AN OVERVIEW OF WATER MANAGEMENT OPERATIONS ON THE KALAWEWA RB CANAL

by

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Abstract

System H, located in the North-Central province and lies within the Kala oya and Malwathu oya basins. The Kalawewa RB canal which is also known as the Nava Jaya Ganga originates at the RB sluice and ends 50 km away. The RB canal is the principal conveyance system for delivering irrigation water to subsystems H4 and H5 covering the administrative blocks of Nochchiyagama, Talawa, Tambuttegama and Eppawala.

The organisation managing the irrigation system is in a state of flux since System H was set up in the mid seventies. The project areas are being redefined and the staff levels reduced. This paper records the present irrigation organisation and the water management operations of the Kalawewa RB canal.

1.0 Introduction

The Mahaweli Ganga development project supplies irrigation water to seven irrigation systems each identified by a letter in the alphabet (A, B, C, D, E, G, and H), and to six power stations for energy generation. As these irrigation systems are scattered within the Dry Zone the seasonal water allocation to each system is decided by the Water Management Panel (WMP) of the Mahaweli Authority. This panel makes operational decisions and decides on the cultivation programmes for the irrigated areas served by the Mahaweli. The information and recommendations to the WMP is provided by the Water Management Secretariat, a specialised unit of the Mahaweli Authority.

System H, is located in the North-Central Province and lies within the Kala Oya and Malwathu Oya basins. The total irrigated area in this system consists of 42,000 ha out of which 28,000 ha are under the Mahaweli project while the remaining area are old settlements.

Mahaweli water supplied to system H, is first diverted at Polgolla and then at Bowatenna into the Kala oya basin via. an irrigation tunnel. The water is then diverted into three main tanks Kandalama, Dambulu Oya and Kalawewa (Figure 1). The combined storage capacity of these tanks is not sufficient to irrigate the extent of agricultural land available in System H during a season. This makes the cultivation in System H dependent on the water diverted at Bowatenna.

The water is released from the Kalawewa tank into three main canals (RB canal, LB canal, Yoda ela) and three minor canals (Balaluwewa goda edla, Kalawewa goda ela and Puliyankulama ela). The lands under the RB and LB canals have been developed recently while the Yoda ela serves the old settlement areas.

System H consists of twelve subsystems, H1 to H12 (Figure 1). Subsystems H1 to H9 are settlement areas under the administration of the Mahaweli Economic Agency (MEA), while H10, H11 and H12 are settlement areas administered by the Irrigation Department.

At the early stages, the areas administered by the Mahaweli Economic Agency was divided into 3 project areas, Kalawewa (H1, H2, H6, H8 and H9), Tambuttegama (H3 and H4) and Nochchiyagama (H5). A project generally covered an area of 8,000 - 12,000 ha. under the control of a Resident Project Manager (RPM). The RPM was assisted by six Deputy Resident Project Managers (DRPMs) each specialising in Engineering, Agriculture, Lands, Community Development, Marketing and Administration. As the System evolved, the project boundaries were redefined which resulted in two project areas instead of three. These were Kalawewa (H1, H2,

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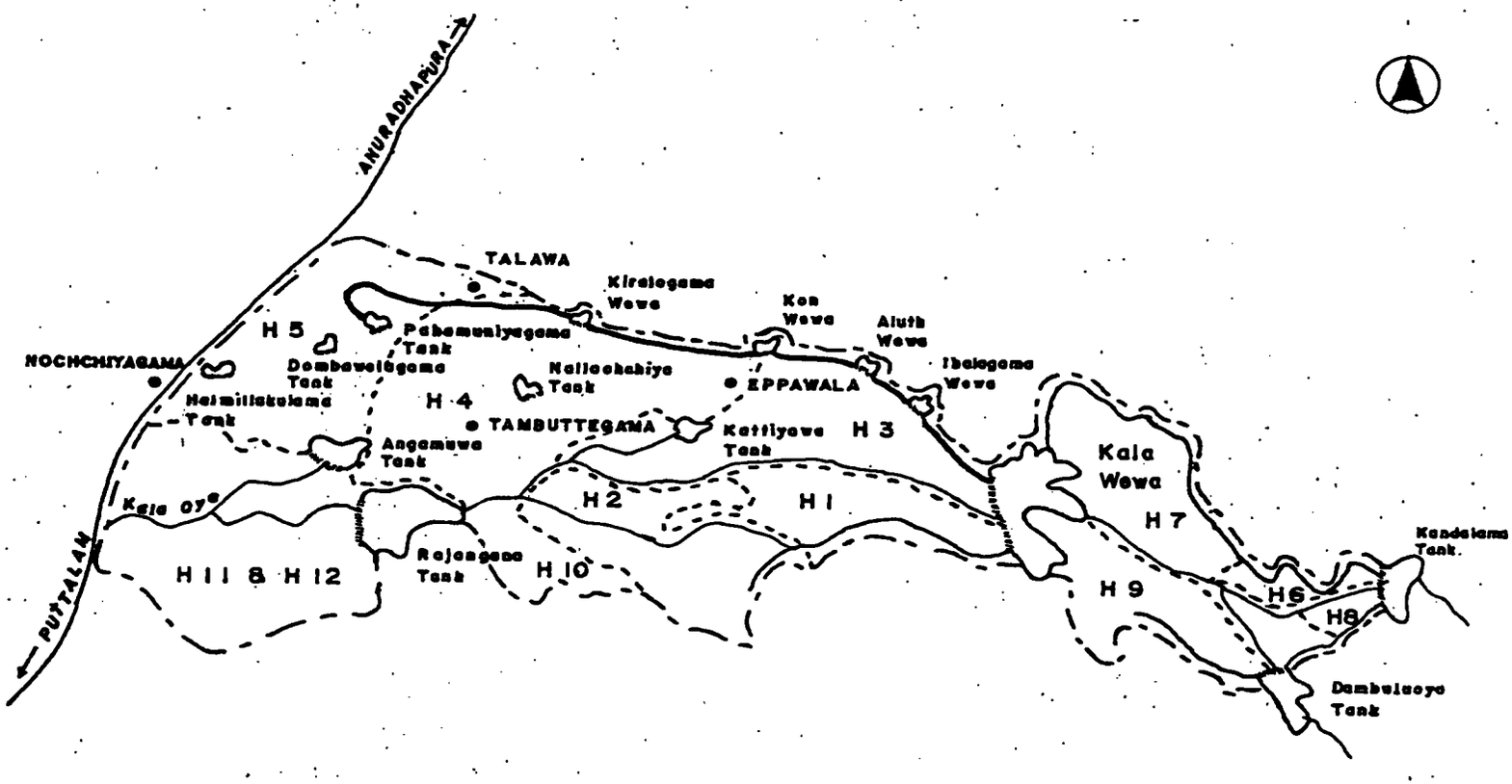

FIGURE 1

SYSTEM H AND ITS SUB SYSTEMS

H3, H6, H7, H8 and H9) and Tambuttegama (H4 and H5). The Kalawewa project area is served by the LB canal, Yoda ela, Kandalama RB canal and Dambulu Oya LB canal while the Tambuttegama project area is served by the Kalawewa RB Canal.

Kalawewa and Tambuttegama project areas have now been linked to form a single project area called Tambuttegama. This project is still under the supervision of a RPM who is now assisted by a DRPM (General) and five other DRPMs/Project Officers, each responsible for the subjects of Agriculture, Lands, Community Development, Marketing and Administration (Figure 2). The DRPM (Engineering) is responsible for water management within the entire project area.

The project area is divided into administration blocks, the boundaries of which are independent of physical features. A Block Manager assisted by a Block Irrigation Engineer, Agricultural Officer, Land Officer and Community Development Officer controls the activities within an administrative block. The irrigation block is a subdivision of an administrative block. A physical feature such as a drainage line forms the boundary of an irrigation block. The water management within an irrigation block is the responsibility of an Engineering Assistant of the Block Irrigation Engineer's staff.

The administrative block is subdivided into units each under the control of a Unit Manager. He is responsible for the welfare of about 1000 farmer families and is assisted by a Field Assistant in agricultural extension and a Water Distribution Labourer.

2.0 Features of the Delivery System

The Kalawewa RB canal which is also known as the Nava Jaya Ganga originates at the RB sluice and ends at the Pahamuniyagama tank 50 km away. The RB canal is the principal conveyance system for delivering water to subsystems H4 and H5 (Figure 3) covering the administrative blocks of Nochchiyagama, Talawa, Tambuttegama and Eppawala. This canal which has a capacity of 32.5 m3/s is routed through 2 regulating tanks (Konwewa and Kiralogama). The Konwewa tank is located 24 km downstream from the Kalawewa sluice while the Kiralogama tank is located 32 km downstream. Ihalagama and Aluthwewa are two non regulating tanks located on the RB canal.

Nallachchiya tank is located at the end of branch canal 4 while Halmillakulama tank is located at the ends of branch canal 7 (Figure 4). The Dombawellagama tank is located 1.5 km downstream on the branch canal 8. A total of 8 branch canals and 20 distributary canals receive water from the Kalawewa RB canal.

A distributary canal, originates from either the main or a branch canal. The control structure located at the head of each distributary canal is used to control and measure the discharge in these canals. Water is supplied to the field canals (which convey water to individual fields) from the distributary canals. The distributary canals are designed to supply the peak water requirements of all the field canals simultaneously. The discharge from the field canal is always 0.0283 m^3/s (1 cusec). The outlets to individual farms generally consist of a 150 mm (6 inches) diameter pipe with a head control diversion box. A single field canal is designed to serve an area between 12 -15 fields each having an average area of 1 ha. Cultivation of only a single crop (either rice or other field crop) is permitted in fields served by a single field canal. This is imposed in order to ease the problems of irrigating mixed crops simultaneously.

The main and branch canals have continuous discharges while a field canal is operated for a predetermined period (rotation). This depends on the quantity of water needed which in turn depends on the soil type and crop. Rotations are usually on a 5 - 10 day basis so that farmers receive water almost on the same day of each week during the cultivation period. Design concept was to supply water simultaneously to two fields from a field canal, each receiving 0.0142 m^3/s (0.5 cusec or half of the design discharge of a field canal) for a specified period of time (usually 12 hours). After the required amount of water is supplied to the fields the outlets are closed and the fields next along the canal are supplied. As the flow along the main and branch canals are continuous, water issues take place even during the night with farmers attending to their crops, but the changeovers are scheduled for daylight hours.

3.0 Water Management

A Water Management Coordinating Panel for System H assists the RPM in water management issues. The most important function of this Panel is to manage the main sluice operations of the Kalawewa, Dambuluoya and Kandalama tanks. The Panel meets periodically (usually monthly and weekly during periods of water shortages) during the irrigation season to review the water issues in relation to the available storage and irrigation demand and to ensure that the available water is distributed equally to the farmers.

A Flow Monitoring Unit monitors the water management operations within the system and maintains the flow

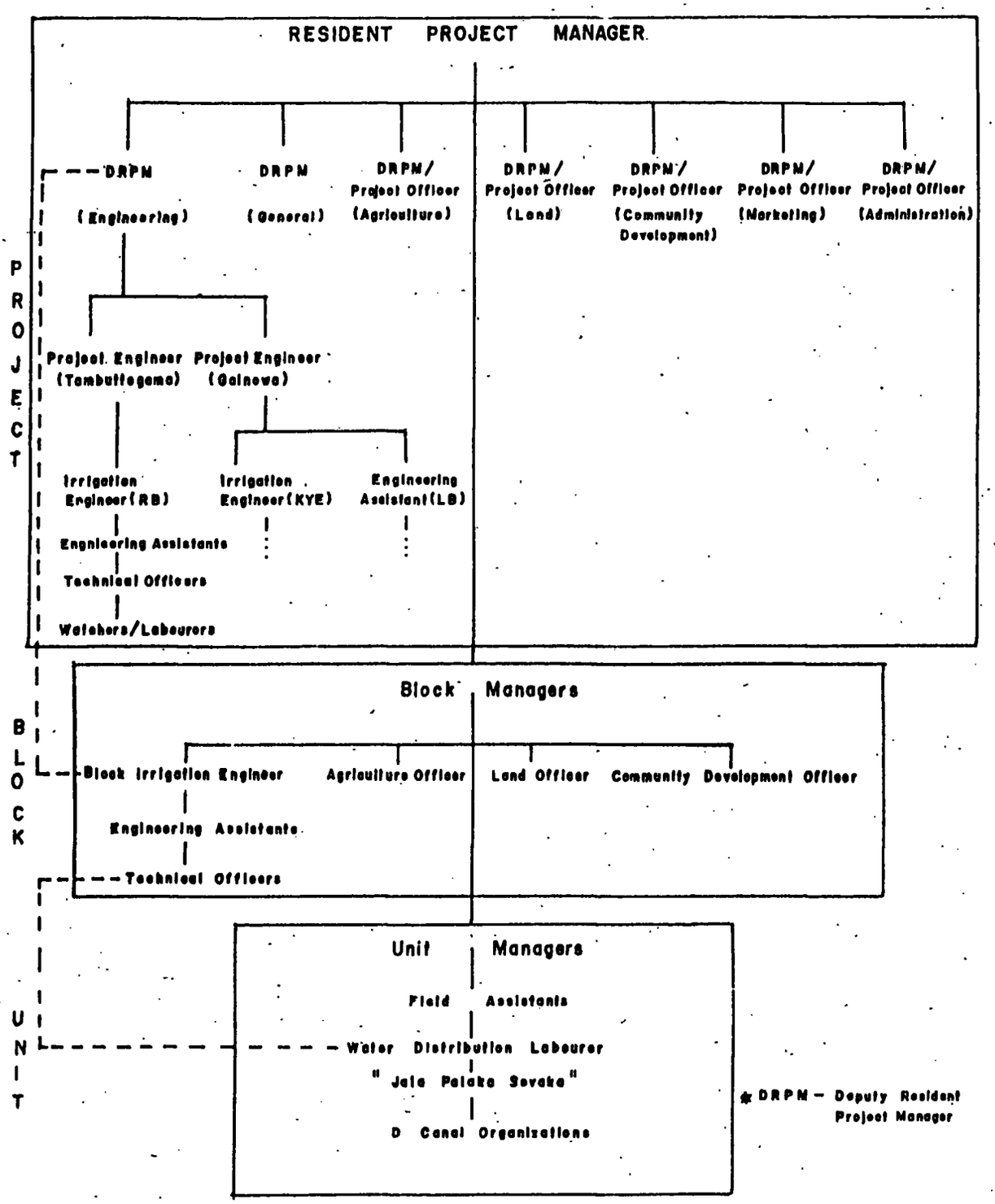

FIGURE 2

ORGANIZATIONAL STRUCTURE OF THE MAHAWELI ECONOMIC AGENCY IN SYSTEM H

records necessary for the System H Coordination Panel. The engineer in charge of this Unit serves as the Secretary to the Panel and furnishes daily, weekly, and monthly reports to the Panel. The DRPM (Engineering) serves as it's Chairman.

Each of the three main canals that take off from the Kalawewa, the RB, LB and the Yoda ela is operated by a Main Canal Unit. The RB Main Canal Unit is also responsible for the operation of the branch canals of the RB canal which supplies water to more than one administrative block (Example Branch canal 4, Figure 4).

At the administrative block level, the Block Irrigation Engineer has Engineering Assistants/Technical Officers to assist him in water management duties. The Block Irrigation Engineer is responsible for requesting water from the main canal into the block via. the branch canal and distributary canals. At the Unit level, the water is managed by the Technical Officer assisted by a water distribution labourer who is popularly known among the farmers as the "Jala Palaka Sevaka". This individual, who shoulders considerable water management responsibilities in spite of his title, is the coordinator between the D Canal Organisations (a group of farmers representing one or more D canals) and the Engineering Assistants/Technical Officers.

The Irrigation Engineers at the block level are responsible for preparing irrigation schedules and implementing them. Data on the types of crop and the area cultivated are gathered by a Field Assistant and submitted to the Block Irrigation Engineer through the Unit Manager. Water issue schedules are prepared by the Block Irrigation Engineer considering the varying water requirements during the land preparation period and the normal vegetation period. The land preparation schedule is based on a water requirement of 125 mm (5 inches) per field in the first week and another 125 mm (5 inches) in the second week. However, an additional 62.5 mm (2.5 inches) of water is delivered during the third week to supply the fields which start land preparation later than the scheduled date. These schedules cannot be always implemented rigidly at the land preparation stage due to various factors and as a result the supply of water is always greater than the requirement resulting in wastage. Attitudes of farmers towards imposed schedules, lack of finance and the non availability of farm power are some of the factors causing this problem. The water issue (62.5 mm a week per acre) during the vegetation period is calculated on the basis of crop water requirements and field losses during delivery.

Once the schedule for the entire number of field canal units are prepared, the total daily water requirement at the entry to the distributary canal is calculated, making an allowance for the canal losses. These delivery schedules for each distributary canal area are submitted to the DRPM (Engineering) at least 2 days prior to the date of commencement of each rotation. It is the Engineering Assistant's responsibility to implement the field delivery schedule. Field canal operations (below field canal inlet) are carried out by a Water Distribution Labourer under the supervision of a Technical Officer and members of the D Canal Organisation. The Unit Manager reports the progress of the crop within his Unit to the Engineering Assistants at the irrigation block level so that the water could be regulated or reallocated.

When there is sufficient rainfall to generate surface runoff, water issues to that particular area is stopped. This decision is taken after an inspection of the area during or immediately after a rainfall. The rotations are restarted from the point it was stopped. This occurs, when the farmers request irrigation water for their fields from the Water Distribution Labourer. The usual practise is for the farmer to make this request a couple of days ahead of the day when water is required. This is to accommodate the time lag between request for and the receipt of water.

Two soil types are found in System H namely the Reddish Brown Earth (RBE) and Low Humic Gley (LHG). The RBE soils cover about 60% of the total area of System H, while LHG covers the remaining area of 40%. Water requirement of crops grown in well drained RBE soils is about 1.7 times that for crops grown in poorly drained LHG soils. This soil composition remains the same down to block areas and sometimes to distributary canal areas. However, the ratio of soil groups among field canals vary considerably. Hence, the water requirement of each field canal area is different. Irrigation is carried out from the head end to the tail end of the field canal to enable seepage from the upper areas with high permeable RBE soils to be used in the lower areas. It is assumed that this practise reduces water quantities needed for farms located at the tails end of a field canal.

Delivery schedules are planned for each administrative block at Nochchiyagama, Talawa, Tambuttegama and Eppawala. The water requirements for these blocks originate at the field offices at Helambawa (for Nochchiyagama), Rathmalgahawewa (for Talawa), end of branch canal 4 (for Tambuttegama) and at Konwewa (for Eppawala) (Figure 4).

4.0 Daily Operations

The daily water requirements of the distributary canals (calculated at the field offices) is taken to the RB Main

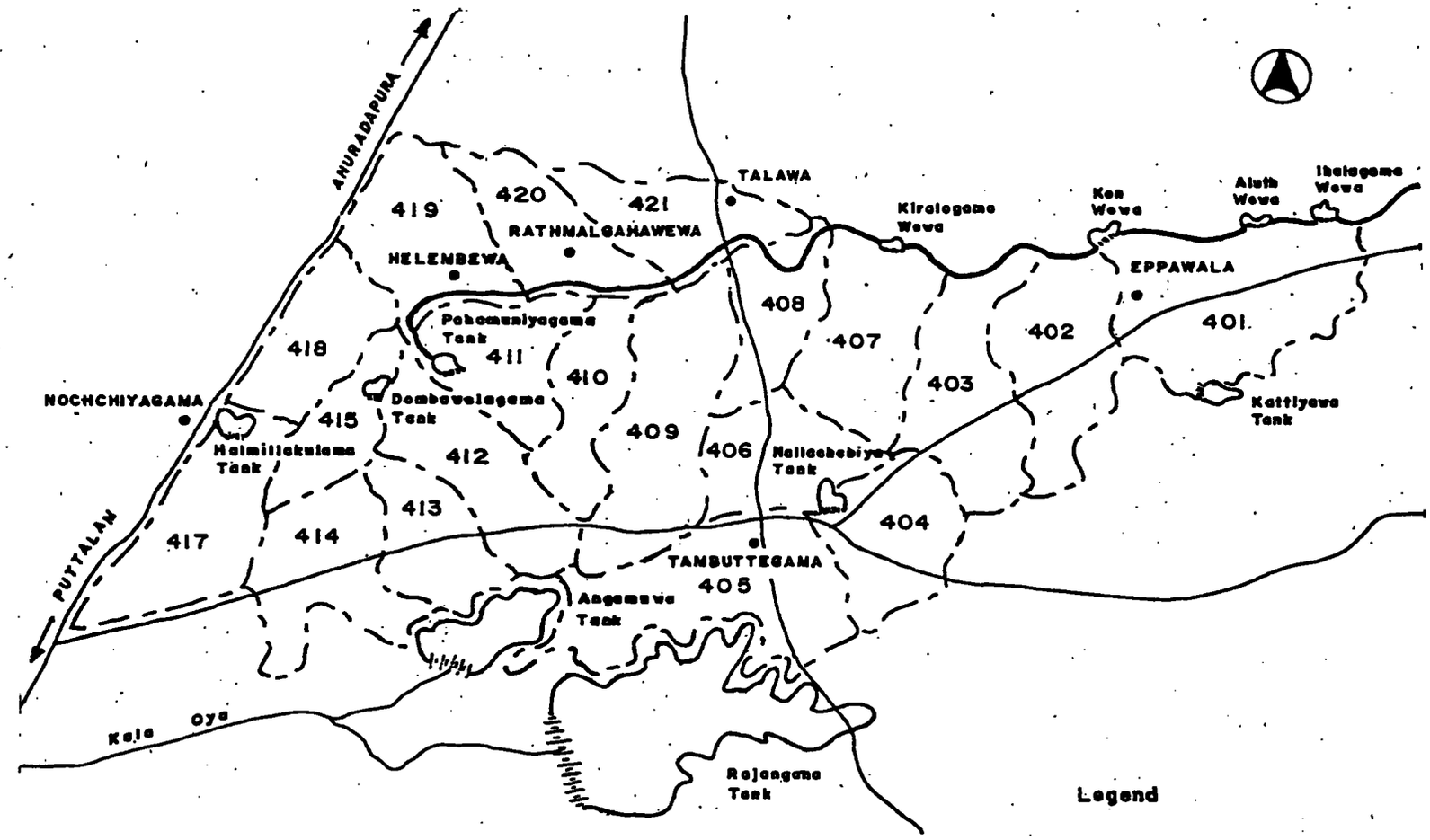

FIGURE 3

IRRIGATION BLOCKS IN SUBSYSTEMS H4 AND H5

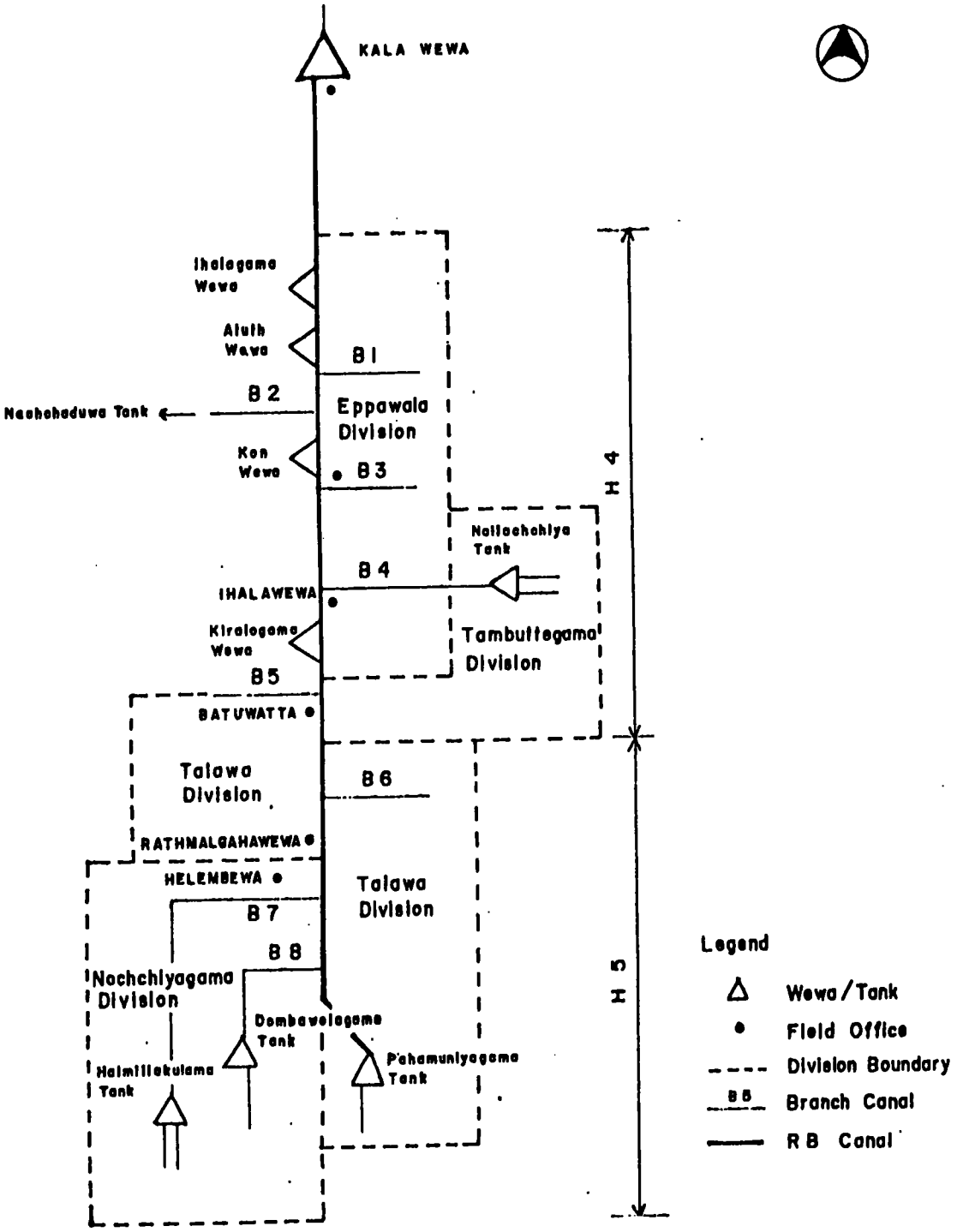

FIGURE 4

SCHEMATIC DIAGRAM OF THE KALAWEWA RB

Canal Unit located at the Project Office in Tambuttegama by messengers on bicycles. This mode of transport is used due to the lack of telephones or radio communication. A messenger leaves Helembawa (which is the farthest distance from the Project Office) at 0600 hours each morning. On the way to the Konwewa field office this messenger collects instructions and messages from Rathmalgahawewa, Batuwatta and Ihalawewa. At Ihalawewa, located at the head of branch canal 4, the messenger collects any messages or instructions from the Tambuttegama block which originates further down the branch canal and then proceeds to Konwewa.

Another messenger leaves Kalawewa RB sluice at 0700 hours, with information relating to the water level of the Kalawewa and the water issues from the RB sluice during the previous 24 hours. He reaches the Konwewa field office around 0930 hours. A third messenger leaves Konwewa for the Project Office just after the arrival of the messengers from Helembawa and Kalawewa. He reaches the Project Office at Tambuttegama at 1030 hours. The data brought by the messenger is processed at this office and operating instructions for the next 24 hours are issued. The messenger then leaves the office at 1130 hours to reach the Kalawewa sluice via Konwewa. The route taken by the messengers and the time schedule are given in Figure 5. The same figure also indicates the route taken by messengers carrying urgent and non routine operating instructions originating from the Project Office.

In order to accommodate the time lag between the demand and supply, the Block Irrigation Engineer has to inform the Irrigation Engineer of the Main Canal Unit at least 20 hours in advance if there is any change to the agreed schedule. The regulating tanks (Konwewa and Kiralogama) along the RB canal enables the Main Canal Unit to respond quickly to sudden changes in demand from the divisions. If not for these tanks, a request for a change in schedule from the Nochchiyagama division would take about 50 hours (row 1, Table 1) to be effective. Table 1, gives the response times for requests for irrigation water from the RB canal without utilising the regulating tanks.

The final operating instructions for the current day are carried out messengers from the Project Office to the field offices of the RB Main Canal Unit. Changes to the discharge of the RB canal which in turn depends on the demands of the branch and distributary canals are made at 1100 hours each day by the Main Canal Unit. This leaves sufficient time for the data to be reported to the Main Canal Unit at the Project Office, to be processed there and the day's operating instructions to be relayed to the respective units. The Main Canal Unit maintains the required discharge of water to branch and distributary canals providing that the total discharge of the distributary canals do not exceed the capacity of the main canal. Water issues to an irrigation block is never altered by the Main

Division	Duration for water to flow from Kalawewa (hrs)	Origin of request	Duration for request to reach Project Office (hrs)	Duration to process request (hrs)	Duration for feedback from Project Office to division g (hrs)
Nochchi-yagama	36	Helambewa	8	2	4
Talawa	28	Rathmal-gahawewa	8	2	4
Tambutt-egama	25	Branch canal 4	8	2	4
Eppawela	18	Konwewa	8	2	4

Table 1. The time schedule for flow of information to and from the Project Office, Tambuttegama.

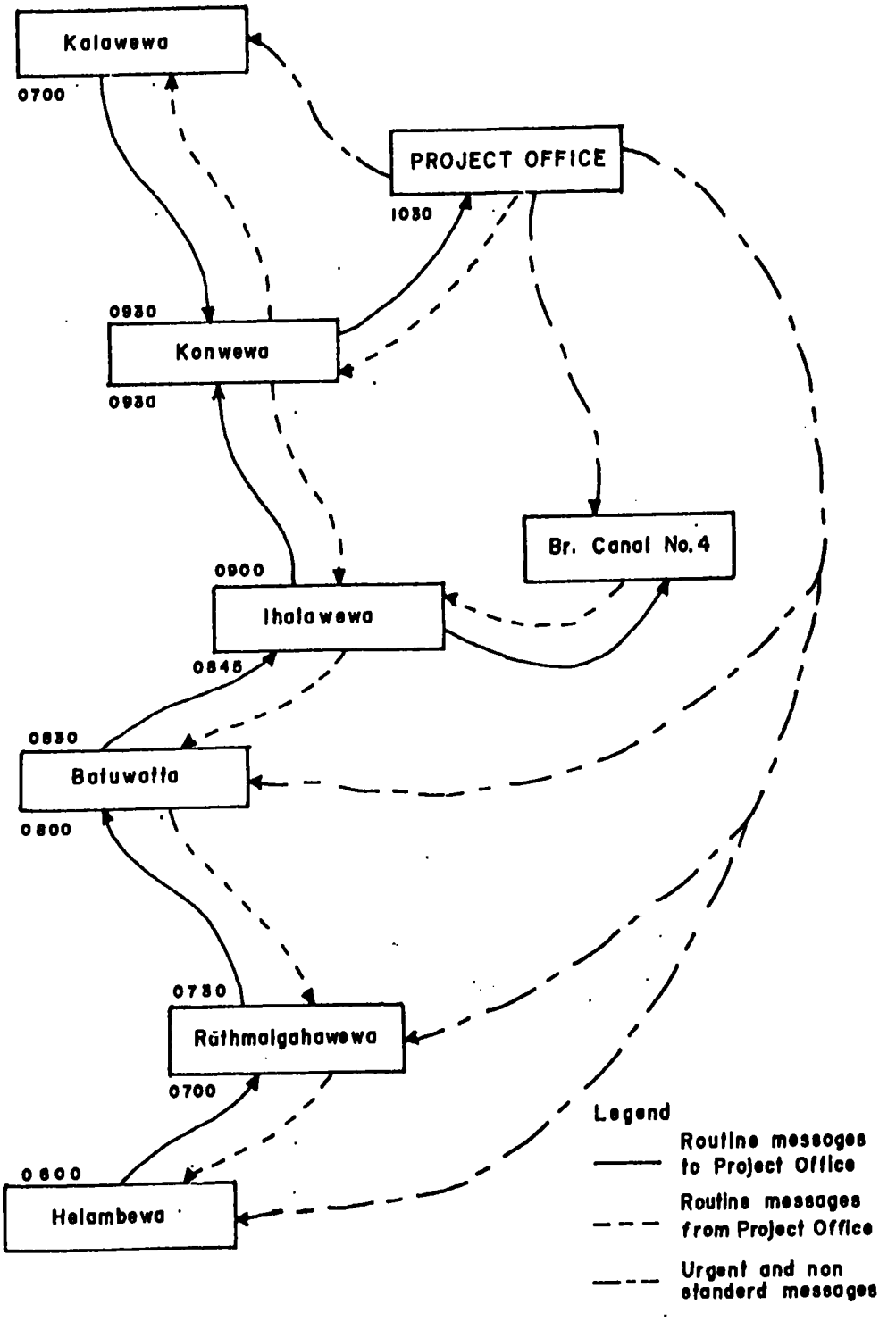

FIGURE 5

SCHEMATIC DIAGRAM OF INFORMATION FLOW TO AND PROJECT OFFICE

Canal Unit unless requested by the Block Irrigation Engineer.

5.0 Conclusion

The main physical constraint of the Kalawewa RB Canal is it's length. Even with this disadvantage and the poor communication facilities that are available, the Kalawewa RB is operated smoothly under normal conditions. However, it is not flexible enough to respond to sudden changes in demand, resulting in wastage of valuable water. The sudden changes in demand occur whenever there is rainfall over the irrigation area. This is further complicated by the scattered nature of the rainfall. The average volume of areal rainfall during the Maha season (September to March) is 830 mm. The ability of Kalawewa RB to respond to rainfall over the irrigation areas is impaired due to the poor communication and transport facilities. If this rainfall is effectively substituted for the irrigation water released from the Kalawewa, the quantity saved in the tank can be beneficial to the subsequent Yala (April to September) cultivation. Provision of telephones and motor cycles to field staff will help towards better management of the RB canal and efficient use of water.

In a multipurpose water resources project such as the Mahaweli, the operations at the macro level are well documented. It is the operations at the distributary and field canal levels that are not defined. For efficient water management it is important to understand how the System operates at this level because it is at this level that water is either saved or wasted. Even within the Mahaweli, each system may have it's unique operational problems and their solutions. The operational experience in these systems too should be documented for posterity.

6.0 Acknowledgement

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