3. IRRIGATION DEVELOPMENT AND PRESENT STATUS OF FARM WATER MANAGEMENT IN MALAYSIA

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Introduction

Paddy is the only irrigated crop in Malaysia[1] at present. Although it is known that rice was grown near community settlements in the earliest historical days (some 2,000 years ago) along the trade waterways of Peninsular Malaysia, irrigation development has taken place over a much shorter period, commencing about the turn of the century. The impetus for irrigation development has always been given by pressing needs to increase rice production. Even as early as 1930s' there was already a keen realisation of the danger of over-dependence on other countries for basic food requirements and a technical department—the Drainage and Irrigation—was formed to deal with the problems of land and water development with particular reference to the utilization of these natural resources for increasing rice production. Since the Country's independence in 1957, irrigation development has been greatly accelerated and irrigation programmes have been implemented with the twin objectives of increasing food production and improving the economic status of the large number of farmers (totalling some 300,000 families) engaged in paddy farming.

In 1930, rice production in Peninsular Malaysia amounted to 250,000 tons meeting about 30% of the Country's requirements. At present, the annual rice production in Malaysia is approximately 1,400,000 tons—a more than five-fold increase since 1930—with a self-sufficiency level of 85–90%. At the same time, farmers especially those in the double-cropped paddy areas, are economically better off than they have been before. To make this possible, some M$540 million have been invested solely on the development of irrigation facilities and about 90% of this amount has been spent since Independence.

Farm water management came rather recently at the advent of high yielding varieties of paddy and large-scale double-cropping. It may be regarded as a logical extension to the irrigation development that has taken place up to the most recent past. Modern farm water management is still at its infancy in Malaysia but its successful implementation will have far-reaching effects on future development of irrigated agriculture in this country.

Traditional Wet Rice Cultivation

Major wet rice producing areas in Malaysia are located on the flat coastal plains of Peninsular Malaysia notably on the north western and north eastern parts of the Peninsula (Fig. 1). Very little paddy is grown above the 30 meter contour, and a relatively small amount is grown on the bottoms of narrow inland valleys.

Traditional rice growing is very much tied to weather conditions ,as it depends, to

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[1] Malaysia comprises Peninsular Malaysia, formerly known as the Malay Peninsula which extends from the Kra Isthmus to the Straits of Johore, Sabah and Sarawak situated in the northern and north-western parts respectively of the Island of Borneo.

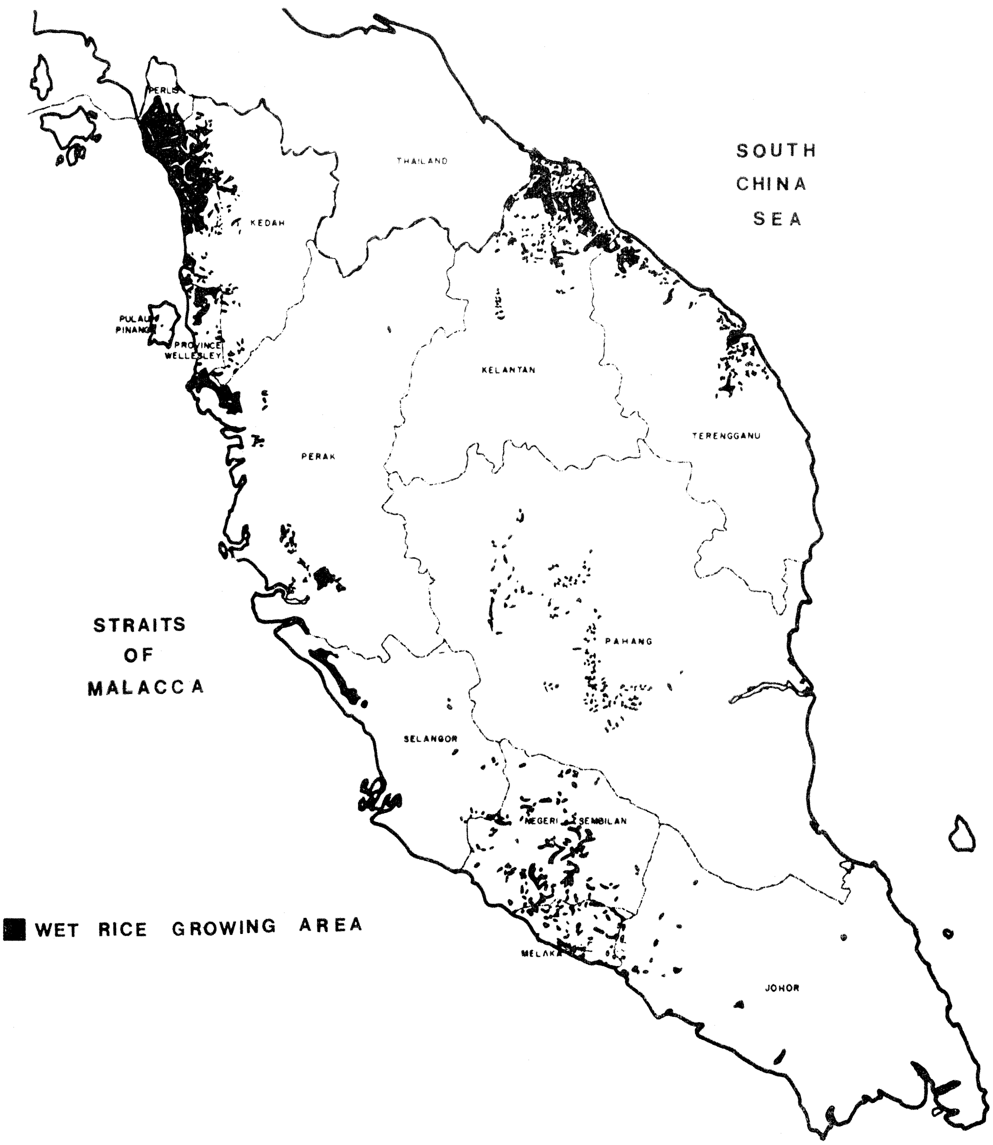

Fig. 1.

a very large extent, on direct rainfall for the flooding of paddy fields. The planting of paddy is so timed that the growing period of the plant will coincide with the rainy season, i.e. the monsoonal season, and harvesting is carried out when rainfall is normally at its lowest. Furthermore, the traditional strains of paddy are photo-period sensitive and are bound to the rainy season. Although the annual rainfall follows a somewhat defined pattern, variations do occur from year to year. When the monsoon is delayed or breaks with diminished force, partial or total crop failure may occur.

Prior to the introduction of the so-called modern irrigation works, the traditional way of paddy growing was extensively established and over 240,000 ha of land were under wet paddy before 1900. This had depended largely on (i) adequate inundation

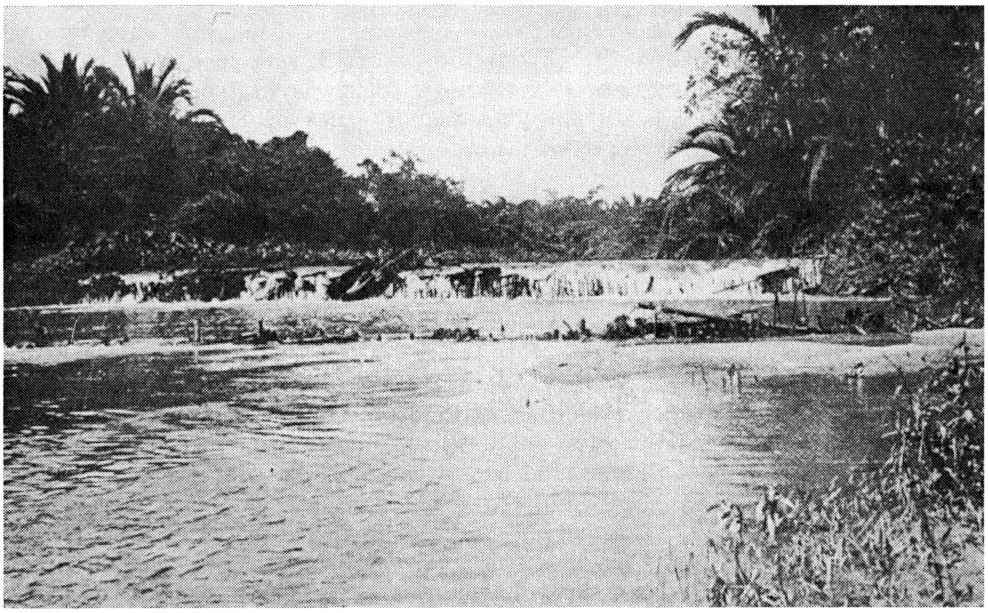

Fig. 2.

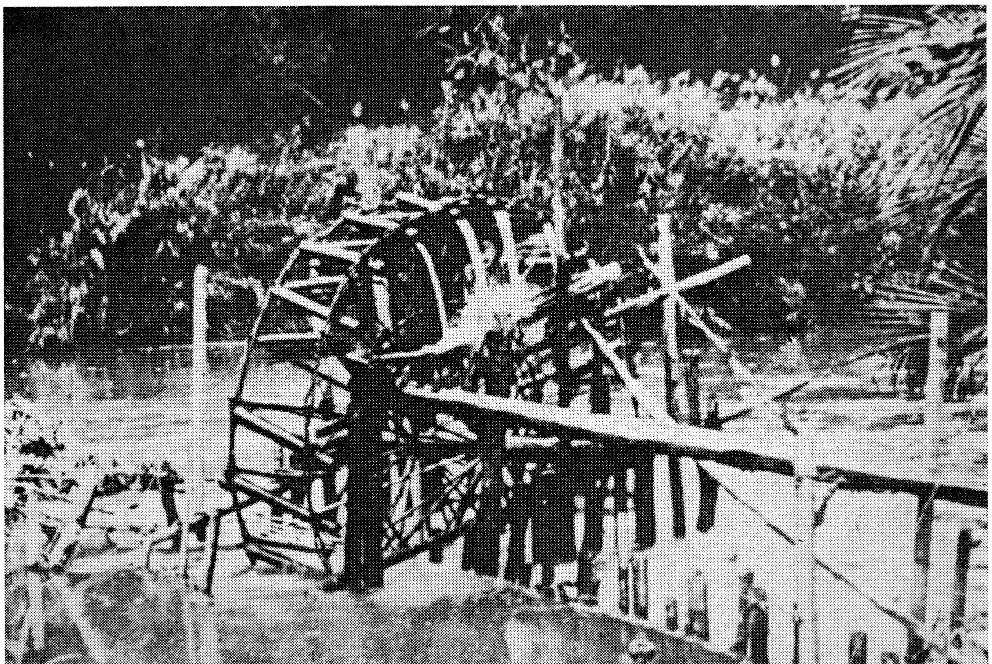

Fig. 3.

of the field during the greater part of the growing period of the plant and (ii) adaptation of cultural practices to suit conditions—topography, soils, rainfall and water conditions such as flood and drought—peculiar to the locality. Where possibile, methods were also improvised to effect some form of irrigation. The "brushwood dams" (Fig. 2) and the picturesque water wheels (Fig. 3) are examples of rudimentary structures built through communal effort to solve the water problems.

Early Irrigation Schemes

Consequent upon the need to increase food production, it was recognized that in order to sustain and develop rice cultivation, some effective form of water control was necessary. Under the Malaysian climatic and physical conditions, water control in the majority of cases comprises both drainage and irrigation, the former generally preceding the latter.

Soon after the turn of the century, the first project, the original Krian Irrigation Project covering some 20,000 ha in the State of Perak in Peninusular Malaysia, was completed in 1906. However, from then on and until 1932 little work of significance was done except for the replacement of a number of brushwood dams by properly constructed hydraulic structures. With the inception of the Draingage and Irrigation Department in 1932, the area equipped with irrigation and drainage facilities increased steadily. Up to about 196O, the majority of the irrigation schemes were constructed to enable one crop of paddy to be cultivated in a year, the main common feature being that the schemes were designed to supplement the rainfall to the extent of providing a reliable water supply

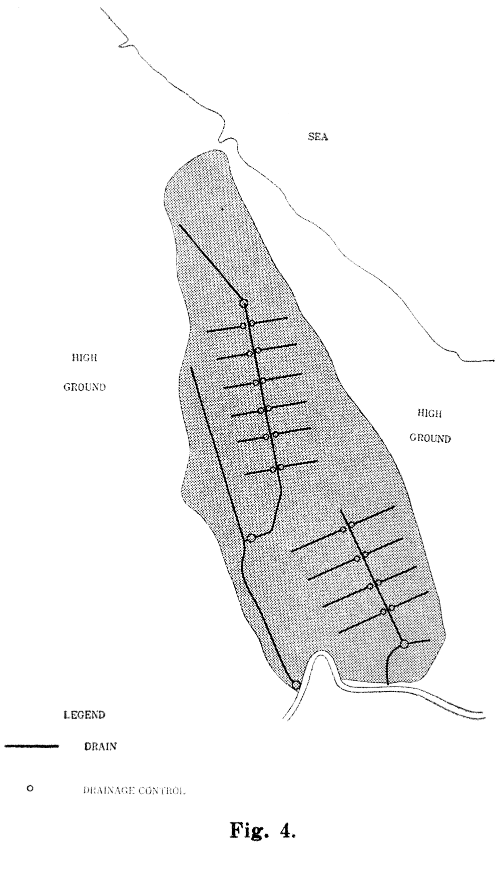

Fig. 4.

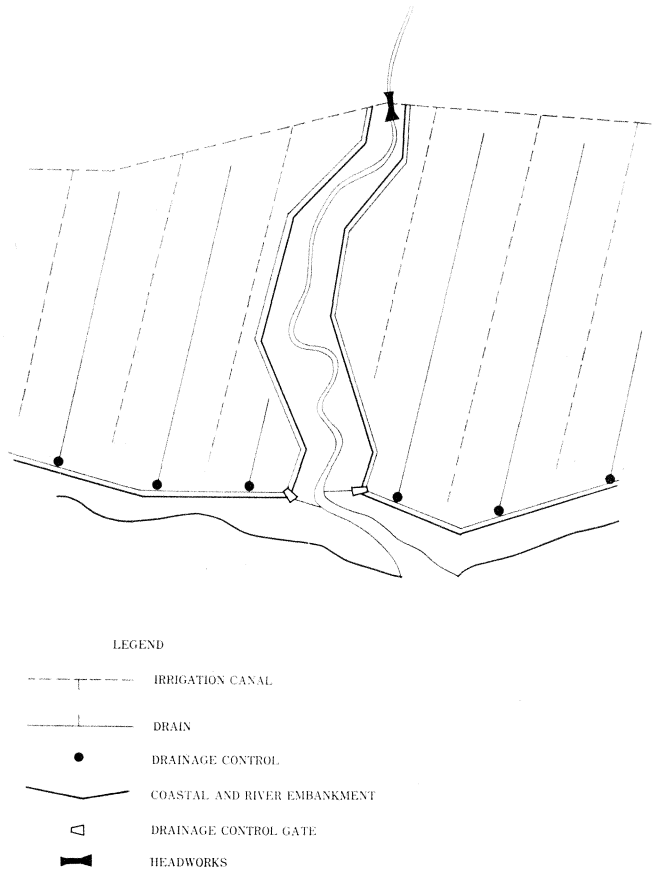

Fig. 5.

throughout the growing seasons. Such schemes could generally be grouped into three separate categories:

(i) Controlled drainage schemes in coastal areas where a positive source of water supply was absent and irrigation depended on the conservation of direct rainfall by means of drainage control gates which were closed during the growing season to prevent draining away of water from the area (Fig. 4);

(ii) Supplemental irrigation schems in coastal areas where a source of irrigation water was available but not always adequate to maintain the required depth of water in the fields, and provision was made to prevent free discharge of water into drainage outlet channels by temporarily closing the drainage control gates (Fig. 5);

(iii) Inland narrow riverine schemes where irrigation water was fed to the paddy field from contour canals along either flank of the valley. Surplus water from the paddy lots drain freely into the central river channel (Fig. 6).

Development of Water Resources for Large-Scale Double-Cropping

With the advent of double-cropping, the main effort of irrigation development has devoted to the development of an adequate water supply for the second crop (the dry-season crop) which must of necessity be planted during the period in the year when rain-

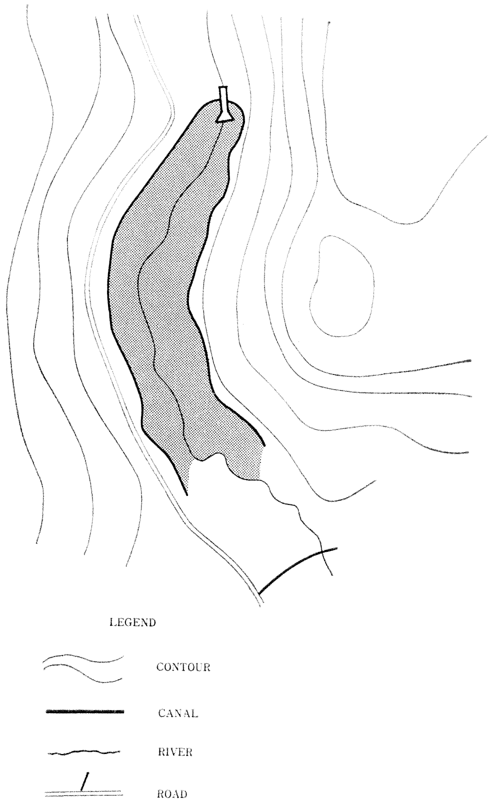

Fig. 6.

fall is less and the river discharges are correspondingly lower. To bring about double-cropping in existing major rice producing areas, the construction of storage reservoirs and large irrigation pumping stations involving major engineering works has been undertaken in recent years. Where the irrigated areas were rain-fed before, a system of conveyance and distribtuion canals and drains has been provided to replace the rudimentary works that existed. For areas where facilites were already provided to supplement rainfall for single cropping, the existing reticulation systems are improved or enlarged in their capacity so as to handle the full irrigation supply from the controlled source.

By 1975 all existing major rice growing areas are equipped with major engineering works to enable double-cropping to be carried out. These include areas under Krian Irrigation Project, Muda Irrigation Project, Kemubu Irrigation Project, Tanjong Karang Irrigation Project and Besut Irrigation Project, totalling some 170,000 ha. Extensive irrigation works have also been constructed in a number of other existing paddy areas to augment the supply and to extend the facilities for double-cropping. In all, over M$300 million were spent on irrigation expansion during the period 1961–70 while a further M$160 million will have been spent by the end of the Second Malaysia Plan period (1971–75).

As a result of these investments on irrigation works, the total irrigated area in Peninsular Malaysia increased from 210,000 ha in 1960 to 250,000 ha in 1970, while the area equipped with double-cropping facilities increased from 8,000 ha to 116,000 ha during the same period. By the end of 1975 the irrigated area will have increased to 315,000 ha, of which 240,000 ha will have been provided with facilities to plant two crops of paddy in a year. The impact of these schems can be gauged from the fact that total rice production in Peninsular Malaysia increased from 550,720 tons in 1960 to 914,550 tons in 1970. This is expected to reach 1,242,000 tons by 1975, bringing the total rice production in Malaysia to 1,400,000 tons.

On-Farm Development and Water Management

Irrigation development in Malaysia since about 1960 has been closely linked with the successful development of the high yielding varieties of rice (HYVs), the characteristics of which are already well known. The HYVs are nitrogen-responsive and for this reason are capable of high yields with heavy fertilizer application; they take a short time to mature (ranging from 135 to 145 days) are therefore admirably suitable for double-cropping; they are not season-bound and can be planted at any time of the year without the risk of crop failure. On the other hand, such varieties are relatively susceptible to attack by pests and diseases; they are more sensitive to adverse physical conditions: drought and flood greatly affect the yields. For high yield therefore, they require timely water application and better water control in conjunction with improved cultural practice and the requisite agricultural inputs, or what has now been referred to as better irrigation water management.

The present average yield in many irrigation projects is only moderate and is well below what the HYVs are capable of producing. This may be attributed, among other things ,to the lack of adequate facilities for proper water distribution and control at the farm level. Water problems mainly concern the uneven water distribution and the inordinately long time-lag between the start of water delivery and the time irrigation water reaches the farthest field. Waterlogging and inadequate drainage are other problems which are inherent in the lack of adequate on-farm irrigations and drainage facilities. Thus to a large extent the lack of these facilities has precluded the effective use of water resources that have been developed for intensified rice cultivation.

Recent experience has shown that the provision of on-farm facilities requires only a relatively modest increment in financial investment to give an attractive return in terms of additional yield. It follows then that the shift in emphasis from major water resources development to on-farm development with a view to further increasing the yield of existing irrigation projects will be the logical step to take for the immediate future. But on-farm development may lead to much more benefits as it may open the way to modern farming, and herein lies the great promise in future development in irrigated agriculture.