tendency to damage structures and 'steal' water in the expectation of having shortages).
3. Effecting distribution and application taking into account cropping patterns, nature of soils and effective rainfall.

The field channels (F.C.C.) are usually designed to discharge 1 cusec and each F.C. serves about 12 farm lots. There has to be close co-operation and harmony among the farmers served by a F.C. for equitable sharing of the water and maintaining the facilities. The importance of having measuring devices at the headgates of field channels cannot be over-emphasised in this context. Also, training in farm irrigation practices will help the farmer to appreciate water management concepts.



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Weekly Operational Planning

A significant advance this year is the establishment of weekly Operational Planning and Monitoring meetings at the WMS attended by the WMS staff, Consultants, representatives from the CEB, MEA, ID and the Headworks O & M Division. At these meetings, the System performance during the past week is reviewed and decisions are made in regard to the operations for the following week.

Maha 1983/84

The WMP decided to cultivate the full extent of 83,600 ha (206,800 ac.) benefitted by the Polgolla diversion. Dry hydrological conditions prevailed in the early part of the season delaying the commencement of the cultivation. As a

result in most areas short term variation of paddy were grown, but in December heavy rains were experienced in all parts, causing all the major tanks to spill. The rains continued well into 1984, affecting the harvest in certain areas.

Yala 1984

The extent cultivated was much larger than what was usually cultivated during Yala in the other years. This was possible because of the high storage available in the tanks at the end of the Maha season. Under all the schemes, almost the full extent was successfully cultivated, except under Kalawewa and Minipe LB, where the cultivation was 75% and 60% respectively. For the first time 4200 ha (10,400 ac.) of new land in System C was cultivated during the season.

The Planned 80% Dry Flows and Actual Diversion at major diversion points are given below

| Season | Unit | Polgolla Diversion | | Ambanganga Flow | | Total at Bowatenne | | Diversion to H-area | | Diversion at Elahera to E. M. Y. E. | | Diversion at Angamedilla to P. S. S. | |
|--------|------|--------------------|-------|-----------------|-------|--------------------|--------|---------------------|-------|-------------------------------------|-------|--------------------------------------|-------|
| | | Pl. | Act. | Pl. | Act. | Pl. | Act. | Pl. | Act. | Pl. | Act. | Pl. | Act. |
| 83/84 | MCM | 675 | 817 | 286 | 431 | 961 | 1248 | 468 | 330 | 568 | 281 | 222 | 107 |
| Maha | | (547) | (662) | (232) | (349) | (779) | (1011) | (379) | (267) | (460) | (228) | (180) | (87) |
| 84 | MCM | 544 | 617 | 69 | 179 | 613 | 796 | 362 | 284 | 293 | 260 | 74 | 130 |
| Yala | | (441) | (500) | (56) | (145) | (497) | (645) | (293) | (230) | (237) | (210) | (60) | (105) |

Note: MCM – Million Cubic Meter

– Figures in brackets indicate Thousand Acre Feet

Pl. – Planned 80% Dry values

Act. – Actual values

EMYE – Elahera Minneriya Yoda Ela which feeds Elahera Scheme, Minneriya, Giritale Kaudulla and Kantalai Tanks.

P. S. S. – Parakrama Samudra.

Details of Systems presently benefited by Mahaweli Diversions

| Name of Irrigation System | Diversion Point | Benefited Tank | Capacity of Tank | | Extent available | | Yala 83 [‡] T Ac | Cropping Intensity 1983 | Yala 84 [‡] T Ac | Cropping Intensity 1984 | |
|---------------------------|----------------------|---------------------------|------------------|---------|------------------|---------|------------------------------|-------------------------|------------------------------|-------------------------|-----|
| | | | MCM* | TAF+ | T ha(×) | T ac(‡) | | | | | |
| | | | | | | | | | | | |
| H | Bowatenne | Kandalama | 33.8 | (27.4) | 4.9 | (12.1) | 3.8 | 1.3 | 9.6 | 1.8 | |
| H | | Dambulu Oya | 11.7 | (9.5) | 2.1 | (5.2) | 2.7 | 1.5 | 4.9 | 1.9 | |
| H | | Kalawewa | 123.3 | (100.0) | 23.8 | (58.8) | 17.2 | 1.3 | 42.0 | 1.7 | |
| H | | Rajangane | 100.7 | (81.6) | 6.7 | (16.5) | 16.5 | 2.0 | 16.5 | 2.0 | |
| M(H) | | Huruluwewa | 67.8 | (55.0) | 4.3 | (10.6) | 3.0 | 1.3 | 10.1 | 2.0 | |
| I(H) | | Nachchaduwa | 55.6 | (45.1) | 2.4 | (5.9) | NC | 1.0 | 8.9 | 2.0 | |
| I(H) | | Nuwarawewa | 44.4 | (36.0) | 1.0 | (2.5) | NC | 1.0 | 2.4 | 2.0 | |
| I(H) | | Tissawewa & Basawakkulama | 6.7 | (5.4) | 0.5 | (1.1) | NC | 1.0 | 1.1 | 2.0 | |
| G | | Elahera | Elahera | – | – | 3.6 | (9.0) | 9.0 | 2.0 | 9.0 | 2.0 |
| D1 | | | Giritale | 24.0 | (19.4) | 3.0 | (7.5) | 7.5 | 2.0 | 7.5 | 2.0 |
| D1 | Minneriya | | 135.7 | (116.0) | 8.9 | (22.0) | 22.0 | 2.0 | 18.0 | 1.8 | |
| D1 | Kaudulla | | 128.3 | (104.0) | 4.5 | (11.0) | 11.0 | 2.0 | 11.0 | 2.0 | |
| D1 | Kantalai & Vendrasan | | 157.9 | (128.0) | 9.3 | (23.0) | 20.9 | 1.9 | 23.0 | 2.0 | |
| D2 | Angamedilla | Parakrama | – | – | – | – | – | – | – | – | |
| | | Samudra | 134.4 | (109.0) | 10.1 | (25.0) | 25.0 | 2.0 | 25.0 | 2.0 | |
| E | Minipe | Minipe L.B. | – | – | 6.1 | (15.1) | 9.6 | 1.6 | 10.0 | 1.6 | |
| C | | Ulhitiya–Ratkinda | – | – | – | – | – | – | – | – | |
| | | | – | 142.0 | (115.0) | 6.3 | (15.6) | – | – | 11.1 | 2.0 |
| C | Minipe | Zone 1 | – | – | 2.1 | (5.2) | 5.2 | 2.0 | 5.2 | 2.0 | |
| B | Minipe | Pimburrattewa | 49.4 | (40.0) | 1.8 | (4.4) | 3.4 | 1.9 | 3.3 | 1.8 | |
| A | Kandakadu | Allai | – | – | 7.3 | (18.0) | 8.1 | 1.5 | 16.9 | 2.0 | |
| | | | | | 108.7 | (268.5) | | | | | |

Note: * = Million Cubic Meters

+ = Thousand acre Feet

× = Thousand Hectares

‡ = Thousand Acres

‡ = Full extent cultivated for Maha.



An anicut in the downstream areas for regulation of water flows for irrigation.

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Water Management in Sub-Systems (Project and Farm Level)

The Mahaweli Economic Agency (MEA) has taken over Water Management in Sub-systems and at farm level, and has introduced measures to reduce the water consumption while maintaining high yields and high income for the farmers. Water management is a multi-disciplinary activity which needs efforts not only of Engineers and Agronomists but also of Credit and Marketing officers, Socio-economists and Land Administrators for success. All these specialist services are available within the MEA. Its Chief Irrigation Engineer and Agronomists communicate with the Water Management Secretariat in preparing Seasonal Operating Plans. The various field observations are analysed, studied in detail and presented to the Water Management Secretariat enabling them to prepare realistic operating plans. Credit facilities, agricultural inputs, good seed materials, fertilizer, weedicides, pesticides etc. are supplied in time through the Manager/Production, Marketing & Credit and project staff specialised in those fields. Reduction of water consumption is not the only aim. Obtaining better yields from the crops, cultivation of crops giving high incomes etc. are also important. In order to get high yields, water has to be maintained at the correct levels at different stages of the crops. Sufficient water should be available during the land preparation period. Timing of cultivation is also a very important factor, because the crops should receive

longer durations of sun-shine, high day time temperatures and low night temperatures during flowering and seed filling stages, in order to get high yields.

Organization and Responsibilities

In order to facilitate operation of the Irrigation systems, MEA adopts the following procedure. Deputy Resident Project Managers (Water Management) assist the Resident Project Managers in operation and maintenance of the irrigation systems and in water management. The irrigable areas under the projects are divided into administrative blocks. There are Block Managers in charge of these blocks. Each Block Manager administers a net irrigable area of approximately 5000 acres. There are Unit Managers under Block Managers, in charge of units covering a net irrigable extent of 250–1000 acres. The channel system within a block is the responsibility of the Block Manager. An Irrigation Engineer (or a Senior Engineering Assistant) is attached to a block. He assists the Block Manager in all the irrigation and water management activities. Junior Engineering Assistants, Technical Officers, and other supporting staff are attached to the Irrigation Engineer. Field channel (turn out) Water issues are done by the Unit Managers with the assistance of Jala Palakas. The "Jala Palakas" assist Unit Managers in water issues and in preparation of the schedules. The Engineering Assistants of the block

give guidance for all irrigation works to the Unit Managers.

The Water Management has the services of supporting technical and clerical staff and has the responsibility to maintain and operate the main channel and the large branch channels. The branch channels feeding individual blocks and all the distributory channels within a block are the responsibility of the Block Managers. The Water Management gives technical guidance to Block Engineers, and all improvement and maintenance work in the administrative blocks are approved by him on behalf of the RPM. Water monitoring unit headed by an Irrigation Engineer, directly under Water Management is responsible for monitoring of water issues from the reservoirs up to the blocks. This unit maintains records of the water consumption in each administrative block and gives technical guidance where ever necessary.

Operation of the System

The Seasonal Operating Plan (S.O.P.) as approved by the Water Management Panel forms the guide for operations. The S.O.P. indicates the monthly sluice issue for each sluice, monthly diversions to other systems etc. It is not possible to operate exactly according to the Seasonal Operation Plan, because actual diversions and rainfall may differ from the assumptions. As such, the following procedure is adopted in issuing water in order to minimize operational losses and to make the best use of rain fall.

The Block Managers with the help of Irrigation Engineers, Agricultural Officers and Unit Managers prepare detail cultivation schedules for their blocks, taking into account factors such as availability of farm power best staggering to make the maximum use of available farm power and labour etc. The block engineer prepares

the water requirements in the respective distributory and branch channels in the block based on the schedule, and gives his weekly requirements to the main channel engineer a week in advance. The main channel engineer collects the requirements of the blocks and prepare his schedules of water issues in the main and large branch channels allowing for conveyance losses etc. Water issues to the blocks are made on the basis of weekly schedules given by the block engineers, but are adjusted at times taking into account the local rainfall and changes in other planned programmes. The additional water in the main channel due to the time lag between operation of distributory channels and main sluice in case of reduction in block issues is stored in the equalizing reservoirs of the main channel. These storages are also used to meet the immediate additional demands if more water is required for blocks than the quota requested in the weekly schedules (opposite of the previous case).

As long as there are no major shortages or excesses of water in the reservoirs in the main systems this operation can continue. When there are shortages or excesses fresh decisions have to be taken after discussions with the water management secretariat. The major advantage in the new irrigation systems is that discharges in the main channels can be varied through a large range (while maintaining peak discharges in distributory channels) as there are regulators with control gates in the main and branch channels.

Assessing Field Conditions

The field conditions have to be assessed properly in order to determine the water requirements at the channels. Some farms require less water from the channels than others depending on the location, type of soil etc. The Irrigation and Agricultural

staff make every effort to identify the requirements at the field channel level and prepare water requirement schedules accordingly.

Different programmes for land preparation are being tried out taking in to account the relative elevation and the nature of soils, and making the maximum use of the initial rains in the project areas. To prevent waste, it is very important to ensure that land preparation actually commences on time, once water is issued for this purpose. Drainage channels are being improved in order to provide drainage to the poorly drained L.H.G. soils. Build up of salinity is being monitored in the whole project area.

Education and training programmes for the farmers are being conducted. Benefits of economising water, of growing subsidiary crops etc. and all other relevant work on farm development are being explained to the farmers. It is intended eventually to hand over the operation and maintenance of the field channels entirely to the farmers. In the preparation of cultivation programmes farmer's suggestions are also considered and adopted when-ever possible and a very close contact is always maintained with the farmers.

Operation and Maintenance Cost

Farmers have to contribute towards the maintenance of the irrigation system, as they are the primary beneficiaries of the Mahaweli Project. It has been found that cost of maintenance of the irrigation system alone amounts to Rs. 200 per acre. It has been decided to collect Rs.

100 per acre during 1984, and increase the levy annually by Rs. 20 increments, so that by the sixth year, the rate of Rs. 200 per acre will be collected. The framers are alive to their responsibility in this respect, but want to be assured that they get a reliable water supply. Up to date, nearly 50% of the farmers in the H area have paid the fee for 1984.

Measurement of Water Deliveries

Efforts are being made to measure water issues up to the head of field channels. At present, measurements up to the distributory channels are reliable. However, in some of the field channels poor maintenance resulting in silting and growth of weeds has hampered the measurement of flows. In spite of such difficulties, in most field channels measurements are being taken properly, using alternative devices such as venturi flumes and gauging by pigmy type current meters, whenever existing measuring devices are found faulty. The flow Monitoring Unit checks the accuracy of all the measuring devices in the main, branch and distributory channels. At locations where it is difficult to provide measurement structure (due to non-availability of sufficient head) flow is gauged by current metering. The rating curves are updated frequently. Parshall flumes have been provided for flow measurement in main and branch channels. In order to evaluate the actual water usage it is necessary to measure the return flows and also to know the position of the ground water table. Measurement of return flows has commenced on experimental basis.



These Mahaweli farmers are oriented towards new cropping patterns like crop diversification.

Changing Concepts of Human Settlements

“For the villager of all too many parts of the Dry Zone, life is a long drawn question between a crop and a crop”.

These were the sentiments expressed by Sir Hugh Clifford, Governor of Ceylon, at the Second Annual Agricultural Conference held on 11th March, 1927, reflecting on the situation that prevailed at the time in the Dry Zone which had very few irrigation facilities for agricultural development, but had numerous hazards of poverty and disease.

For more than fifty years since this statement was made, the people of Sri Lanka have endeavoured to change this situation by way of gaining access to two seasons of crop development through improved irrigation facilities, thereby to better agricultural practices and better environmental conditions, through new social development programmes. Although, the cropping intensity has increased resulting in corresponding increases in income levels, and environmental and technological awareness has increased resulting in considerable social development, one has to carefully assess whether the villager's life has now ceased to become “a long drawn question between a crop and a crop”. After fifty years of a massive national effort which has paved the way for the realisation of self-sufficiency goals in rice production, and reasonably satisfactory solutions for some of the hazards associated with life in the Dry

Zone, the last hopes of “the crop to crop question” being finally solved lies in the integrated Mahaweli Development Programme. Having experienced over five years in settlement work in the Mahaweli Programme, we have now reached the threshold of a new era which should bring about a self-sustained, economically and socially viable community in the agrarian sector. It is in this respect that all the partners in this current effort are compelled to think of new concepts of settlement and new strategies of agricultural development.

The possibility of reaching self-sufficiency in rice production in Sri Lanka is being more convincingly discussed today as a result of visible results of the introduction of new rice varieties, increased cropping intensity coupled with better water management practices, and, of course, the increasing areas of productivity in the new developing Mahaweli Programmes. The willingness and the ability of our farmers are also increasingly demonstrated in terms of more diversified agriculture, faster social development and greater self-reliance. Those trends are more positively seen in the Mahaweli areas than in previous settlement schemes. However, the counter-veiling forces that tend to neutralize these trends are seen in the rising cost of production, the inevitable increases in the population, and the rising expectations of the masses. The challenge that the Mahaweli Programme faces today

therefore, is to sustain these levels of satisfactory results and seek to improve its achievements in such a way that the positive effects of its strategies would over-whelmingly out-weigh the effect of the counter-vailing forces.

The new concepts that have to necessarily emerge and have immediate applicability if we are to be successful in this attempt, are broadly based on the following needs:—

- (a) The past practices of conveniently adopting the traditional rice/rice cropping pattern have to be gradually changed towards a crop diversification strategy that would eventually bring about greater economic benefit to the settler community. High value crops more suited to soil types will give better incomes to the farmer and save on the consumptive use of water.
- (b) In the light of increasing costs of production, the efficiency of the management with use of scarce resources such as land and water has to be maximized.
- (c) In order to enhance the living conditions among the increasing numbers within the agrarian sector, the productivity of both human and natural resources has to be maximized.
- (d) To supplement the incomes arising from the agricultural effort, mainly to provide an opportunity for the second generation, individuals of the original settler families, strategies of creating off-farm employment, through business and industrial development within this sector, have to be vigorously pursued. At present the farmer's plot of land can be given by him to only one child. His other children have to be provided other means of livelihood.

- (e) In order to escape from the "crop to crop" interim period subsistence cycle, the earning capacity of the settler community by diversified occupation of the farmer family habits, saving and making intelligent investments to provide for lean periods of low income between crops and due to failures of crops has to be enhanced and monitored.

Crop Diversification

The surplus of rice which may be reached shortly with the continuation of present development and cultivation patterns, should logically point towards an international market. However, there are difficulties to follow this trend due to the high initial costs associated with the type of export-oriented rice that has to be cultivated, coupled with the limitations of international rice market itself, encourage the planner to look towards the need to modify present cropping patterns rather than think of exporting rice so that the farmers could get a better income from "high value" alternative crops particularly when the price of rice tends to decline.

Diversified cropping patterns with crops such as chillies, pulses, coconut, sugarcane and vegetables are necessarily related to changes in settler-selection criteria, agricultural practices, water management, inputs management, marketing facilities and farmer awareness. To this extent, the traditional methods and practices have to be gradually changed in future settlement work within Mahaweli areas. Such changing concepts need active support from other sectors as well. For instance, changes in the present tariff structures, such as on the importation of Dhal and other grams that can be grown here, just to mention an illustration, are essential if crop diversification is to become economically viable in this context.

Considerable progress has been seen, particularly in System H area in the cultivation of other field crops during the Yala season. Although, the emphasis on chillies has been extended dangerously close to saturation limits in relation to marketability, on the average this shift away from rice during Yala has so far paid good dividends. A further step has to be taken to encourage the farmers to grow other field crops on soil types unsuitable for rice even during the Maha season. A realisation is being reached, though gradually, on the profitability of developing a land-use pattern at a micro-level, using the one-hectare plot for different varieties of crops depending on the soil type and the availability of water.

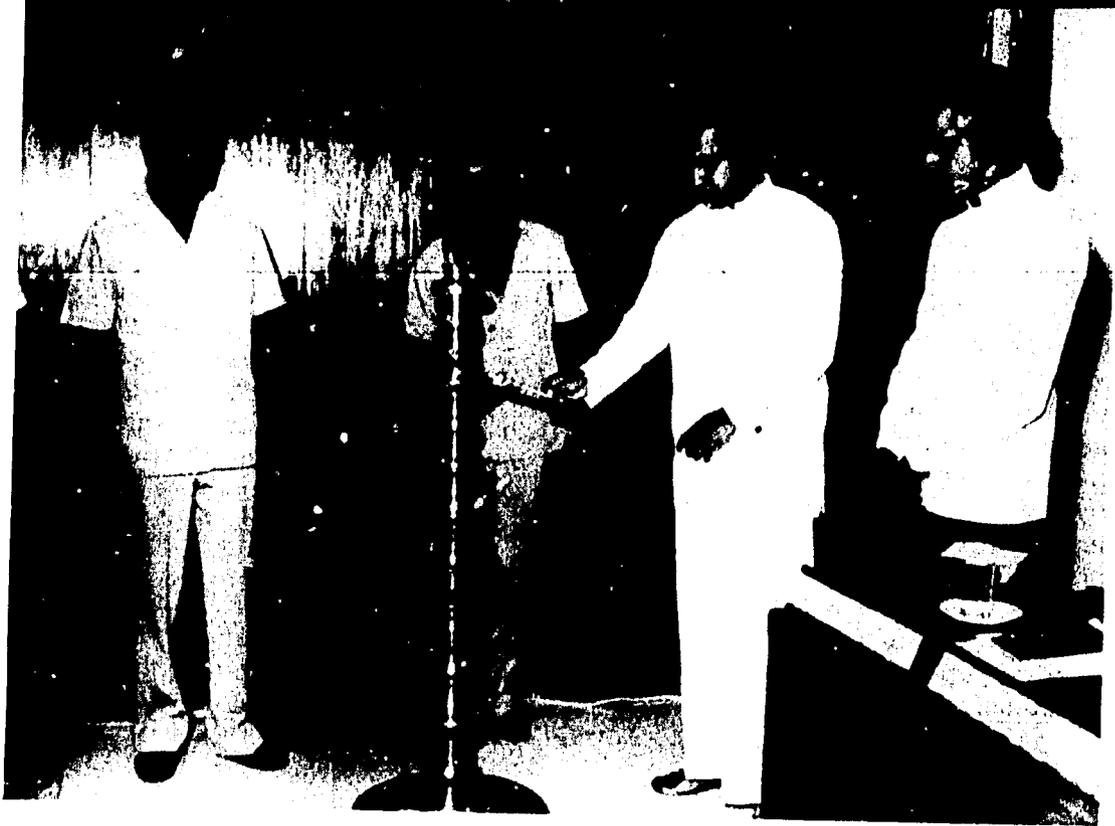
Land and Water Management

The cultivation of both ill-drained and well-drained soils with rice, with little regard to the efficiency of the use of both land and water, has been the practice so far in many Project areas. However, the limited availability of water which has to be evaluated, in terms of efficiency of its use, in relation to the different type of soil has now become a critical concern. Considerable amount of water can be saved if large extents of well-drained RBE soils can be used for the cultivation of field crops other than rice.

Since soil classification is fundamental in deciding the land use pattern, future cropping patterns have to be developed on the basis of not only on the optimum use of water, but also, on the optimum use of the particular type of soil. However, as other crop cultivation cannot co-exist sporadically with wet land rice cultivation, at the same time in the same area, because upland crops may not withstand high soil moisture, contiguous areas with predominantly one type of soil or the other have to be demarcated in developing future

cropping patterns. Depending on the available markets and the determinants of the national economy, a certain mix of crops has to be identified carefully in pursuing this strategy. As at present, it is being recognised that sugar-cane which becomes the second most important crop next to rice in view of the above consideration, should become a priority crop. With this in view, attempts are now being made in System – C and the Walawe Special Area to establish medium scale sugar-cane plantations with considerable support from outgrowers.

A very important feature of our present small scale farm structure is that most of the decisions regarding the management of land and water are being taken by the individual settlers. From a management point of view, this poses two major constraints towards the final production outcome. On the one hand, a large number of individual decisions have to be co-ordinated in formulating a viable composite investment decision for a Project, and on the other, a much more difficult effort in co-ordination has to be effected in implementing such a decision. The degree to which a facilitating role of an Agency, such as the MEA, could effect substantial economies in the use of land and water need not be limited to the results that could be achieved by persuasion if sufficient demonstration pilot projects are introduced in the new areas. Although, many decisions are monitored through the collective mechanism of cultivation meetings and the deliberations at project level farmer organisations, many economic decisions are still taken by the individuals, sometimes differing from collective decisions. The availability and the price of farm power, seed material and other inputs become the major determinant in these individual decisions.



A Seminar on Mahaweli Settlements was recently inaugurated at the Sri Lanka Foundation Institute by the Hon. Minister of Lands and Land Development and Mahaweli Development, Mr. Gamini Dissanayake. Others in the picture were (left to right) Mr. Ivan Samarawickrema, Secretary, Ministry of Mahaweli Development, Dr. D. Wesumperuma, Director, S.L.F.I. and Mr. D. J. Bandaragoda, Executive Director, Mahaweli Economic Agency

A shift towards the use of well-drained soils, for selected other field crops, such as sugar-cane, perhaps, may provide for better collective decisions, as the out-growers would be much more closely related to the management of the nucleus farms or processing plants associated with such field crops. However, the constraints in the growing of crops like sugar cane is the lack of small farm structures which are necessary to provide a market for the farmers produce. An answer to this problem in the long run may lie in the capability of our overall national system to organise farmers in specific settlement areas on legally instituted economic enterprises, such as Co-operatives or People's Companies, or any other form of farmer organisations, which will create an assured market by processing the farmer produce.

Another important consideration in the management of land is to assess the present emphasis by the farmers on using the irrigable plot as against his homestead plot. It is observed that since the farmers have been accustomed to derive the results only twice a year at the end of the two cultivation seasons, the lack of a regular cash flow into his hands through his effort tends to prevent him from meeting his daily requirements of consumption in an effective way. As a result, the nutritional requirements of the family, his capacity of spending for the education and other needs of his children, are very often constrained by his ability to obtain regular rural credit. Also, the bi-annual income flow into his hands tempts him to spend for unnecessary consumption goods not necessarily related to his essen-

tial domestic needs. At times, it has been observed that the farmer who gets caught up in the clutches of the money lender gradually declines in his ability to sustain both his agricultural effort and his living standards.

In view of this, it has now become necessary to encourage the farmer to pay an important attention to the development of his homestead. In the traditional village setting, the homestead that has been developed with varying types of crops of primary importance towards his nutritional needs, can be described as an exemplary land-use effort. The traditional 'gevatte' in the village often provides the family with essential needs of food, spices, fruits, etc., in addition to their drinking water through the well and other facilities towards the improvement of hygiene. Therefore, in the early stages of a settlement, attempts should be made by the authorities to encourage the settlers to develop their homesteads with much greater emphasis.

Improved Productivity

It has been observed that the Sri Lankan domestic agricultural sector has already emerged as the more dynamic sector in relation to the plantation sector in the recent past. While the country is becoming almost self-sufficient in rice, other crops such as pulses, coarse grain, oil seeds and legumes have also expanded steadily both in production and in acreage. A share of the food crop sector in agricultural GDP has increased from 18.5% in 1960 to 29.3% in 1975, while it has been close to 35% in more recent years. Its contribution as a provider of employment is also very high. It is expected that the role played by the food crops sector in providing livelihood to the large majority of rural population would continue to be an important feature.

However, it has to be mentioned that despite these positive growth trends, the food crop sector still performs less than half of its potential capacity. This potential lies mainly in the area of improving its productivity. Although, within the Mahaweli areas we have achieved record average yield levels such as 104 bushels per acre in System - H and Walawe Special Area, improved agricultural practices coupled with better land and water management referred to above should bring us to a much higher average yield target. Similarly, the cropping intensity which on the average has reached 140% in the late 1970's is not a figure that one can still be proud of. The changing concepts of our settlement work therefore, are in the direction of achieving better results in these two areas, namely, the productivity per unit of land and an increase in the cropping intensity to 200%.

Off-Farm Employment

The need to create off-farm employment in settlement areas cannot be over-emphasised. But then, what has been the reasons for poor results? Spontaneous growth of entrepreneurship within the settlement sector on the basis of increasing settler income, may have been the expectation on the basis of the framework of an open economy. However, even if the settler incomes had gradually increased, the counter-veiling forces that might have retarded the growth of entrepreneurship were many. As a result of increasing costs of production and prices of consumption goods, the real purchasing power of the settler community has been inadequate to provide the necessary impetus for the desired levels of off-farm employment. Although, many attempts have been made to attract investment into agricultural areas, the relatively low rate of return in

such projects and the environmental problems that tend to discourage the investor from outside the settlement areas, have been the two main constraints so far. In the absence of sufficient tariff concessions and support from other sectors, this situation is likely to continue.

Our selection criteria for settlers have been geared to help the relatively poor landless people and the greatest virtue of this policy is that it is an important poverty removal exercise. For us to make it develop into the next essential phase of a surplus-generating economic enterprise, we have to either provide through various mechanisms a method of injecting external economic support from the other sectors, or a comprehensive package of incentives for the settlers to emerge as entrepreneurs in converting the present subsistence level performance to a more economically viable enterprise. Concurrently, a closer look at the current selection criteria also seems necessary in view of the massive investment that goes into the Mahaweli Programme.

Training and Community Development

The present package of community development provided in the settlement areas needs reinforcement for it to be more gainfully absorbed by the community. The provisions of physical infrastructure for Health and Education becomes less meaningful if such infrastructure items are not humanised properly at the proper time. The transfer of technology

and knowledge through the various training programmes is not productive unless it is matched by the availability of other resources. These discrepancies crave for a "rural bias" in the national policies in providing the necessary staff and equipment and also the opportunities for basic industrial and business development within settlement areas.

The basic concept here is one of Regional Development. The resources within the settlement sector, as well as any surplus generated by it, should be re-invested in the region itself so that the settlers could build further on the base provided and have a multiplier effect out of their effort.

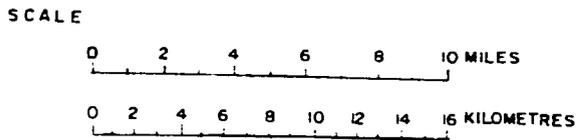
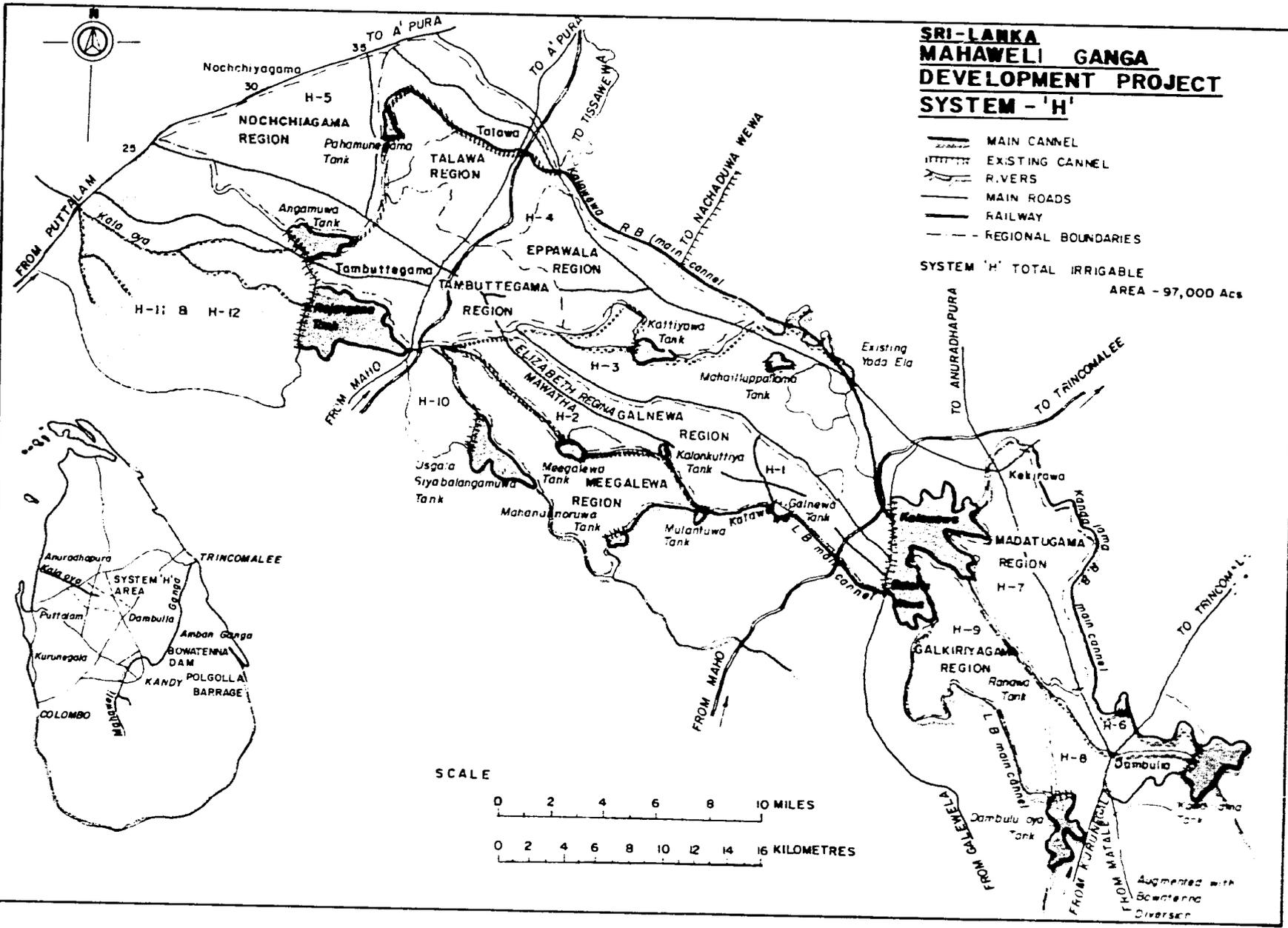
For the small farmer to take-off from the "crop to crop" subsistence cycle, he seems to need some more support through institutional arrangements. If through policy measures, these savings can be re-invested in the Region itself then the locally generated resources (surpluses) are made available for further development in the Region. Mechanisms such as Rural Loan Funds and Institutions specifically developed for this kind of arrangement are under consideration by the MASL. These changes in concepts are necessary steps to be taken if solutions are to be found for the long drawn question of how the farmer can be kept occupied between one crop and the next crop, which has pervaded the agricultural sector for so many years.

map

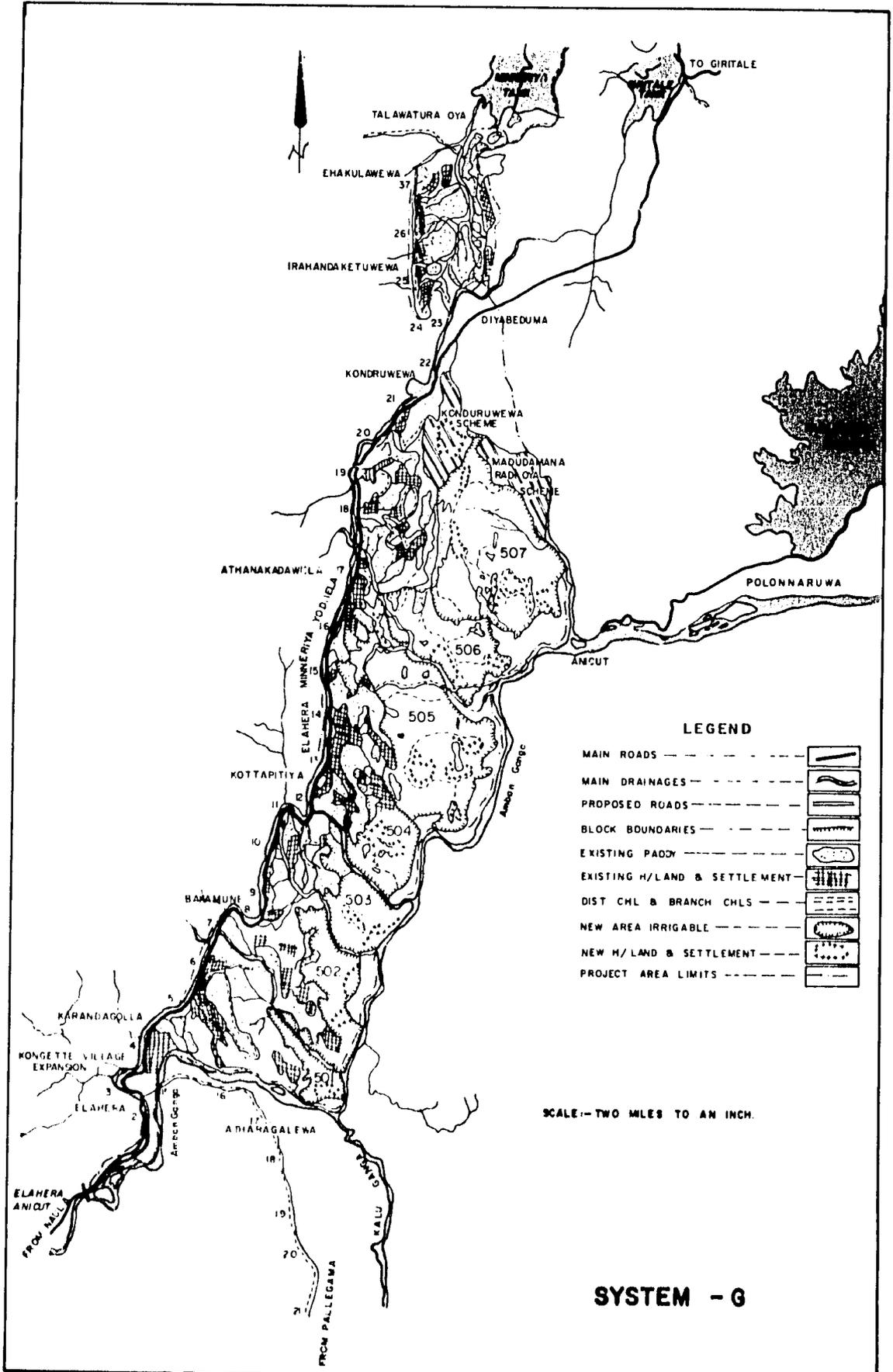
SRI-LANKA MAHAWEI GANGA DEVELOPMENT PROJECT SYSTEM - 'H'

-  MAIN CANNEL
-  EXISTING CANNEL
-  RIVERS
-  MAIN ROADS
-  RAILWAY
-  REGIONAL BOUNDARIES

SYSTEM 'H' TOTAL IRRIGABLE AREA - 97,000 Acs



Augmented with Scattered Diverses



SYSTEM - G

Agricultural and Inland Fisheries Development

Agriculture in the new Mahaweli Settlements like in other parts of the country suffered a severe set back due to excessive rainfall experienced in the Maha 1983–84 season. Mean monthly rainfall in the Maha

season at Maha Illuppallama, reference station for dry zone, and rainfall recorded in Maha 1983–84 are given below in Table for easy comparison:

TABLE I

| | October | November | December | January | February | March |
|--|-----------|-----------|-----------|-----------|-----------|-----------|
| Mean monthly rainfall .. | <i>mm</i> | <i>mm</i> | <i>mm</i> | <i>mm</i> | <i>mm</i> | <i>mm</i> |
| Mean of 32 Maha seasons .. | 256 | 265 | 254 | 78 | 45 | 72 |
| Mean monthly rainfall for Maha 1983–84 season .. | 123 | 153 | 495 | 166 | 474 | 381 |
| Monthly deficit (-) or surplus (+) | -133 | -122 | +241 | +108 | +429 | +309 |

Excessive Rain

Despite the deficit in rainfall at the start of the season (October and November) irrigation deliveries to systems serviced by the MASL commenced on schedule. However, excessive rain in December, January, February and March, a period critical to flowering, maturing and harvesting of crops, led to colossal destruction of irrigated paddy as well as rainfed crops like maize, chillies, pulses, vegetables etc. grown on developed highland and farmers houseplots. Crop yields were substantially depressed due to reduced solar radiation caused by abnormally high cloudy skies and also to increased post harvest losses. The prospect of a good Yala crop nevertheless is in the

offing as the Maha heavy rains filled the reservoirs, including Kalawewa, Kandalama and Ulhitiya–Rathkinda directly supplying irrigation water to the new Mahaweli settlements in Systems H and C.

Increased waterspread caused by recent impounding of Ulhitiya–Rathkinda and Maduru Oya reservoirs and distribution of about 400,000 fingerlings produced at the Dambulu Oya Fish Breeding Station, the first to be established in the Mahaweli Project, boosted activities on fish production in Mahaweli areas during the year 1984.

Agricultural Research – The following agricultural research stations catered to the different regional demands in the



▲ *Kalawewa in System H spilling over.*

▼ *Chillie, a successful crop in System H, is now bringing much foreign exchange for Mahaweli cultivators.*



new Mahaweli settlements and the Uda Walawe Special Project.

Maha Illuppallama Research Station –
System H and G

Girandurukotte Research Station –
System C

Aralaganwila Research Station –
System B

Angunukolapellessa Research Station –
Uda Walawe

Maha Illuppallama and Angunukolapellessa have been progressively developed and staffed over the years to cater to the research needs of irrigation systems served by them. Laboratories and infrastructure required for irrigated agriculture are partially provided at Girandurukotte and Aralaganwila; research work therefore had to be limited to investigate problems relating to rainfed farming.

Investigations at Maha Illuppallama varied from breeding and improvement of crop varieties, evaluation of their yield potential and income maximization by intercropping systems. Majority of field experiments suffered from abnormal weather in the Maha season. Water Management studies demonstrated;

- (i) When duration of land preparation for paddy cultivation is shortened the weed population after crop establishment increased substantially and,
- (ii) even with deep drains in imperfectly drained soils growth of chillie plants was poor due to limited root aeration.

At Angunukolapellessa investigations were directed to determine the seed rate for dry sowing of paddy, evaluation of cotton varieties for yield potential and control of phytophthora disease of sesame.

The Department of Agriculture is responsible for operation of research activities and the programmes are co-ordina-

ted by the Mahaweli Research Committee. Capital investment on development of research stations in Mahaweli settlements and operations are funded by the MASL.

Pilot Demonstrations: Several pilot demonstrations have been in operation in 1984, highlights of which are given below:–

(a) **Malwanegama Farm** in System H that was set up with technical and financial assistance from the Government of the People's Republic of China demonstrated that

(i) despite adverse weather in Maha 1983/84 season, cotton variety D – 15 yielded 1560 lbs. per acre, in contrast to the traditional variety H.C. 101 that responded poorly with a yield of 225 lbs. per acre and,

(ii) paddy row-seeded on upland compared favourably with crops raised under conventional mudded system. Investigations on cotton as plant and ratoon crops are pursued in the Yala season under irrigation.

(b) **“Demand Irrigation Schedule” or underground pipeline irrigation pilot project** in system H, which in concept is expected to make irrigation water available to the farmer in rates, quantities and frequencies required for crop production demonstrated that,

(i) the project area yielded **6 bushels more** than the conventional open irrigation channels in the Maha 1983/84 season and,

(ii) **water consumption** in the project was **higher** being 3.46 acre feet in contrast to 2.94 acre feet in the conventional area.

- (c) **Kalankuttiya Pilot Farm**, also in System H—findings are now being tested in farmers fields. Trials have demonstrated that furrowed basins are more suited than raised beds, mainly because of greater conservation of irrigation water.
- (d) **Pilot demonstration** of land development of 673 ha. in Tract 302 System C, on an outright grant by the Government of Japan, was recently completed. Seed production of paddy and of subsidiary food crops and demonstration of cultivation techniques of tree and subsidiary food crops and medicinal plants are the main activities planned for the 1984/85 Maha season, the first season of cultivation.

Agricultural Extension and Training: Extension services of the Department of Agriculture has increasingly adapted to the unitary management structure of the MASL, which has been designed for smooth operation and effective co-ordination of production-oriented services and disciplines such as water management, input supplies, marketing etc. at Project Block and Unit levels. Training and Visits (popularly referred to as ("T and V") system is supplemented with demon-

strations, farmer group meetings etc. "T and V system" is in essence a team of extension workers supported by subjects matter specialists which lays down a regular programme of training and visits that focus on seasonal extension messages and operations.

Pre-seasonal training of extension workers provides a forum for surfacing field problems, transfer of new technologies, evolved the research stations and discussion on seasons programme. Majority of "contact farmers" are also the "turnout farmer leaders" responsible for water distribution among 12 – 18 farmers under a single field canal or 'turnout' and this improved the effectiveness of "contact farmers" as well as farmer groups.

Agricultural Production:

- (a) **Paddy** – The following are the extents cultivated and the yields realized in the new Mahaweli settlements where irrigation facilities were provided in the Maha 1983–84 and Yala 1984 seasons: As actual yield for Yala is not available estimated yields are presented in Table II below.

TABLE II

| | <i>System H</i> | | <i>System C</i> | | <i>System G</i> | <i>System B</i> | | <i>Walawe</i> | | |
|------------------------------|-----------------|-------------|-----------------|-------------|------------------|-----------------|-------------|---------------|-------------|-------|
| | <i>Maha</i> | <i>Yala</i> | <i>Maha</i> | <i>Yala</i> | <i>Maha Yala</i> | <i>Maha</i> | <i>Yala</i> | <i>Maha</i> | <i>Yala</i> | |
| Estimate extent (acres) .. | 64,684 | 42,317 | 5392 | 8918 | 7932 | 3305 | 2928* | 3590 | 27584 | 27377 |
| Yields per acre (bushels) .. | 86.2 | 91 | 51.6 | 80 | 63.1 | 70 | 77.5 | 78.2 | 85.9 | 98 |

*Excludes 2677 acres of rainfed paddy grown.

(b) **Uda Walawe**—A recent outbreak of a yet unidentified disease condition in paddy on a fairly extensive scale, was observed in the Special Project Area. This may result in a yield reduction for 98 bu/ac. originally estimated, to 86 bu/ac.

Subsidiary Food Crops: In the Maha 1983/84 season extents of subsidiary food crops were grown mainly under rainfed system on unirrigated highland and house-plots are given in Table III below.

TABLE III

| <i>Crop</i> | <i>System H (Acres)</i> | <i>System C (Acres)</i> | <i>System B (Acres)</i> | <i>System Walawe (Acres)</i> |
|----------------------|-------------------------|-------------------------|-------------------------|------------------------------|
| Chillies .. | 561 | 40 | 250 | 687 |
| Soyabean .. | 125 | — | 87 | — |
| Cowpea .. | 839 | 201 | 567 | 1365 |
| Greengram .. | 397 | 21 | 122 | 2776 |
| Blackgram .. | 45 | — | 20 | 28 |
| Maize .. | 901 | 1366 | 1764 | 307 |
| Kurakkan .. | 81 | 159 | 122 | 387 |
| Vegetables & Yams .. | 181 | — | 657 | — |
| Groundnut .. | — | 25 | 75 | 290 |
| Onions .. | — | — | — | 33 |

Crops suffered from continuous rain, while some were totally destroyed, yields of others were severely depressed.

In the Yala 1984 season, however, prospects of better harvest of subsidiary food crops are in the offing. The total extents cultivated under irrigation in the individual systems are System H (14121 acres), System G (1537 acres), Walawe (617 acres). The predominant crop grown is chillie, which has a ready market and gives high returns to the farmer. Of the total extent of 16,275 acres of subsidiary food crops cultivated, chillie constitutes 13,633 acres.

Inputs: Supply of inputs namely improved seed, fertilizer and agro-chemicals was co-ordinated by Resident Project Managers. Seed issues of improved varie-

ties of paddy and fertilizer use in the Maha 1983/84 season are summarised in Table IV at page 76.

Despite adverse weather conditions fertilizer use has been satisfactory though it is yet far below the recommended levels. The entire extent was cultivated with high yielding varieties including the recent releases BG 276-5, BG 380, BG 400-1 etc.

Cultivation Loans: A sum of Rs. 93.1 Million Cultivation credit was disbursed by the People's Bank among 34245 farmers in System H, C, G and Uda Walawe during the Maha 1983/84 season. The least number of farmers of proportion to the extent cultivated availing themselves of institutional credit was from Uda Walawe

TABLE IV

| System | Paddy Seed Issued (in bushels) | Fertilizer Used (metric tons) | Urea Top dressing |
|----------------|-----------------------------------|----------------------------------|-------------------|
| H | 18,963 | 1133 | 860 |
| C | 1,674 | 72 | 53 |
| B | 404 | 86 | 76 |
| Walawe | 1,781 | 615 | 280 |

project, where great majority are known to rely on private lending sources. About 50% of the total disbursed has been recovered by the end of February 1984, when harvesting was yet in progress. A total of Rs. 3.5 million was disbursed among 1240 farmers by the Bank of Ceylon in System G, System C, System H and Walawe Project while a sum of Rs. 7.7 millions was disbursed by the Hatton National Bank among 2181 farmers in System H.

Fisheries Development :

An added benefit from Mahaweli Development is increased inland fish production in the newly constructed reservoirs and old reservoirs that are replenished with the water resource from Mahaweli. Fisheries Development in the Mahaweli would not only generate new employment opportunities but would serve the new settlements with a popular source of animal protein.

Fish Breeding Stations: The first fish breeding station in the new Mahaweli Area was established with UNICEF assistance at Dambulu Oya and is operational under the Ministry of Fisheries. The station is provided with 31 earthen ponds covering an extent of 3.84 hectares and 10 cement tanks and other infrastructure including a laboratory constructed by the Mahaweli Development Board. The gan-

getic carps Rohu (*Labeo rohita*) and Mrigal (*Cirrhinus mrigala*) were both successfully bred during the year 1983 and 58 million fertilized eggs were obtained by administering hormone injections. During the first half of 1984, 430,000 fingerlings of Rohu (Indian Carp) produced at the station were stocked in Maduru Oya, Kandalama, Senanayake Samudra and several other tanks.

Fish Production: Maduru Oya reservoir produced fish even before a systematic stocking programme. About ninety boats are operating now and the average monthly catch is about 75 metric tons. Maduru Oya and other reservoirs in System B are expected to yield 2000 metric tons valued at Rs. 20 million annually when in full operation. Eighty boats are operating in Uihitiya-Rathkinda, a new reservoir in System C with a water surface of 2270 hectares, while in the major reservoirs of System H Kalawewa, Kandalama and Rajangana 253 boats are operating.

The Ministry of Fisheries would systematically harness all new water bodies (reservoirs & village tanks) to get maximum benefits from scientific fish culture that would provide direct employment to fishermen and vendors and partially meet the animal protein needs of Mahaweli settlers and others.

Livestock & Dairy Development Programme

The Draught Animal Programme of the Mahaweli Authority of Sri Lanka commenced in the middle of 1981 in order to combat the escalating costs of mechanised power and the spiralling cost of fuel which in consequence constrained the rapid development of the Settlement Programme of the Mahaweli Accelerated Programme. Livestock Farms were set up in each of the Systems and at the close of 1984, the farms of Niraviya & Kalankutiya servicing the needs of System H, the Kantalai Farm servicing the needs of System A, Girandurukotte & Soraboravewa Farms servicing the needs of System C were at full development. Poonanai Farm commenced in June 1982 to service the Programme in System B and full development of this Unit will not be completed until June 1985.

These Farms serve both the breeding and upgrading stations for cattle and buffaloes and the Extension Programmes radiate from each of these units.

In the middle of 1984, the activities of the Draught Animal Programme were combined with Dairy Development Programmes and the Division was therefore renamed, The Livestock & Dairy Development Programmes of the Mahaweli Authority of Sri Lanka.

Niraviya Farm

Niraviya Farm which aims at a total Sahiwal herd in 1985 maintains a cow and

heifer population of 150 animals and carries a saleable bull calf and heifer unit of around 100 animal at any given time. This stock is being mated to imported Sahiwals gifted to Sri Lanka by the Government of Pakistan and negotiations took place in the third quarter of the year under review for a further consignment of pure bred Sahiwals so as to accelerate the Programmes in System H

Apart from farm activities, extension covers the vital inputs of animal health, Vaccination Programmes, feed inputs, Straw Treatment Programmes and general animal health practices. Surveys for 1984 have been completed.

The infrastructure development of Niraviya & Kantalai Farms were assisted by a Grant from the Netherlands Government and the current Extension Programme is also supported by the same donor Country.

In order to create breeders within the System, stud bull centres have been set up and the output from these sources will complement the ever increasing requirements of farmers in the area.

At the inception of this Programme, it was estimated that 11% of the settler farmers use draught animals for land preparation. The figure in the middle of 1984 is said to be 40%.

Milk collections for simple processing of by-products commenced in the final quarter of 1984 in an attempt to combat



Yoghurt, a by-product from milk, being poured into cups at a Milk Processing Centre in System C. Looking on were the Hon. Minister of Lands and Land Development and Mahaweli Development, Mr. Gamini Dissanayake and Mr. Chris De Saram, Consultant, Livestock Development, MASL.

part of the malnutrition associated with new areas of settlement. These activities are managed by groups of trained farmers and negotiations have taken place to instal a small processing plant for diversification into other milk products for consumption in the area of production. A total of 1111 animals comprising both neat cattle and buffaloes have been sold to farmers to date mainly for cash, as the current availability of rural credit is inadequate for the Programme to have a full and meaningful impact in System H.

The Draught Animal Programme has therefore been incorporated with a dairy development programme and the programme provides a vital input in the creation of added income generation with returns being made available on a bi-monthly basis. Interest is also being shown in the raising of pigs and a small breeding unit has already been established at Niraviya Farm. Another aspect of activity in this farm is a commercial goat herd, the offspring of which is being directed to a

certain specific segment of the community which require these animals.

Kantala¹ Farm

This Farm comprising 2850 acres is the last of the Systems to be developed in the Accelerated Mahaweli Programme. This has already built up three herds of improved indigenous white stock mated to imported Khillari and the supply of direct draught stock to this and other Systems is being made through the current farm production.

Stud bulls have been distributed to nomadic breeders in the area but due to the paucity of stud material, the major impact in the field of tract breeding has not been realised. However, negotiations with the Pakistan Government for Tharparker stud bulls will have the desired effect in 1985.

Girandurukotte Farm

Girandurukotte Livestock Farm in System C, adopts three strategies in the total

acreage of 1800 acres in its command. Many of the Purana villages have shown a preference for the traditional white animals and two herds are being upgraded to imported Khillari for this purpose. Provision has been made to meet part of the requirements of settlement programmes in Zones 4 – 6, in which areas there is little evidence of human habitation and in order to achieve this purpose, surplus individual cows belonging to former nomadic herd owners in the area have been purchased for upgrading to Sahiwal studs. The latter strategy therefore utilises a national resource which would otherwise have found its way to the meat market and apart from instances of Brucellosis now under control, the Programmes in System C have progressed favourably.

The use of draught animals in the current settlement programmes is said to be round 50% and the majority of new settlers are purchasing upgraded stock to replace the small and often indigenous stock formerly found in these areas.

As in System H, stud bull centres have been set up in order to promote the creation of livestock breeders who will, as in System H, complement farm out-put in due course.

The move towards dual purpose animals is more relevant in System C and the milk collecting programme, which commenced as a Pilot Project in March 1984, now covers Zones 2 & 3. Over the year approximately Rs. 150,000/= have been earned by farmers contributing surplus milk to this programme and with the demand for better dual purpose stock, further substantial increases are estimated. As in System H, this milk is converted into acceptable by-products consumed in the area of production and groups of trainee farmers manage their own affairs under the guidance of the main livestock farm.

Poonanai Farm

Poonanai Farm comprising 1400 acres was the last of the livestock farms to commence operations in the total Mahaweli Accelerated Programme, and was initiated for the purpose of large dual purpose white animals in System B. The cow population of 650 is being mated to the best local Tharparkar stud bulls but, consequent to the importation of studs from Pakistan this Farm will play an important part in the future development of livestock in the area where the largest indigenous cattle population in the island is seen.

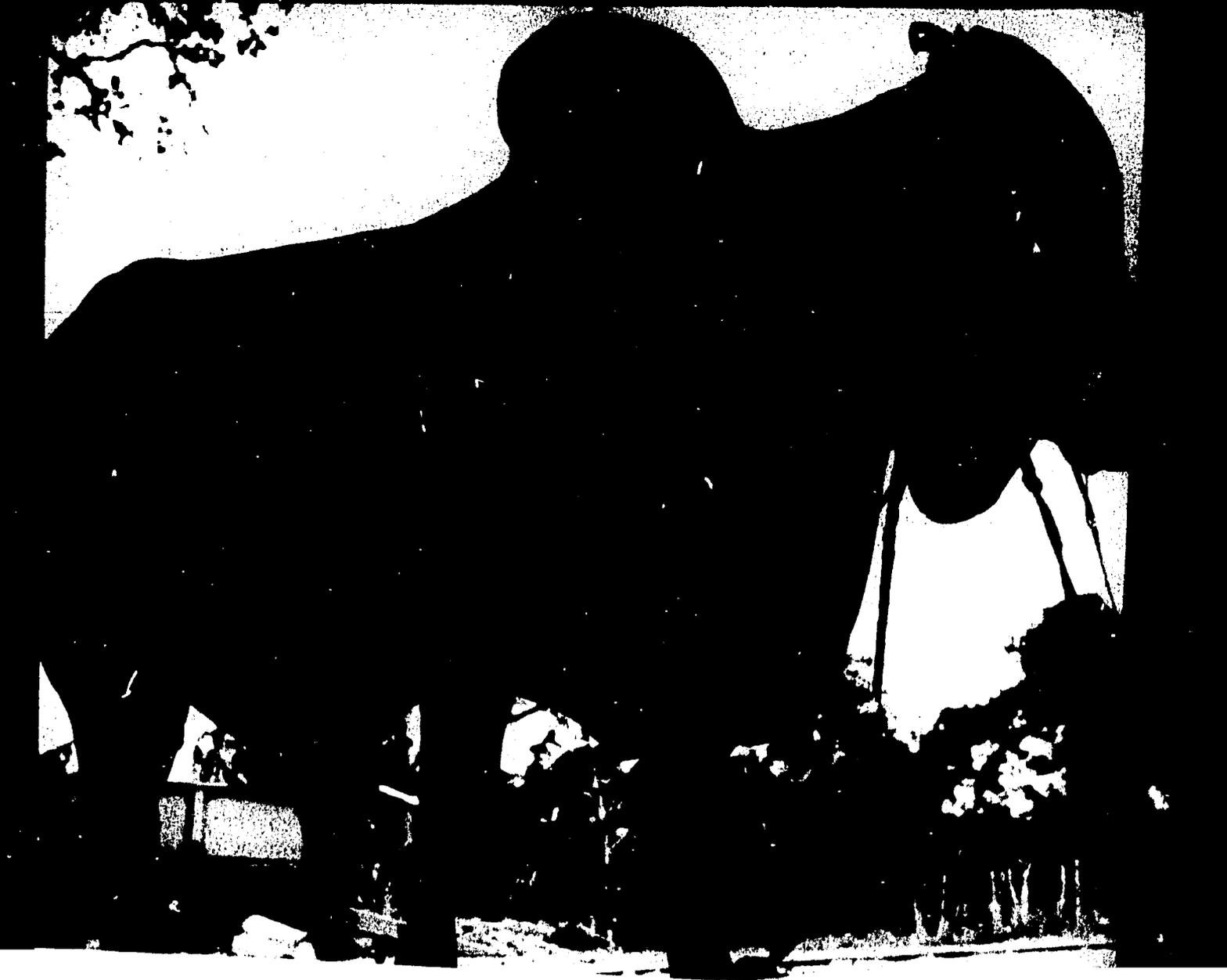
The trend from large nomadic herds is slowly moving to the need for more economic and smaller herds and this is achieved through the extension activities radiating from this Unit.

Dairy Development

In order to diversify the agricultural and livestock produce of the Mahaweli Accelerated Programmes, Dairy Development Programmes commenced in Zone 5 of System B on upland irrigated land in September – 1984. The preparatory infrastructure work has been partially completed and full development is expected at the close of 1985.

A further diversification activity in utilisation of non-irrigable Type 6 soil in Zone 3 has been programmed between Muthugala and Welikanda and here again work commenced in September 1984. This Programme is being assisted by European Economic Community.

The overall objectives of any Livestock & Dairy Development Programmes are long term and the fundamental base in regard to policies have been clearly laid down. Settler farmers are being encouraged to move across to intensive economic livestock husbandry, disregarding the for-



Foreign breeds of stud bulls have been introduced to improve the quality of local cattle.

mer extensive and un-economic practices, which were traditional in these areas. The combination of draught and milk animals enables a far wider impact on the dimensions of optimum extension and all animals sold from the farms are monitored regularly by the staff in these divisions.

The Livestock & Dairy Development Division is associated with Crop and

Stock Integration Programmes of the I.R.R.I. of the Phillipines, with the straw treatment techniques covering countries in the South East Asia and adopt a programme of producer participation in their collections of surplus milk. This programme therefore integrates with the proposed national policy determined by the Government of Sri Lanka.

Planning and Evaluation of Progress

To facilitate the flow of performance information, the Mahaweli Authority of Sri Lanka established a Monitoring and Progress Control Unit in 1980. The Unit has undergone evolutionary changes since then but since 1982, it has attained a reasonably settled structure with a defined role. The provision of statistical support services and macro-planning are now important functions of the Unit.

In summary the Planning and Monitoring Unit is responsible for the following areas:

- (a) Macro planning,
- (b) Coordination of implementation planning and scheduling;
- (c) Progress monitoring and preparation of regular progress briefs on a monthly and quarterly basis as required by the Authority.
- (d) Maintenance of up-to-date development statistics and other information; and
- (e) Coordination of impact studies.

The Planning and Monitoring Unit has no decision making powers but operates as the secretariat to the Authority on such matters as the Authority may direct. The purpose is to facilitate the day-to-day business of the Authority and provide the necessary information upon which the Authority can make decisions.

The very fact that projects are being regularly and objectively monitored and

the Unit's reports are being given serious attention at the highest level, gives this Unit a high degree of responsibility. Considering the magnitude of the Mahaweli Development Programme and the accelerated nature of its implementation, the regular monitoring of its progress is of paramount importance.

Monthly Management Briefs

The monthly management brief is a comprehensive review for the management of the Authority in order that their policy directives may be based upon adequate current information. The presentation format acts as a convenient and regular vehicle for the management of the Authority at meetings with representatives of the implementing agencies and the engineering consultants to coordinate their separate activities within the Authority's overall strategic plan. The format is designed for ease of assimilation, whilst the written report and charts together with the audio-visual presentation form a historical record of progress on a monthly basis.

Two separate monthly management briefs for major Headworks Projects and Downstream Development Settlement and Production are being produced on a routine monthly basis for circulation as a written report and for presentation in an audio/visual, slide/tape form. In addition to the management briefs, a performance review is prepared quarterly for the President, Prime Minister and the Cabinet and

Members of Parliament. A General Performance Review is also available for presentation to foreign delegations and other Agencies associated with the Accelerated Mahaweli Programme.

The Headworks Management Briefs cover the projects of Kotmale, Victoria, Maduru Oya and Randenigala and the Briefs on Downstream Development, Settlement and Production cover the Right Bank Transbasin Canal Civil works, Systems H, C, B and G, the Draught Animal Programme, the Right Bank Main Canal (System C), the System B, Maduru Oya Left Bank and Right Bank Canals, the Mahaweli Area Roads Development Programme and the Uda Walawe Project.

Monthly progress reports are being sent to the Planning and Monitoring Unit by the Mahaweli Economic Agency, the Mahaweli Engineering & Construction Agency, the Central Engineering Consultancy Bureau, the River Valleys Development Board and the Project Directors and Consultants for the Kotmale, Victoria, Maduru Oya and Randenigala Projects. A report is also received on the Draught Animal Programme. These reports are submitted to the Unit before the 7th day of the month following the reporting period so that the Planning and Monitoring Unit is able to prepare the Briefs for presentation to the Management by the fifteenth. In order to ensure the accuracy of data supplied and the objectivity of comment, special study teams covering the engineering and socio-economic aspects respectively, are being sent to the field for filling gaps in data supplied and also to do short term studies of management constraints. The Unit also makes use of information provided by other sources to supplement the data received from the above Agencies.

Based on the information provided in these reports the Planning and Monitoring

Unit compiles the two monthly confidential management briefs. In compiling these briefs the Unit attempts to identify constraints and bring them to the attention of the management of the Authority for remedial measures.

Discussions Held Monthly

The discussions between the Authority, the Agency Representatives and the Consultant Engineers on the points raised in the monthly brief are held at a meeting which would open with an audio/visual presentation of the brief. The written briefs are in the hands of participants a few days before this meeting, so that answers to Authority queries can be prepared by the relevant Agencies. The text of the report is tape recorded, average running time being thirty minutes, charts capable of being read from a distance and easily understood, maps and site photographs are synchronised with tape and are automatically displayed using two screens simultaneously. The average management briefing presentation contains 275 thirty five millimetre slides. The main advantage of using an audio/visual format for management presentation are as follows:

- (a) It eliminates the constraint upon the discussion of the participant who has not sufficient time to read or has not adequately read and understood the brief.
- (b) It presents facts both orally and graphically in a manner which gives the maximum impact.
- (c) The presentation concentrates the mind on the matters to be discussed.
- (d) Criticism which can be mentally discarded on a written report cannot be so easily avoided when the comments are heard and seen by an audience of colleagues.
- (e) The slide/tapes make an important addition to the archives of the

project and can be re-set and projected quicker than the report can be read.

- (f) They can be produced relatively cheap as an in-house effort.

Through the close liaison and guidance of the implementing Agencies and the field staff of the Unit who will collect and present progress data, a regular flow of pertinent and accurate management data is being achieved. High professional standards are being maintained in the production of the audio/visual presentations. As facilities improve, attempts will be made to make suitable presentations to the field staff on site as a feed back and to keep them in touch with the totality of the Accelerated Mahaweli Programme.

Progress of Work

During the year under review, this Unit was responsible for the presentation of implementation programmes for Systems B and C covering both Mahaweli Economic Agency and Mahaweli Engineering & Construction Agency activities and preliminary work for the preparation of an implementation programme for System G was initiated. Among the other reports prepared by the Unit, the following are note-worthy.

1. Preliminary Project Cost Estimates on Zones 2 and 3 of System B Left Bank, for EEC assessment of donor commitments.
2. Final Report on 'Accelerated Mahaweli Programme Integrated Development Plan, System B Left Bank Zones 2 and 3 of System B'.
3. Accelerated Mahaweli Programme Integrated Implementation Plan System B, Left Bank. Zones 2, 3 and 4A.
4. Notes and Schedules for World Bank Mission visits.

5. Project Completion Report – System H Phase II.

The Planning and Monitoring Unit also prepared Quarterly Reports on the Progress of the Accelerated Mahaweli Programme for the Ministry of Plan Implementation. A number of Evaluation and Impact Studies have been initiated by the Unit. An appraisal of System H has been completed and submitted to the Authority. This study was done by a Research Team drawn from the Universities, Central Bank, Agricultural Research and Training Institute and other relevant Government Departments. Five other similar research projects have received the approval of the Director General. Progress has been made on a study relating to social change in the Mahaweli Development Area. Another study on Agricultural Labour in System H, which relates to labour needs during the Yala season 1983 has been extended to cover the Maha 83/84 season and is under way.

Audio-Visual Presentations

Under the Audio-Visual Presentation Programme, the Unit made a total of 39 presentations on the performance of the Project. These included 17 monthly Progress Briefs each on the Headworks and Settlement Projects and 22 General Performance Briefs. 55 maps, charts, implementation schedules and structure plans were prepared and up-dated by the Cartographic Division of the Unit for the purpose.

During the year under review, the Unit strengthened its Audio Visual and Cartographic Division with the purchase of additional up-to-date equipment. This Unit's Library was developed by the purchase of additional volumes of development-related books and by generous donations by the Asia Foundation and the

British Council. These have greatly enhanced the Planning and Monitoring capabilities of the Unit. The data registry involved itself in the formulation of a Data Bank which made available 266 field project charts for analytical reporting under special classification. With the help of a Microfilm Reader Printer, 8 important and rare reports were micro-filmed and stored in the library for reference. A Desk Top Computer has been set up in the Statistical section to facilitate storage and for retrieval of data relevant for the implementation of project activities.

Another significant factor which helped the smooth functioning of this Unit was the reconstitution of the Mahaweli Development Board. The Mahaweli Engineering and Construction Agency as the Mahaweli Development Board is now called, has been brought directly under the purview of the Mahaweli Authority, but would continue to be responsible for downstream engineering and construction work.

This change facilitates the free and continuous flow of information and other pertinent data relevant to both monitoring and planning aspects.

In the implementation of a massive development programme, accurate and systematic planning in the initial stages and regular monitoring of progress are indispensable. Since the Accelerated Mahaweli Programme has already been in operation for over 5 years, evaluation of work already completed becomes necessary, not only to understand and identify problems but also to learn lessons from past experience and to take necessary action to avoid such lapses in the future. This responsibility also lies on this Unit. To this extent the Planning and Monitoring Unit of the Mahaweli Authority is in the enviable position of performing some of the most critical activities needed to ensure the successful completion of the Accelerated Mahaweli Programme.

Community Services & Community Development

There are varying stages of settlement in the different project areas of the Mahaweli Development Programme. System 'H' is almost completely settled with about 23,000 farm families. In Systems C, B & G settlement is going space and hence they are called "forward areas". In the forward areas, Community Services (Food Aid, development of social infrastructure and promotion of social cohesion) take pride of place. Settlers are provided assistance of Rs. 1500/= per family to build their homes. A squatting plate for the latrine and some materials for the construction of wells are also provided. New settlers in System B and C are given World Food Assistance. New lands in System G are being cleared for settlement. Settlers in System G began receiving World Food in 1984. A small component of non-food Aid, under the World Food Programme is given to System B settlers, in the form of Agricultural implements.

Social Infrastructure

Social Infrastructure Development includes schools, hospitals, health centres, food stores and transport and other communication facilities and is now being provided in the forward areas. Health infrastructure is planned by Mahaweli Economic Agency in consultation with the Ministry of Health. Construction is the responsibility of Mahaweli Engineering & Construction Agency (MECA). The norms of the National Health programme are adopted in staffing areas newly

populated under MEA sponsorship. Staffing of health centres and hospitals is done by the Ministry of Health but MEA sometimes supplements staff until the Ministry of Health mobilises adequate staff for a satisfactory health service to settlers. All health activities are coordinated through the Mahaweli Health Coordinator of the Ministry of Health. The Mahaweli Health Coordinator is a Senior Medical Officer of the Ministry of Health, responsible for planning health infrastructure, staffing of all health centres & hospitals, monitoring flow of equipment & drugs, etc. He liaises with the MEA officer in charge of Social Infrastructure facilities in all forward areas of MEA.

A preventive health programme has been launched in all Systems of Mahaweli Economic Agency (MEA) and the Health Education Bureau (HEB) have built up a Volunteer Health Worker (VHW) programme. Volunteer Health Workers are not paid. When they participate in task-force assignments, such as mass-weighing of children they are often paid a token allowance. (VHW) are trained by the Health Education Bureau. The target is 1 VHW to 25 families. In System 'H' there are already about 516 functional VHW.

UNICEF Programme

The UNICEF programme in System H (1980-84) is now in its final Stage. Over the past 4 years, UNICEF provided funds and guidance for activities such as training



U.N. assistance for community development projects in System C have been forthcoming in large measure, contributors being among others U.N.F.P.A. and U.N.I.C.E.F.

The Seva Vanitha Unit of the Ministry of Lands and Land Development and Mahaweli Development has organised health centres in the Mahaweli settlement areas.



(farmer training, day-care matrons, Volunteer health workers, school health, maintenance of hand pumps), school garden projects, small-scale pipe-borne water schemes, etc. In the field of Health & Sanitation, supply of drugs, assistance to well-construction in Institution and sinking of deep wells were also all on UNICEF aid. It was found that shallow wells dried up during severe droughts and settlers had to travel far for household water. A programme of deep well-construction was therefore decided on, in late 1983. Teachers in schools in System H were also trained by UNICEF in basic health & sanitation and Nutrition. At these seminars, many common childrens' disabilities were uncovered. This experience helped to revise and re-organise the "Teacher-training curriculum".

In the field of Child Care, UNICEF supported the training of about 50 Day Care Matrons. In agriculture, UNICEF assisted the training of farmers on agricultural methods, credit, marketing and Community development.

On the experience gained in System H, the UNICEF has launched a similar programme in System B, for the period 1984-1988. The title of the Project is "Community Health Project Benefitting Children and Women in Mahaweli System 'B' of Sri Lanka". Primary Health Care will be developed through a systematic social planning process to promote child survival and development, specifically focussing on the following.

- Health,
- Nutrition, /
- Drinking water supply,
- Environmental sanitation,
- Education,
- Child Care Services,
- Community participation,
- Women's Development.

The target group over the 4 year period will be about 40,000 low income families. Among the supporting departments are: Department of Health Services, The Health Education Bureau, the Department of Education, the Department of Probation & Child Care, The Water Resources Board and the National Water Supply and Drainage Board. UNICEF has committed US\$ 3,686,744 to this project.

UNFPA

In System C where UNFPA is operating, a baseline Nutrition Status Survey of pre-school children was completed and results analysed in 1983/84. Two thousand nine hundred and thirty two (about 50% of the pre-school population) were weighed and their "Weights for Age" plotted on the WHO Chart. Here, too, UNFPA funds are used to build up a VHW program and train FHWW. Funds are also used for training on Income-generating activities as bee keeping, brick making and dress making.

The Department of Health runs Clinics in each block in the Project H, C & B. A clinic is held once in each block.

Schools in Settlement Areas

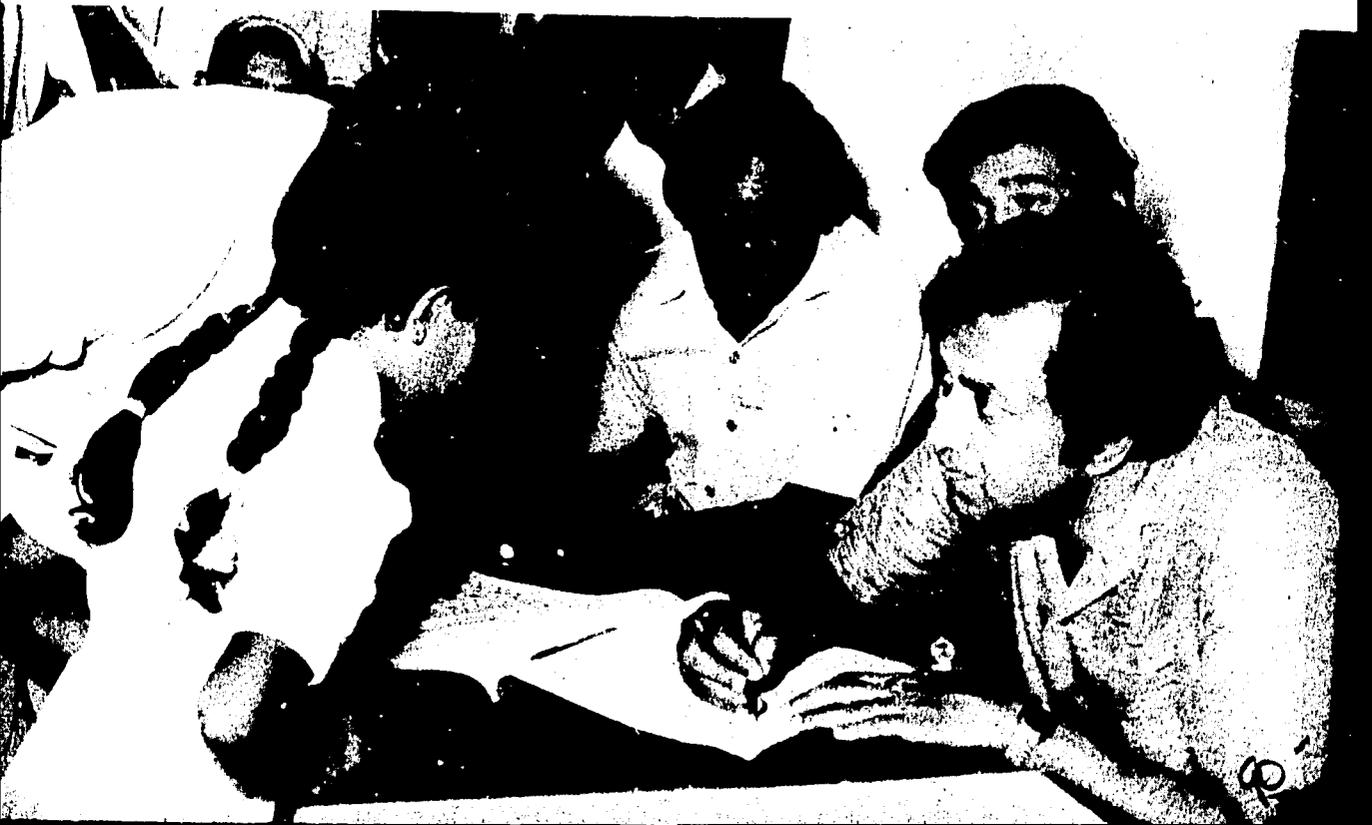
About 88 schools, run by the Department of Education are functioning in System H, 14 in B and 23 in C at the time of writing. The coverage is around one primary school per Unit. Schools are opened as settlers arrive and settle down. There is one Junior School for every village centre, and a Maha Vidyalaya for every Block Centre. There is one Madya Maha Vidyalaya for every Project. A Madya Maha Vidyalaya has classess up to Grade 12 and has facilities for teaching Science.

Providing social infrastructure in Mahaweli areas is the fore-runner of the larger Community Development program. The objective of Community Development is



▲ A new Police Station was opened recently at Girandurukotte in System C. Mr. Gamini Dissanayake, the Hon. Minister of Lands and Land Development and Mahaweli Development signs the Log Book after, declaring open the Police Station, Looking on were Capt. C. P. J. Seneviratne, the Hon. Minister of Labour, Mr. Lalith Athulathmudali, the Hon. Minister of National Security and Mr. Anura Bestian, Deputy Minister of Defence.

A new school at Medagama in System C was recently opened



to evolve a community that is physically healthy and economically sound, self reliant and possessing a sense of high social values. The MEA, realising that the greatest resource of a community is its people, has included a large component of human development in its program. It has therefore begun training both staff and settlers (receipients).

Training Programme

MEA has solicited the support of the Departments of Health, Education, Agriculture, Social Services and the University of Peradeniya to launch a training programme for Community Development Officers in community development with emphasis on the Value Systems. In 1983 a batch of 20 Community Development Officers were trained in sociological and scientific disciplines and management. They were posted in charge of Blocks as Community Development Officer (Home Development) (CDO) (HD). The CDO (HD) supervises work in the homes of settler families. Food storage, supplementary feeding of infants and children, home gardening, child care and nutrition, education of mothers on health & sanitation, cattle rearing, etc. are the activities supervised by these officers.

MEA Organisations

The MEA has a Matrix Organisational Structure. The total function and responsibilities of the Executive Director of MEA is divided into work Units by region – in charge of Resident Project Managers, and by function – in charge of functional Managers. This structure was originally evolved to streamline the issue of many inputs required for high agricultural productivity. In 1984, the Matrix Organisational Structure was expanded to promote "human development". With the Matrix Organisational Structure it is possible to pay attention to the family as a Unit of

development. The family is therefore our *ultimate target* in development, the unit, headed by a Unit Manager, being the *programme target*.

The Unit Manager's interest centres round all line Ministry functions of Health, Education, Agriculture and other social services to people. The Unit Manager can therefore use a composite index of human development, which reflects simultaneously many factors influencing it. Good nutritional outcome is the end-product of a number of interacting variables such as health sanitation, adequate and balanced diets, women's education, animal foods, grain storage and use, etc. MEA therefore uses a Nutrition index and monitors the growth rate of pre-school children (the most vulnerable) as one index of social performance.

Malnutrition however still remains a problem especially in children, as it is in the rest of Sri Lanka. Experimentation goes on, seeking new ways to attack this very old problem.

Income Generating Activities

In Community Development this is a key factor in MEA strategy. MEA has already established 2 Home Development Centres in System H to train settler women. It is proposed to have Home Development Centres in System B and C later. The training offered to women among settlers is multi-disciplinary. Girls trained are encouraged to move into income-generating pursuits. Already there are girls who participate in small scale dairying, food preservation, lace – making, garment-making and home-gardening. Their assistance is also solicited when large-scale man-power (woman-power) is required for short assignments such as mass weighing of pre-school children. A course in National Traditions and Customs is mandatory. MEA is wary of accepting norms and

values that could damage our true national character and mores in the process of modernisation. MEA attempts to retain and sustain the rich cultural veneer of our society, especially through the participation of women. In 1984, MEA began a programme where themes portraying "the ennobling of the human person" penetrated the stage. Socio-drama on Values which our culture upholds, and are consonant with the tenets of religion will continue in the years to come, through settler womens' participation. As the March Hare in Alice in Wonderland said, "If we do not actively try to get what we like, we shall end up liking what we get".

Community Development was described in a recent MEA seminar as the "Cadjunut (crunch) in the pudding". To quote the Holy Bible it is "the leaven in the bread".

Leadership Programme

The cadre of Community Development Officer in the MEA is the catalyst in the Community Development programme. Hence we propose to train all these officers in all the required disciplines in the Universities and elsewhere, so that they feel comfortable to set to work on this complex task. Their performance as "leaders" will be measured by their ability to release the potential of leadership, lying inert in the settlers themselves.

Dams are built, channels laid, water flows into fields. . . . yet the most important consideration of the Mahaweli Programme is the *society* that we generate in these regions. That society will live, forever, renewing itself with every generation. The new MEA strategy is therefore to transform the settlers' self-image, which is necessarily a slow process and it is far too early to judge the results.



The Buddhist Temple has become the centre of religious and cultural activities in the Mahaweli Settlement areas.

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Religious and Cultural Activities in Settlement Areas

When the settlement now going apace under the Accelerated Mahaweli Programme is completed, our country would then have taken a giant step forward towards economic progress, self sufficiency in rice, creation of employment opportunities and the beginning of a new life of hope and plenty for the settler. The newly settled 145,000 families, selected mostly from peasants on the edge of poverty, will play a vital role in the development of the Mahaweli region. They will sweat and toil and coax the good earth, now refreshed and enriched by the Mahaweli waters, to yield its bounty in plentiful measure. The Mahaweli authorities in return will not only lead the settlers towards material prosperity, but also provide them with spiritual guidance to make them morally upright.

Towards Prosperity

With the establishment of townships, more people will be drawn to the area – traders, businessmen, mechanics, artisans, bankers, public servants, mercantile employees and labourers. Thus, while this once forestclad, scantily populated area, the haunt of the elephant, the bear and the leopard, will be teeming with people tilling their lands and echoing with the sounds of civilization, the townships will be marked by the hustle and bustle of booming business.

The H area, where settlement of people has been recently completed, gives a

clear picture of the shape of things to come in the Mahaweli region. The fact that prosperity is not a distant dream in this area is amply proved by the almost unending stretches of green paddy fields, the luxuriance of highland crops, permanent houses that are gradually replacing the old mud huts, the well-stocked shops in townships, heaps of farm produce at fairs, happy smiling faces of the settlers and the pleasing sight of neatly clad children wending their way to school. There is no doubt whatever, that, as the years roll by and the remaining systems are also settled and developed, the Mahaweli area will become the rice bowl of our country in addition to other produce. Dairy farming, cottage industries, and the establishment of other industries suited to the area will enable the once poor landless villagers, eking out a precarious existence, to enjoy prosperity and security and at the same time contribute their share towards the development of the country.

Inner Self Refinement

Wealth alone, however immense it may be, does not lead to happiness and contentment, nor does it make man a worthy being as evidenced by those living in affluent countries. This is because, in the midst of material plenty, they live in spiritual poverty. Being fully alive to this fact, the Mahaweli authorities are directing it's efforts to ensure the happiness and wellbeing of the settlers, the younger generation in particular, by making them

economically secure, spiritually clean and culturally refined. Thus, assistance in varied forms is given to those engaged in agriculture, trade, industry and other lawful pursuits, while facilities are provided and encouragement given to the settlers to practise their religion and lead righteous lives. In regard to culture, an attempt is made to revive some of the ancient customs and practices, generate an interest in cultural matters and activate the latent skills lying dormant in the people.

One of the aims cherished by the Mahaweli Authority is to build the settlers into a community of truly good men, living in accordance with the tenets of the religions they profess, so that a healthy spiritual atmosphere will pervade the entire Mahaweli area and make it a haven of peace and order. To achieve this most desirable end, the clergy, Mahaweli officials, in particular, Public Relations Officers, Community Development Officers and Training Officers, Youth Organizations and the Home Development Centre under the guidance of the Resident Project Manager play a major role. At largely attended meetings, seminars and farmer-training classes, the people are exhorted to perform religious observances and practices, make sincere efforts to shun evil and do good and lead upright lives of moral excellence.

Temple —the Centre

For the Buddhists, who form the majority of the settlers, the temple has become the nucleus of all religious activities. On Poya days every family has been advised to go to temple, offer flowers, perform various other rites, listen to sermons or observe sil. Similarly people of other faiths are encouraged to visit their respective places of worship on special days to pray, engage in rituals and ceremonies, forget all mundane matters

and allow their minds to dwell on elevating spiritual thoughts. Every family has been advised to set apart a small part of the house, however humble it may be, as a small shrine room, where the entire family can devote a short time every morning and evening for worship, devotional activities or meditation, forgetting all cares of life. Worshipping together in this manner strengthens family bonds and binds the members in spiritual threads of love and respect. As far as the Buddhists are concerned, their engagement in rituals, ceremonies and reciting of Pali stanzas is only the first step in their spiritual ascent, as this only attunes the minds for higher and more important religious exercises.

Developing Virtues

The next step will be to show the value of cleansing themselves of defilements like greed, hatred, anger, illwill and malice and developing the virtues of kindness, compassion, generosity and tolerance. They must necessarily practise the five precepts in their daily actions and not be satisfied with merely repeating them. In addition they must show kindness to all beings, tend the sick, help the weak and the feeble, work selflessly and give graciously and generously and thus actually practise the teaching of the Buddha.

It has been decided to provide a temple for every 300 families. In areas where there are no temples at a convenient distance, the settlers concerned will be allotted a plot of land to put up a temple by their sweat and toil and then invite a monk of their choice to reside there. The settlers now provide the monks with alms and other simple needs. Thus a happy relationship between the monks and the laymen is maintained. Similarly wherever there are sufficient groupings of families belonging to other faiths, they too will be

given land to build their own places of worship. In this praise-worthy exercise of turning the minds of the settlers towards religion, there will be no discrimination whatever.

Religious Instructions

Dhamma classes for children have been started at several temples. At present, the resident monks teach the dhamma to children with the earnest hope that the future generations will be marked by a sound knowledge of the dhamma for men and women to lead lives unstained by evil. It is expected to have a dhamma school in every temple in the area, so that no child will be denied a good knowledge of the Buddhist teaching and its influence of purifying and elevating the human mind. If the number of children attending the classes is too large for the monks alone to teach, the help of volunteers, well versed in the dhamma, will be sought. Apart from imparting of knowledge of religion, these children will be taught to respect their parents, teachers and elders, develop good habits, protect public property, be polite and civil, show kindness to all including animals and thus grow up as cultured and refined men and women.

A Buddhist society has already been formed at Resvehera. The aim of this society is to stimulate in the people a deep interest in religion and turn them into practising Buddhists guided by the five precepts in their actions. It will also help to maintain peace, forge unity among settlers, campaign against alcoholic drinks and keep a watchful eye on unwary youths likely to be ensnared by the lure of drugs. On important days like Vesak and Posen, it will organize "Sil" campaigns, take part in decorating temples and houses, gather flowers for distribution to worshippers and prepare food parcels

for pilgrims who flock to Anuradhapura and important places of worship in the vicinity.

Action has already been taken to lease out a spacious building near Resvehera to the society to be used as a meditation centre. Eminent monks and laymen who have mastered the art of meditation will instruct people who wish to be introduced to this certain way of controlling and taming the mind and thereby enjoy serenity and peace in a world agog with excitement and tension. The members of the society, with the active assistance and guidance of Mahaweli officials, will be making arrangements for conducting the classes and at the same time attend to the needs of those taking part in meditation.

Publication of Religious Books

Action has already been taken to publish a booklet containing two important discourses of the Buddha – the Sigalovada and the Vyaggapajja Sutras. These contain invaluable gems of advice to laymen. The Sigalovada Sutra is really a code of discipline to the householder and discipline is what we need most today. It is therefore most fitting that these words of wisdom uttered over two and a half milleniums ago, but are still fresh and valid should be made known to the old and the young alike. This discourse sets forth the domestic and social ethics clearly and comprehensively and anyone who follows them can be assured of progress. It also enumerates the duties of parents and children, husband and wife, teacher and pupil, layman and monk, friend and friend and master and servant. Further it shows the vices that have to be eliminated, channels through which wealth is dissipated and the evil consequences of addiction to intoxicants, gambling, loitering in streets, indolence and association

with evil friends. The Vyaggapajja Sutra shows man how wealth should be gathered by persistent effort and skill, balanced livelihood, watchfulness and good friendship. In order to eradicate greed that will rear its ugly head in the course of earning riches, man has been advised to develop in him faith, virtue, generosity and wisdom.

This booklet will be given to every household at a nominal price. It is not meant to be merely kept at home in shelves and drawers gathering dust, but to be read, re-read, digested and most important of all, the advice followed. Every year a written and oral test will be held in which both the young and the old can take part. Prizes and certificates will be awarded to those who reach a high standard in these tests. From time to time more books of this type, giving the essence of Buddhist teaching will be published and issued to the people, so that they will gain a satisfactory knowledge of Buddhism and thereby be able to fashion their lives according to the dhamma.

Ancient Cultural Activities

Proceeding from the realm of religion to the territories of culture, it is most fortunate that we are the inheritors of a rich culture, flavoured by the spirit of the high and noble teaching of Buddha coming down through two and a half milleniums of history. In its passage through the years, it has absorbed what is beautiful, elevating and pleasing in other cultures. The intruduction of Buddhism to our contry roused the inner natures of our people, awakened them spiritually and stimulated their latent talents into activity. Their love and devotion to the new religion were so great, that they wanted to honour its founder in the worthiest manner in paintings, sculptures, and by the building of temples, monas-

teries, stupas and other cultural monuments. Art came naturally to them, for the freedom they enjoyed, the love and devotion to the new teaching that resided in their hearts and the general prosperity that made their lives secure, led to the expression of their innermost feelings and stirrings in works of art. The graceful dagabas, exquisite paintings of refined taste, frescoes that depict feminine charm, grace and poise with amazing skill, the Buddha statues, chiselled out of solid rock and looking serene even in antiquity and a multitude of other creative works bear ample testimony to the heights reached by our people in the fields of painting, sculpture, architecture, and engineering skill.

450 years of foreign domination had led to the withering of the creative human spirit that activated our people to produce things of beauty. The rulers of that era gave no encouragement to talented men and women and as a result, interest in cultural activities reached a low ebb. With the achieving of independence, however, the environment has once more become suitable for the flowering of the dormant talents of our people. The interest displayed and encouragement extended by the government gives promise of our regaining the cultural splendour that had once brought honour and fame to our country.

Cultural Renaissance from Mahaweli

The Mahaweli area which includes several of our ancient cities, important places of worship, irrigation works and dotted with the ruins of temples, dagobas and other religious monuments is eminently suited to play a vital role in the cultural renaissance of our country. It is therefore a matter for deep satisfaction that the Mahaweli authorities are making a determined endeavour to revive our

ancient customs that reflect the goodness and the finer qualities of man. Further, the skills that produced those magnificent works of art, sculpture, architecture and literature lie dormant within our people. Therefore those at the top who guide the destinies of the Mahaweli settlers will spare no pains to stimulate the latent talents of the people, so that they will sprout and create things of beauty to gladden the heart and raise the human spirit.

In order to kindle interest in our ancient customs and traditions New Year Celebrations are organized on an impressive scale by Public Relations Officers, Community Development Officers, the Home Development Centre and Youths Organizations under the guidance of Resident Project Managers, Sports events, music, singing, dancing and competitions form an important part of the celebrations, while attractive prizes are awarded to the winners. A spirit of gaiety and joyous revelry prevails throughout the festivities. A mass meeting attended by thousands of men, woman and children concludes the day's celebrations. At this meeting speeches are made calling upon the people to follow our time-hallowed customs and traditions. Special emphasis is laid on customs that help to develop men of culture, possessed of high values and aware of their duties towards society.

Observing New Year Traditions

Every family has been advised to start the New Year by paying due respect to parents, teachers and elders and the clergy by going on bended knees offering a sheaf of betel and worshipping them with folded hands.

The delicacies prepared during the New Year must be offered to every visitor who comes to the house. Apart

from this, sweetmeats, other preparations and fruits must be distributed among neighbours and friends, This teaches the people the gracious art of sharing, while the joy of giving and the pleasure of receiving are felt by every family.

The custom of forgetting old enmities by the offer of a sheaf of betel will be revived in the Mahaweli region. It is the way of a cultured person to forgive and forget. Officials in the area will do everything possible to convince the settlers of the wisdom of following the above custom.

There is an important custom that clearly shows how man's good nature comes to the fore, when another is overtaken by sorrow. When a death occurs in a family, the members of the household are in no mood to prepare their meals. It has been an old custom of ours for neighbours or visiting relations to bring quantities of prepared food, not only for the bereaved family but also for friends and relations coming from distant places. No settler family in the Mahaweli region will ignore this practice.

The offering of a part of the harvest of the paddy land or the first fruits of any tree to the temple is a custom that every agricultural family in Mahaweli area has been asked to follow. In the case of settlers of other faiths this offering can be made to their respective religious dignitaries.

Our people have earned a reputation for their hospitality. In the old days any visitor to a village was not allowed to go back unless he was at least treated to a refreshing drink from a young coconut plucked from a tree in the garden. In this age of materialists some people, pre-occupied with earning money, have abandoned this charming custom of welcoming visitors with smiles and treating

them with food or drinks. The various organizations and officials will ensure that this custom will not disappear from Mahaweli area.

Better Clothes Encouraged

The Home Development Centre that renders a great service to the women of settler families is keen that both men and women should take an interest in the clothes they wear, for, the way one dresses is a mirror to one's character. This, in no way means that men and women should be attired in expensive clothes. However, they should be appropriately and neatly clad in clean clothes, for, as Shakespeare has said "the apparel oft proclaims the man". In this age it is not possible for our people to dress in the way our forefathers did. Of course for important events like one's marriage, it is desirable to wear the traditional costumes. There should be no raised eyebrows at modern women's fashions, for they have the freedom to follow any fashion they like. They of course should know that modesty is a great virtue in a woman. Due to the efforts of the Home Development Centre, Mahaweli women will be decently dressed and not scantily clad, however, fashionable the latter mode may be.

Other beautiful customs now followed in Mahaweli Settlements area include lighting of brass lamps before the commencement of any function, boiling of a pot of milk till it overflows, when a family goes into occupation of a new house or at the start of some important venture and chanting of pirith and alms givings in memory of the dead. There are many other charming customs like entertaining people to "Kavun" and "Kiributh" on happy occasions too numerous to recount here. Efforts are being made to introduce into the settlement area our

ancient customs and practices, so long as they are not out of place in the modern world of changing ideas.

Developing Latent Talents

The settlers of the Mahaweli area are selected from different regions of the country and as a result there is a regular flow of varied types of skill to the area. These talents are not allowed to wither and die through disuse but every assistance and encouragement is given to the persons concerned for their skills to be nourished and come into blossom. From time to time, exhibitions are held and the works of painters, sculptors, cartoonists and craftsmen are displayed to be viewed avidly by interested crowds. Prizes are awarded to works of high artistic value. Suggestions have been made to train talented young men and women of promise at Art Centres in Colombo. Arrangements have also been made to send artistic creations of a high standard for sale at Laksala.

Dancing has become popular among boys and girls. They perform at various functions that are held in the area. The aim is to have a well-trained dance troupe in each block. School children and youths are encouraged to act in plays staged in schools and community centres. Several plays have been performed before interested audiences. Several young men and women have displayed their ability of becoming good actors and actresses with prospects of appearing on the silver screen, provided they are properly instructed and guided. Singing has also become popular among children, young men and fair maidens. Arrangements are afforded for the best of singers to broadcast their songs over the S.L.B.C. This will give a great deal of encouragement to singers and musicians. There are adepts among children, youths and mature men and



In Mahaweli settlement areas pride of place has been given to religious activities. Mr. Gamini Dissanayake, the Hon. Minister of Lands and Land Development and Mahaweli Development is seen here in conversation with a Buddhist monk.

▼ *Recently in System C settlers held the traditional "Aluth Sahal Mangalya" to mark the harvesting of paddy.*

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women who can recite folk songs in soothing tunes. Women now sing en masse while transplanting paddy to make their work more pleasant and less tiring.

Poetry and Folk Tales

There are several persons in the area gifted with the ability to compose poetry and write short stories and novels. Some of them have had their works published in newspapers and magazines. Competitions are held occasionally and prizes are offered to works of a good standard by way of encouragement.

Arrangements have been made to publish folk tales of particular interest to children. These will be written by well known writers in a style that will capture

the interest of the young. They will be profusely illustrated by way of added attraction. Already, the Community Services and Business Development Division has published one book, attractively designed and beautifully illustrated. The Home Development Centre has advised all mothers to relate folk tales and jataka stories to their children at home.

It is now clear that the Maiaweli authorities are engaged in the challenging task of making the settlers materially sound, culturally rich and spiritually elevating. There will be difficulties to be faced, problems to be solved and hurdles to be cleared, but this endeavour of theirs founded on love, goodwill and service to fellow men, will, in the end, be crowned with success.



Sinhala New Year celebrations in System 4

Private Sector Investment Potential

The planners of the Mahaweli settlements had been, to a great extent, influenced by the 'integrated development concept'. They have, in their planning process given adequate thought to the need for the development of all sectors of the economy and the social, cultural and religious aspects of life. Consequently, there is wide scope for private sector investment in Mahaweli settlements.

A settlement consisting of small holders, solely dependent on agriculture, does necessarily go through a slow pace of economic growth. Such a settlement would provide meagre avenues of employment to the youth and other adverse effects of slow economic growth might manifest in the form of low family incomes, large scale migration of youth to urban centres in search of jobs and the fragmentation of land into uneconomic holdings. The architects of the Mahaweli Programme, therefore, have taken care to harness the resources in Mahaweli settlements to stimulate the expansion of the industrial and commercial sectors in the Mahaweli areas.

The Mahaweli Authority of Sri Lanka Act has provided for the important role private sector investments could play in Mahaweli settlements to create prosperous Mahaweli communities. There is provision in the Act to join hands with the private sector to set up business ventures. An undertaking in which 10% of equity is subscribed by the Mahaweli Authority can

be declared a subsidiary of the Mahaweli Authority and qualify for attractive tax concessions.

Flow of Investment

The organisation of Mahaweli settlements enables flow of private sector investment in varying degrees to a multiplicity of sectors and locations. The settlers live in highland plots clustered into hamlets consisting of 100 to 200 families. Each hamlet has a hamlet centre where there is provision to set up trade stalls, service centres and small-scale industries. For a group of villages, a village or Block Centre is provided. The Block Centre has the essential infrastructure such as electricity to establish commercial and industrial ventures. Townships are created for every 10,000 population where facilities for entrepreneurs to invest in a large range of activities are available. These urban centres have electricity, pipe-borne water, banks, filling stations, public markets, etc. The investors, therefore, depending on their financial and other resources, have a wide choice to invest in any field at whatever the scale in an appropriate location.

Already the private sector investors are playing a significant role in Mahaweli settlements. Facilities for the settlers to buy their daily needs and sell their produce are provided by a large number of business men. The service sector is also rapidly expanding with the inflow of more

and more private sector capital to set up farm power units, transport services, vehicle repair shops, etc. Some activity is seen in the food processing sector too. The rice milling capacity is gradually expanding with the addition of more milling units.

New Townships

A number of completely new townships such as Galnewa and Meegalawe in System H, Girandurukotte and Dehiattakandiya in System C and Aralaganwila in System B have come up. The old small townships in Mahaweli Systems like Talawe, Nochchiyagama, Tambuttagama and Eppawela are expanding. These townships have shops for sale of provisions, groceries, textiles, radio and T.V. sets, bicycles, motor spare parts, fish, meat and vegetables. They also have facilities for tailoring of clothes, hair dressing and repairing radios, bicycles, etc. Private transport services for carrying passengers and goods operate on a regular basis in the newly opened up road net work. The impact of the sudden influx of population and the economic boom due to more land coming under the plough and construction activity in Mahaweli Settlements is visible in towns like Anuradhapura, Kekirawe, Dambulla, Polonnaruwa and Mahiyanga situated in the periphery of Mahaweli Settlements. These towns are rapidly expanding to cope with the ever increasing demand for goods and services.

Agro-Industries

For the entrepreneurs in agro-industries Mahaweli settlements provide a solid foundation for viable ventures. In Mahaweli areas farmers cultivate vast expanses of land twice a year under irrigation. These farmers are immune to the hazards most farmers are exposed to due to the erratic behaviour of the weather gods from

time to time. The larger extents of cultivable irrigated land in Mahaweli System consist of well-drained fertile soils suitable for the cultivation of a variety of crops.

Another important feature is that the Mahaweli farmers are a well organised lot, quite receptive to new thinking especially in the area of scientific farming. They are also increasingly becoming commercial-minded in the choice of their crops. Some farmers have set up export villages and are earning thousands of petro-dollars producing high quality crops for the West Asian market. The Mahaweli settlements, therefore, present the ideal climate for the growth of stable agro-industries. Some of the promising lines are processing high quality rice, soya-based products, fruit canning, cold storage of vegetables and fruits, packing of vegetables and fruits for direct export, sugar and cashew production.

Export Village

The share holders of the Kalawewa Export Village who are also settler farmers have earned in 1983 Rs. 700,000/- supplying green chillies and other vegetables to Middle-East markets. Most of these farmers have invested their comparatively high incomes very wisely in profitable ventures like tractor units for tillage services. This Company anticipates in 1984 a turnover of Rs. 2,000,000/-. Judging by their performance during the current season their target seems to be realistic.

The Mahaweli farmers committed to tight water-issue calendars cultivate crops in Maha and Yala seasons like most farmers in the country, utilizing fully the seasonal rainfall. A disadvantage of this type of cultivation is the peak production times, creating gluts in the markets, and



Communication facilities are now being provided in Mahaweli settlement areas Mr. Gamini Dissanayake the Hon. Minister of Lands and Land Development and Mahaweli Development recently opened a Post Office in System C.

depriving the farmer a good price for his produce. The vegetable growers particularly, are vulnerable to this occurrence. Facilities to preserve fruits and vegetables in cold rooms and as canned and dehydrated products would be beneficial to both the producer and consumer as fairly stable supplies and prices can be maintained right round the year.

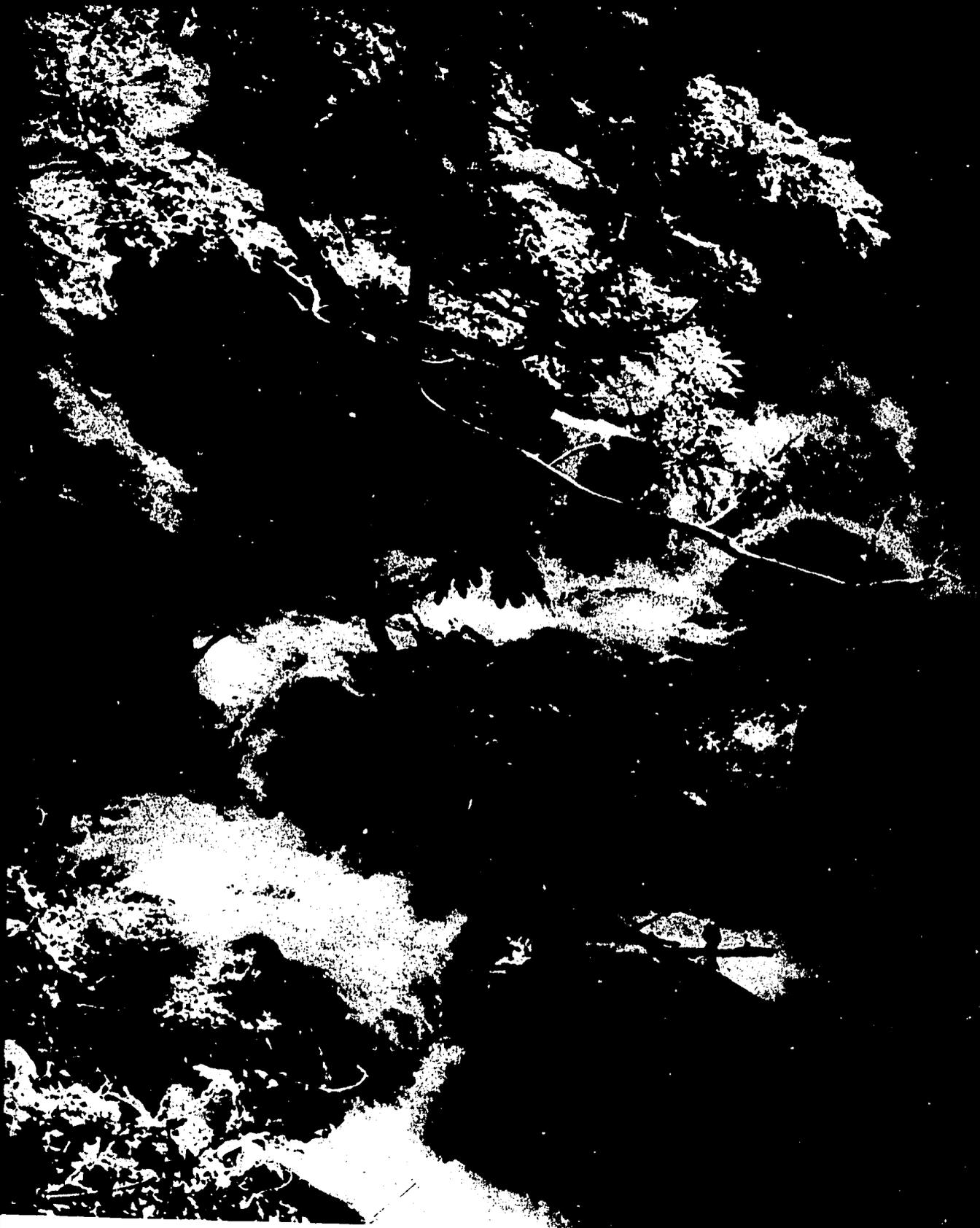
Natural Resources

The Mahaweli Systems are endowed with high commercially exploitable natural resources. Hundreds of water bodies dotted all over the Mahaweli Systems and the main reservoirs have vast potential for a prosperous inland fishery industry. Broad acres of low-lying (villu) land in System B are convertible as pasture land for a flourishing dairy industry. Those adventurous investors looking for new and uncommon but highly rewarding industrial ventures may strike with

comparatively less effort an abundance of resources such as high quality clay for pottery and porcelain industries.

The innovative entrepreneur may also find manifold lucrative business lines in cottage type industries such as cane basket weaving and reed ware. The energetic and versatile, ever smiling youth in Mahaweli settlements will provide the man power requirements of the investors.

The architects of the Mahaweli Programme have set themselves an ambitious target of guiding the Mahaweli settlers to form themselves into prosperous and viable communities within a short period of time. The path they take to achieve this laudable objective is not restricted to only agricultural development but an integrated development approach, pride of place is given to private sector investment in all sectors of the Mahaweli economy.



The mighty Mahaweli forges ahead crashing through rocks, sending out foams of exhilarating beauty, as it proceeds its long journey.

Protection of Environment

The implementation of the Mahaweli Development Programme would result in the replacement of presently forested areas with intensive agriculture and modify the landscape for the creation of townships, settlement and related infrastructure. This resultant change is expected to bring about certain environmental changes in the area.

Recognizing the large environmental significance attached to a development project of this magnitude, the Government of Sri Lanka sponsored a series of studies in order to identify possible detrimental effects of the programme on the environment. The major contribution in this respect was made by Messrs. Tippetts – Abbott – McCarthy – Stratton (TAMS) of USA. They undertook a comprehensive environmental impact assessment of the Accelerated Mahaweli Development Programme, providing a detailed analysis of the effects of the project on the terrestrial, aquatic and human environments.

Subsequently, an 'Environmental Plan of Action' was prepared for the Development Programme. This is an implementation plan for specific mitigation, protection and enhancement of the environment. It presents in detail how these measures should be designed and operated, the resources required and the schedule for implementation.

An Environmental Committee has been set-up within the Mahaweli Authority

comprising representatives from various governmental and non-governmental agencies concerned with environmental conservation to assist and advise the government in the implementation of the 'Plan of Action'.

Wildlife Conservation

The effects of this development on the region's diverse wildlife is a cause of much concern in Sri Lanka. The loss of nearly 100,000 hectares of high quality forests to give place to agriculture would result in a significant reduction of natural wildlife habitat and a concomitant unavoidable loss of large number of plants and animals presently found in the project area.

The development of new lands for cultivation can only proceed at the expense of natural habitat and their associated fauna and flora. However, social values derived from cultural and spritual traditions in Sri Lanka indicate a need to balance development goals with wildlife conservation. Because of this, and considering the rich and unique wildlife inhabiting the Mahaweli area, all reasonable means of conserving the animal and plant species affected by the accelerated programme have been incorporated into the development scenarios. It is in this context, that the conservation process and the establishment of protected areas comes into its own. The objective is to provide as much contiguous natural habitat as possible around the Mahaweli Development Programme and to manage these areas so as

to maximize benefits to agriculture and settlers. It is on this basis, that the Mahaweli Environmental Project – a five year programme for the creation of an environmentally sound and socially acceptable system of protected areas has been designed. This programme is supported by the United States Agency for International Development. Under this programme a total of over 200,000 hectares of land round the accelerated programme is to be developed as four National Parks. These parks will be inter-linked wherever possible by the additional forest reserves and jungle corridors so as to safeguard the migratory routes of the elephant.

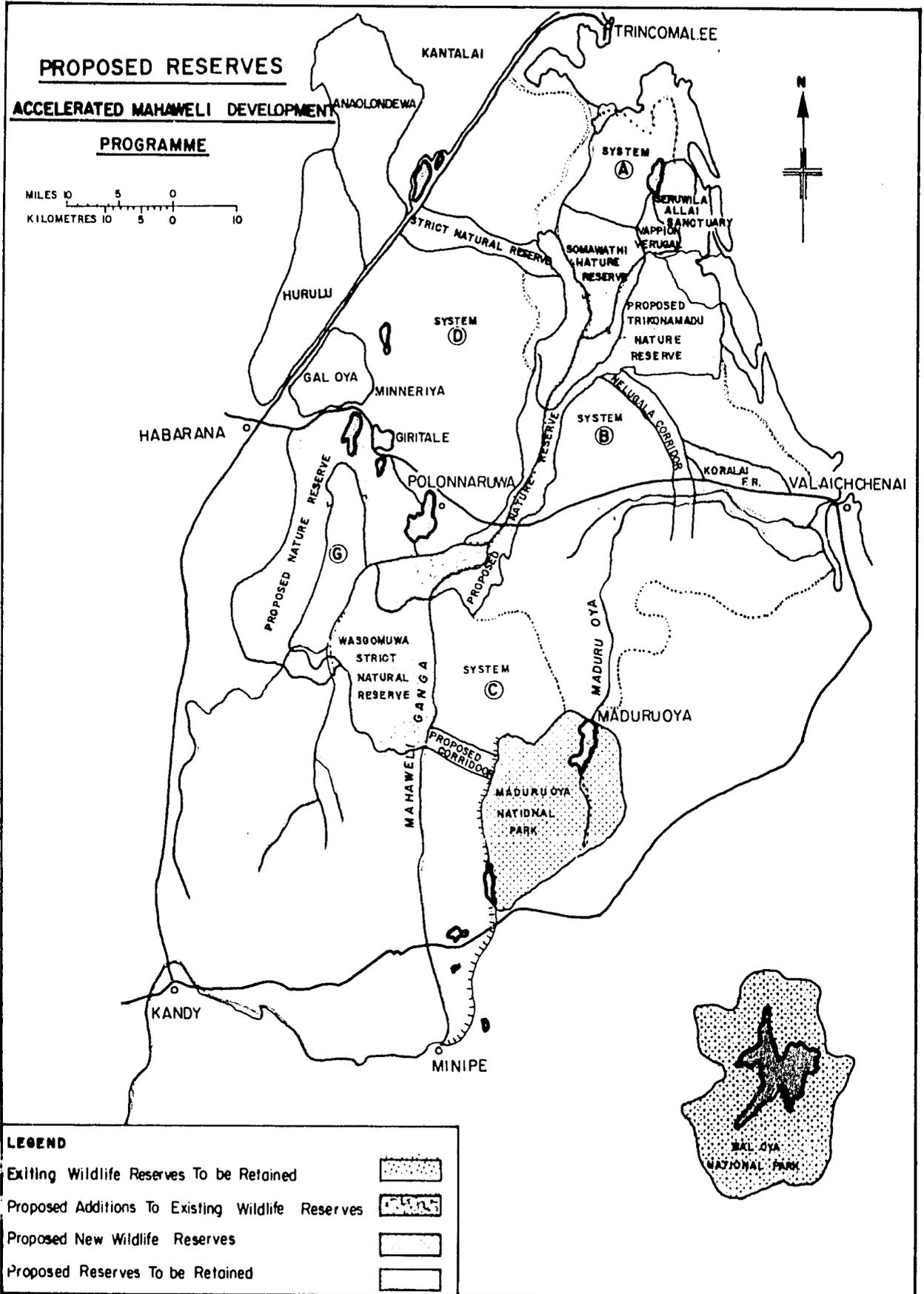
In designing the Parks system, very high priority has been placed on the up-grading and establishment of protected areas in the prime wildlife habitats, in the catchment of reservoirs and along the major river banks of the project area. The four parks designed for protection are: Maduru Oya National Park (57,000 hectares), Wasgomuwa National Park (76,000 hectares), Somawathiya National Park (52,000 hectares) and the Floodplain National Park (20,000 hectares). Work has already commenced on the survey and demarcation of these parks. The Maduru Oya National Park was declared in 1983 as a protected area under the Fauna and Flora Protection Ordinance while the Wasgomuwa and Floodplain National Parks are expected to be declared during the course of the current year.

During the course of the above exercise, it has become necessary to re-settle people living within the proposed park areas. A total over 1,500 families including the traditional Veddhas living in the Maduru Oya National Park were provided alternate land under the Mahaweli Scheme. The land so vacated is rapidly reverting back to thick jungle as desired.

The Accelerated Mahaweli Programme represents the first opportunity in Sri Lanka where the establishment of national parks and protected areas have been incorporated in the overall development plan. This favourable situation has been brought about by the realization that proper management of wildlife resources in strategic areas of the accelerated programme will conserve wildlife while protecting investments in irrigation work and human settlements; and bring about several benefits from nature conservation such as watershed protection and flood control directly to the people. The Maduru Oya National Park, for example, will protect the watersheds of no less than three important reservoirs under the Mahaweli Programme, Maduru Oya, Uthitiya and Ratkinda reservoirs, all of which are crucial to the success of the project.

The Mahaweli Development Programme is also expected to provide opportunities for tourism development, rural employment through use of local people as staff, casual labour and personnel for private enterprise tourism, and provide benefits such as crop protection and fishery possibilities.

Measures are underway to improve the conditions within the parks through pasture improvement and habitat enrichment. Buffer zones are also being established with suitable forest species along sections of the park boundary where the environment faces especially threat by human invasion. This will provide a buffer between human settlements and the parks thereby enforcing people to keep out of the more strictly protected park areas. There will be adequate roads, staff facilities and related infrastructure provided in the parks. In order to meet the new challenges in the Mahaweli areas, the Department of Wildlife Conservation is being provided addi-



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Veddhas re-settled at Henanigala in System C are beginning a new life, hopefully to become farmers. Here the Veddhas led by their chief, Kalu Appu, greet the Hon. Minister of Lands and Land Development and Mahaweli Development.



Hon. Gamini Dissanayake participates in a ritual of the Veddhas.

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tional staff, training and research facilities and equipment under the Mahaweli Programme.

Forest Cover and Forest Resources

It is inevitable that large extents of forests would have to give way to agriculture under the Mahaweli Development Scheme. This would have a major impact on the energy (fuelwood) resources of the rural population. The success of the Mahaweli scheme as a whole, the magnitude and scope of which is the largest ever undertaken in Sri Lanka, will depend to a large extent on the total volume of forestry provided. Conscious of this urgency, the Mahaweli Authority is seeking to accelerate the rate of reforestation to maintain adequate forest cover and provide sufficient fuelwood supply to the settlers.

In this connection, various steps have been taken to restrict the unnecessary elimination of forests and forestry resources in the Mahaweli areas. In systems A and B, for example, forest clearing activities have been postponed until such time as these areas would be needed for development. In the development areas, forest clearing is restricted to agricultural land below irrigation command. Homesteads and certain other non-irrigable tracts are maintained in forest cover which will include at least part of the fuel wood energy requirements of the settlers.

Progress in reforestation has been fairly satisfactory so far, with a total of 160 hectares in System B, 500 hectares in System C and 100 hectares in System H being already established. It is planned to reforest a further 200 hectares in System C, 200 hectares in System B and 75 hectares in System H during the current year. The scope and dimension of these programmes will be further extended in the future.

The involvement of new settlers in forestry work in the project areas too have been given due consideration. In system C for example, 140 hectares have been reforested in 1983 with the participation of the settlers. There has been a growing interest shown by settlers in Mahaweli areas for community forestry projects. It is envisaged to undertake similar programmes in other areas under the Mahaweli Development Programme in the future.

Under the Mahaweli Development Programme adequate consideration is being given to conservation forestry aspects as well. In connection with this, certain areas of ecological and conservation importance such as riverine forests, stream reservations, rock knobs and catchments of reservoirs are being ear-marked for protection. Further reforestation programmes and enrichment of existing forests in the project areas have been initiated. A total of 400 hectares in System C and 500 hectares in System H have been reforested with suitable naturalized tree species. These programmes as well would be extended in the future.

Management of Montane Catchment Areas

The upper catchment area of the Mahaweli Ganga is the principle source of water supply for the numerous hydro-power and irrigation schemes in the Mahaweli Development Programme. It is therefore vital that effective measures should be taken to protect the catchment from activities that would seriously impair its functions.

In this respect, it must be mentioned that various activities in the catchment areas caused soil erosion and sedimentation of rivers and reservoirs in the last few years. In the year in review, there have been uncontrolled and haphazard clearing of land on steep and degraded slopes for



Conservation of Wild Life in Mahaweli areas occupies high priority in the Mahaweli Programme. Here wild elephants take time off to bathe and enjoy in the cool waters of the Mahaweli Ganga.

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the cultivation of chena crops and promotion of tobacco. A total of over 1,000 unauthorized tobacco barns have been constructed in the tobacco growing districts of Kandy, Nuwara Eliya and Badulla in the current year. Due to these activities and the extraction of fuel wood for drying the tobacco less than ten percent of the catchment has been left in forest cover, an extent which is inadequate to maintain a satisfactory watershed area and achieve minimal soil conservation requirements. In the absence of considerable improvement in the standard of land management, the situation in the catchment area is likely to deteriorate rapidly.

The Mahaweli Authority has become more and more concerned about the rapid deterioration of the catchment areas and has taken action with the relevant Ministries and Agencies concerned with land use in the catchment in order to bring about a more enlightend land use programme in the area. It is hoped that necessary action would be taken during the current year to restrict cultivation of tobacco and other seasonal crops on steep unstable lands.

The Mahaweli Authority has also commenced certain programmes for the improvement of the immediate catchments of the three upstream reservoirs, namely Kotmale, Victoria and Randenigala. Although selective reforestation is the most suitable measure, it can only be implemented on a limited scale due to population pressures in the area and the need for agricultural land by the farmers. In the immediate catchment of the reservoirs, the Mahaweli Authority, through non-governmental organizations have so far reforested 900 hectares in the Victoria catchment and 50 hectares in the Kotmale catchment with naturalized forest species. The progress in the reforestation programme has been

fairly satisfactory and holds much promise for similar programmes in the future. It is proposed to undertake reforestation of a further 400 hectares at Victoria, 100 hectares each at Randenigala and Kotmale and 400 hectares above the Minipe Right Bank canal in 1984. All these programmes would be extended in scope and dimension as work progresses.

In addition to the above programmes, the Forest Department is involved in a reforestation exercise in the total Mahaweli Ganga catchment. Under its USAID sponsored Upper Mahaweli Programme an estimated 1,000 hectares are to be reforested annually. Other agencies like the State Plantation Corporation, Janatha Estate Development Board, and international Rural Development Missions have reforestation programmes in the upper catchment.

In the year under review, action has been initiated in the formulation of peripheral development plans for each of the upstream Mahaweli reservoirs. This is with the objective of preventing adhoc and haphazard development of the reservoir periphery and to safeguard the reservoir environs from degradation, pollution and sedimentation.

Aquatic Environment

Construction of reservoirs and subsequent transfer of water to meet agricultural requirements would have a series of effects. Possibly the most significant impact of the reduced flows as a consequence of the above, would be on the flood plain marshes. It would be expected that reduced flows would probably decrease the duration and magnitude of the flooding of these marshes resulting in a concomitant loss of productive and grazing potential. However, the creation of the Floodplain National Park should provide the mechanism to protect these marshy areas from over grazing and degradation.

An additional concern is the inundation of large extents of land by the creation of new reservoirs which could result in the loss of certain important plant and animal species. Surveys have already been completed in the Victoria and Kotmale reservoir bed areas with a view to identifying the need for special conservation measures for rare and endangered species that may occur in the area. These studies have indicated that virtually all the land to be inundated by these two reservoirs constitute well developed land, and conservation of wildlife, in terms of protecting an existing population of endangered species, does not arise. However, action has been taken to launch rescue operations to save animals that could be drowned with the rising waters of the reservoirs.

The alteration of water quality in both ground and surface waters could result from the substantial increase in the use of agro-chemicals in the downstream farmlands. In connection with the above, a programme has commenced to obtain data on water quality conditions and pesticide levels in both the operational and accelerated programme areas. This study would enable subsequent monitoring to identify potential problem areas as the programme proceeds. This programme is designed to evaluate the quality of surface and ground waters for use in irrigation, domestic supplies protection of aquatic life and livestock consumption.

Fisheries Development

The creation of some large new reservoirs and the augmentation or restoration of many more tanks under the Mahaweli Programme provides much scope for the development of inland fisheries. Since the cultural and culinary tradition of many Sri Lankans favours fish as a source of animal protein, the most efficient and desirable means of meeting the demand for low-cost

animal protein for the settlers in the Mahaweli areas is fish farming using fast-growing fish species.

The expansion of inland fisheries by carrying out intensive culture of fish in the Mahaweli reservoirs has been given due consideration by the Ministry of Fisheries. A Fish Breeding and Demonstration Centre has been established at Dambulu Oya under UNICEF funding. This Centre has a capacity to produce around one million fish fingerlings. A large fisheries complex, with a hatchery to produce over five million carp fingerlings to cater for System B and C is proposed for development at Maduru Oya with aid from the Canadian International Development Agency.

Health Aspects

The Mahaweli Programme is expected overall to improve the nutrition status and quality of life of the settlers. In order to achieve this, a well organized health-care programme has been designed for the Mahaweli areas. However, in a certain sense some pre-conditions for disease would increase especially in respect of malaria and other vector-borne diseases. It is noted that proper planning, adequate health-care, sanitation and potable water supplies are being provided to the settlers in an attempt to combat the disease threat.

In addition, the Ministry of Health in collaboration with International Agencies has initiated research programmes to study vector-borne diseases in the Mahaweli Project area. These studies would attempt to identify features of irrigated agriculture in the Mahaweli Programme that are liable to increase or cause the prevalence of Vectors of water-related diseases, specially malaria.

Public Awareness

Optimal protection of the environment, in and around the Mahaweli Projects and proper utilization of the natural resources for the benefits of the settlers, need an understanding and appreciation for nature conservation among the settlers. This is most urgent especially in the catchment areas where rapid deterioration of the land could undermine the success of the Mahaweli Programme as a whole.

Recognizing the urgency to bring about environmental awareness, the Mahaweli Authority has commenced a programme of environmental education in the upstream and downstream Mahaweli areas. This programme attempts to spread the message of conservation among the school children, youth and settlers in the Mahaweli areas.

Heritage Considerations

A programme is also underway to preserve cultural and historical artefacts and materials from areas that would be

affected by the Mahaweli Programme. In certain instances these materials have been conserved in-situ or otherwise been re-constructed in new locations.

The ancient sluice discovered on the old breached earthen bund on the Maduru Oya is being conserved in-situ as an artefact of Sri Lanka's hydraulic civilization. A Central Museum has been constructed in Colombo to exhibit artefacts and materials of cultural and historical importance. This Museum is further supplemented by working models of the Mahaweli reservoirs.

The Mahaweli Development Programme is Sri Lanka's largest and most ambitious development programme. However, its success would depend largely on the attention and effort being placed on the conservation of the environment and the rational utilization of the natural resources pertinent to the project. It is encouraging that conservation of the environment and the preservation of the heritage are matters receiving the highest priority of the Ministry of Mahaweli Development.

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