5. PRESENT STATUS AND PROBLEMS OF WATER MANAGEMENT IN RICE FIELDS IN SRI LANKA

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1. Introduction

Sri Lanka presently has a population of 13,000,000 which is expected to almost double itself in about 20 years time. The staple food of the entire population is rice. A brief look at the history of this country would perhaps justify this. Historical records virtually abound with evidence that ancient Sri Lanka was indeed a "Granary of the East". It is said that even in pre-christian times Sri Lanka had successfully practised the art of controlling and diverting the water of streams and rivers to irrigate the fertile lands through which they meandered. Intensive labour and skill had contributed to converting large jungle tracts to areas of prosperity. This era of prosperity reached its climax in the 12th Century and thereafter due to various factors like desease, civil wars, and foreign invasion there was a steady decline. Agricultural development again picked up during colonial rule but not sufficiently enough to make us even self sufficient. Today Sri Lanka has to import approximately 350,000 tons of rice per year to supplement an average of 800,000 tons produced locally to satisfy the needs of the country. The gravity of the problem increases at the prospect of the population doubling in another twenty years. Realising this, the government has launched on a programme of development, which when implemented not only eliminates imports but accelerates food production in the country to keep pace with the expected increase in population. One such example is the proposed Mahaweli Basin Project which when completed would ensure irrigation facilities for 2 crops per year for about 300,000 Acs. (120,000 ha) of existing irrigable land and about 600,000 Acs. (240,000 ha) of new land. The project is phased over a period of 33 years.

2. Present Development and Policy

2.1 Sri Lanka's tropical climate is characterised in many respects. It has 2 distinct zones viz. the wet zone which experiences a mean annual rainfall in excess of 75 inches (1875 mm) and the Dry Zone. It could be said that in the wet zone cultivation is mostly under rainfed conditions, while in the dry zone supplementary irrigation is necessary for a successful cultivation. The monsoon rains occur during two distinct seasons ie. the South West Monsoon from May to September and the North-East from December to February. Depressional and convectional rain occurs during the inter monsoonal periods and is likely to occur in any part of the island. The wet zone which forms the South central and South Western sector of the country covers nearly 35 per cent of the land area. The balance 65 per cent forms the dry zone where irrigated agriculture is practised. These historical, climatological and other data are presented so as to provide a background against which the problems of water Management now encountered in our country could be viewed with better perspective.

2.2 Major Works:

These are large reservoir or anicut schemes. Before construction of such new schemes, the government undertook the restoration of ancient projects with minor modi-

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fications of the parameters like full supply level intake structure dimensions, spill length etc. Most of the ancient works which were concentrated in the dry zone have now been restored. These projects haev been developed for paddy cultivation. The extent of land under major works is approximately 580,000 acres (232,000 ha). The largest of these reservoir projects has an irrigable command of 110,000 Acs. (44,000 ha) and a maximum storage capacity of 770,000 Ac. Ft. (950 million m^3).

Most of the above major works were constructed as colonization projects where landless peasants were settled under these projects; each colonist being allotted a unit of irrigable land and highland. The size of these holdings were sufficient to enable him to derive an adequate income to maintain himself and his family. The extent allotted to each colonist was between 2 and 5 Acres (0.8 and 2 ha) of irrigable land and between 1 and 3 Acs. (0.4 and 1.2 ha) of highland.

2.3 Village Works:

Also called minor works, consist of small reservoirs and anicut schemes. Each scheme serves only about 50 to 100 families who would normally have been long established in the village. These village works are scattered all over the island with the majority of the reservoir schemes in the dry zone and the anicut schemes in the wet zone. It is estimated that about 400,000 Acs. (160,000 ha) of paddy are cultivated under such village works.

2.4 Minor Flood Protection Works:

These are large tracts situated in the lower basin of major rivers in the wet zone. These lands which have an ample supply of water are subject to intermittent flooding. Since major flooding occurs at much longer intervals and since it is uneconomical to protect these lands from major floods, flood protection bunds are constructed with sluices to protect these lands at least during minor flooding of the river. About 35,000 Act. (14,000 ha) are cultivated in paddy each year under such schemes.

2.5 Drainage and Reclamation Works:

These schemes are situated in the coastal strip in the South, and South Western sector of the Country. They are extremely low lying lands varying in elevation from −2 to +5 feet (−0.7 to +1.5 m) above mean sea level and are suitable for paddy cultivation. In addition to frequent inundation, these lands are also subject to ingress of salt water from the sea during the high tide. Moreover due to the low level of the lands, drainage is difficult. Gravity drainage is resorted to by making use of the tidal variation where possible. When the land is extremely low, drainage is done by pumping. The government is now working on a programme of reclamation of 41,000 Acs. (16,400 ha) of which about 13,000 Acs. (5,200 ha) have been reclaimed.

2.6 Lift Irrigation Works:

These are projects for the cultivation of well drained soils in the highland. They are normally meant for the cultivation of subsidiary food crops like onions, chillies, dhall, etc. These projects also play an important role in the Country's economy.

3. Irrigated Paddy Cultivation

3.1 Cultivation Season:

Since Sri Lanka experiences rain in two distinct seasons, viz. the North-East and the South-West, the cultivations are also timed for these seasons. The cultivation during the North-East monsoon rains called Maha commences sometime between October and December depending on the onset of the rains and ends between February and April. The cultivation in the South-West monsoon called the Yala is more rigorously done in the wet zone. In the dry zone however since the rainfall is much less during the South-West than in the North-East, the cultivation is limited to only a part of the lands aswedumised during the Maha.

3.2 Irrigation Method:

The following sequence of operations are carried out:–

(i) Levee Construction
(ii) Ploughing
(iii) Sowing or Transplanting
(iv) Weeding and Pest Control
(v) Fertilizer Application
(vi) Harvesting.

4. Water Management

4.1 In the general sense, water management could be defined as the processes involved in controlling, operating and releasing of irrigation water in a project area. In the more realistic sense, it would mean the procedure involved in assuring that the optimum amount of water is made available in each plot for successfully carrying out the sequence of operations (i) to (vi) detailed in the previous paragraph. This is indeed an exacting requirement; and it is upto the irrigation engineers and agronimists to find ways and means of ensuring this. In this context it would be befitting to quoto Robert Chambers from his paper on "Water Management and Paddy Production in the Dry Zone of Sri Lanka" published in January 1975. He says "....Land stays still (usually) and can easily be measured. Water in contrast cannot be relied on to stay in one place and much harder to measure. It flows, evaporates, condenses, transpires, percolates, seeps, scours banks and deposits silt. It is brought into and removed from the field environment by the weather in a singularly unpredictable fashion. As a result, those who study water and who try to handle it have their research capacity heavily taxed with quite limited tasks such as measuring flows, or evaporation or percolation....".

4.2 Necessity for good Water Management:

In Sri Lanka, in the dry zone where the major part of paddy cultivation is carried out, most irrigation projects are reservoir or tank projects i.e. they have a limited storage capacity. With good water management, it would be possible to save sufficient water to do an additional extent which would otherwise have been lost under poor water management conditions. On a long term basis this would even reduce the necessity for capital expenditure on new works and thereby save considerable foreign exchange which is a very precious commodity in our country. The other disadvantages of poor water management which lead to over irrigation are:–

(i) Leaching of the soil in the root zone
(ii) Water logging part or all of the farmland
(iii) Loss of yield
(iv) Loss of agricultural inputs.

4.3 Prblems in Water Management:

4.3.1 Farmer Education

Invariably the farmer hitherto continues to use irrigation methods which are traditional and is not in a position to appreciate more regained techniques eg. He is used to the method of flooding. This is a method which does not need much labour unlike in "Intermittent Flooding". He is unable to make use of intermitent rainfall, as his field is already flooded when the rains set in.

Fearing that any restriction of water issues to his plot or field channel would ruin his crop, some farmers resort to unlawful acts like breaking locking arrangements at control structures, cutting channel bunds etc., with the intention of tapping more water. As a result the water management in that scheme becomes difficult.

At the initial stages of construction of a major irrigation project, when excess water is available but irrigation facilities have been provided only for a limited extent, the

farmer gets used to an unlimited supply of irrigation water. At a later stage when he is compelled to economise, it is difficult to make him adopt good irrigation and water management practices.

4.3.2 Maintenance of channel system

The channel system of any project is constructed to design specifications. But with the passage of time due to poor maintenance, the entire system loses its design specifications and conveyance channels and structures do not function properly. A prerequisite of good water management is not only controlling water issues but also to providing sufficient water at the required time. Therefore a channel system under poor maintenance could defeat the very purpose for which it was designed.

4.3.3 Timing of the cultivation

This is a serious problem that is frequently encountered. If the cultivation issues commence and end on pre-determined dates, then the water issues could be more efficiently carried out. On the other hand if some of the farmers are not ready on the date of first issues, then the water issues will have to be extended beyond the last date decided on earlier. That means the channels would be conveying water for a longer period than that envisaged, thereby increasing conveyance and evapo-seepage losses.

An ideal cultivation season should be so planned that during intensive rains, the plants would be in such a stage of growth so as to be able to withstand temporary flooding, otherwise the crops could be damaged partly or completely. This could happen in the case of a plot where irrigation did not commence at the proper time but was delayed.

Another reason why all farmers are unable to commence cultivation on a fixed date is the lack of draught power. In a given project, the amount of draught power available both buffaloa and tractors, will be limited. As such it is sometimes, impossible to be ready for sowing at the same time. When this goes on continuously for a number of years, good water manageemnt becomes impossible.

4.3.4 Farm layout

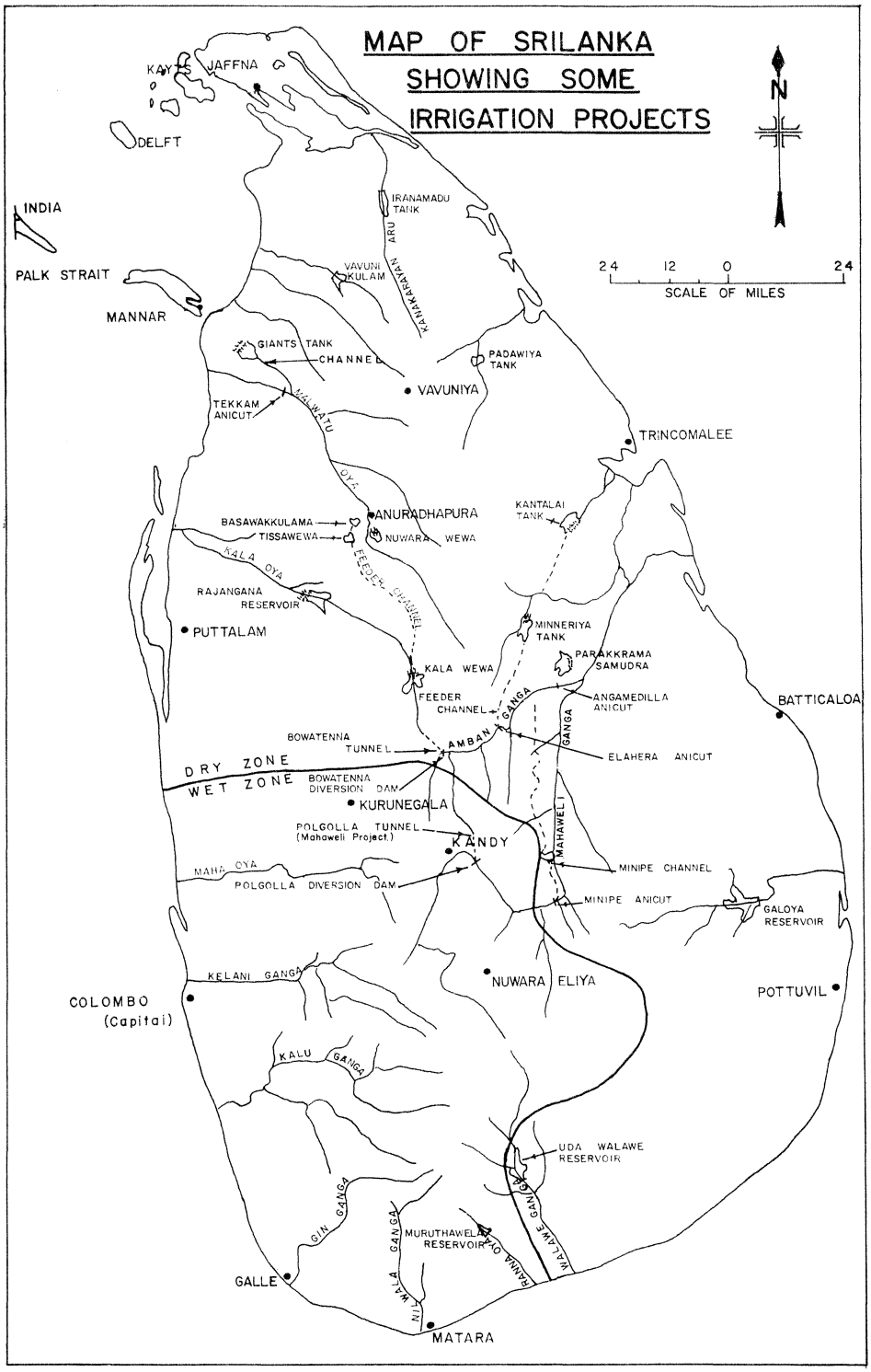
A well laid out farm is one in which the water received at farm entry is conveyed to all parts of the farm in the shortest possible time without causing any ponding up at the lowest point of the farm. This is a common drawback in the farms designed so far and experiments are being carried out to improve the lay out.

4.3.5 Excessive seepage losses

This problem occurs where soils unsuitable for paddy have been cultivated in paddy. This problem has been overcome in the case of future projects where detail land use surveys are carried out to ascertainthe most ideal cropping pattern that could be adopted.

5. Conclusion

The problems of water management detailed above are encountered in all irrigation schemes to different degrees, depending on the type of project, the type of farmers, the government institutions in the locality, the facilities available to the farmers etc. Scanning through this list, one could perceive that these problems cannot be solved by engineers and agronomists alone. It involves many other desciplines. These problems could perhaps be solved to a large extent only if the farmer could be made to realise that irrigation water is both scarce and expensive.


MAP OF SRILANKA
SHOWING SOME
IRRIGATION PROJECTS
N
24 12 0 24
SCALE OF MILES
KAYTS
JAFFNA
DELFT
INDIA
PALK STRAIT
MANNAR
IRANAMADU TANK
ARU
KANAKARAYAN AARU
VAVUNI KULAM
GIANTS TANK
CHANNEL
PADAWIYA TANK
VAVUNIYA
TEKKAM ANICUT
MALWATU OYA
TRINCOMALEE
ANURADHAPURA
BASAWAKKULAMA
TISSAWEWA
NUWARA WEWA
KANTALAI TANK
KALA OYA
FEEDER CHANNEL
RAJANGANA RESERVOIR
PUTTALAM
MINNERIYA TANK
PARAKKRAMA SAMUDRA
KALA WEWA
FEEDER CHANNEL
GANGA
ANGAMEDILLA ANICUT
BATTICALOA
BOWATENNA TUNNEL
AMBAN GANGA
ELAHERA ANICUT
DRY ZONE
WET ZONE
BOWATENNA DIVERSION DAM
KURUNEGALA
POLGOLLA TUNNEL (Mahaweli Project.)
KANDY
MAHAWELI GANGA
MAHA OYA
POLGOLLA DIVERSION DAM
MINIPE CHANNEL
MINIPE ANICUT
GALOYA RESERVOIR
KELANI GANGA
NUWARA ELIYA
POTTUVIL
COLOMBO (Capital)
KALU GANGA
UDA WALAWE RESERVOIR
GIN GANGA
MURUTHAWELA RESERVOIR
NILA GANGA
MATARA
GALLE