

Planning and Programming

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What does acceleration of the Mahaweli Development Scheme mean?

Acceleration of the Mahaweli Development Project means that instead of sequencing the programme of financing, construction, etc., the Government has decided that the major projects must be carried out simultaneously. This implies that a large concentration of resources such as men, money, machinery, material, etc. must be made available over a short time span. The quality of the resources must be adequate to meet the needs of the work and the management of the vast complexity of activities.

Financing

The President, the Minister of Irrigation Power and Highways, and the Minister of Finance and Planning have convinced this nation, the World Bank and the developed countries that the Mahaweli Development Scheme is worthy of their aid and financing. There were many who were sceptical that the Rs. 12 billion of assistance could be found. The sceptics have been proved wrong.

The sequencing of the construction may be examined, considering the main parameters i.e. Finance, Agro benefits, Social benefits, Employment benefits, Power demand and supply, Cost-benefits, etc. The lead times are inter-dependent and complex. In fact, financing and resource availability are so variable in their lead times—and outside the control of the Government of Sri Lanka at the present time—it is my opinion that any attempt to rationalise the sequencing would be futile. It is likely that the sequencing of the construction of major reservoirs like Kotmale, Victoria, Randenigala and Moragahakanda will follow the sequencing of financing.

The construction of the Minipe Right Bank Canal, Ulthiya Reservoir, Madura Oya, Minipe and Kandakadu anicuis, and the irrigation systems A, B, and C will have to follow the sequencing of the completion of the major construction works. The order of this should be clear in the next few months, subsequent to the programmes of donor countries and their contractors being available.

Construction

The resources for construction, in other words, the machinery, men, materials and management available in this country cannot in any field meet the demands (or the peak requirements) over the time scale of 6 years.

This constraint has been solved by the offer of donor countries to execute work through their own national contractors, using their own resources.

The main elements of construction may be briefly summarised as follows:—

- | | | |
|-----------------------------------|---|--------------------|
| 1. Dams, Reservoirs and Headworks | } | Machine intensive. |
| 2. Power Stations | | |
| 3. Irrigation systems | | Labour intensive |

The first two elements lend themselves to execution by foreign contractors. The third is best handled by Sri Lankans with labour and knowledge of local conditions.

*To illustrate this

	Man Years	
	Manual	Mechanical
Earth excavation 44,000 m ³	125	3
Rock excavation 60,000 tons	100	6
Rock crushing 84,000 tons	500	6

A balance could therefore be struck between delayed realisation of social and economic benefits, and the need to solve the immediate unemployment problem.

Irrigation Infrastructure

The design of the irrigation system and its construction must fit not only hydraulic and engineering requirements, but should also meet the demands of crops, cropping patterns, water duties and the periods of cultivation.

Settlement

The selection of farmers will depend on their suitability to adapt themselves to the crops that can be grown on the areas to be settled.

In any event, farmer training programmes are to be instituted to train farmer groups on rotational irrigation. It has been proposed that settlers should be trained on the growing of crops they are not familiar with, before they are settled on lands planned for special crops.

Agriculture

The optimum use of available water is a vital part of the Mahaweli Development Project. In fact, the scheme is designed to be cultivated on a mix of paddy on suitable soils (with low infiltration rates), and other crops requiring less water than the traditional flooded paddy.

The problem of weaning farmers away from flooded paddy on all soils, in all seasons, has yet to be

successfully worked out. This must be done, as reservoir capacities and canal systems are designed for conveying water on predetermined water duties with limited flooded paddy cultivation in Yala.

Community Development (and Social Infrastructure)

The planning of community development precedes, and in many ways, encompasses both Agriculture and Settlement. In fact, the planning of infrastructure roads, transport, housing, communication, supplies, provision of inputs and services for agriculture, marketing and distribution should commence quite early. So much so, this planning and its part execution must take place even before commencement of construction for obvious reasons.

In fact, this is the very reason I have chosen to show Community Development and Social Infrastructure as an all embracing activity linked directly to the early stages of irrigation systems — (See 'Major Activities').

Programming, Reporting and Evaluation

Programming is being refined with a view to achieving realistic dates of completion, using historical and factual data. Networks for each of the main activities are being drawn up, and their inter-relationships and inter-dependencies being worked out. The co-ordination of

the construction of irrigation systems, settlement, agriculture and development is now being done by the Mahaweli Development Board.

Reporting

A visual reporting system has been worked out. I have been encouraged by the fact that Board Members and others in the Mahaweli Development Board and outside it, find it easy to follow progress with this system. This presentation is supplemented by the use of figures in the usual way.

Evaluation

Simple evaluation of progress is now being done both in the 'H' areas already being developed, and in the 'accelerated programme'. The Planning and Evaluation Division is being enlarged with a view to evaluating the benefits from the developed areas, and reviewing achievements in relation to objectives.

Conclusion

Better minds than mine, and more competent persons such as Consultants — both local and foreign — will be working on the different aspects of planning this visionary development effort. Needless to say, each of us, who is associated, will be just one small link in this chain of activities which encompasses the globe.



Appendix 1

Processes, Planning and Execution of the Project

Time →

POLITICAL & ECONOMIC ASPIRATIONS

POLITICAL HUNCHES,
ECONOMIC & SOCIAL
PRESSURES

FEASIBILITY

STUDIES

MASTER PLAN

(UNDP/FAO DATA,
INPUT—OUTPUT
RELIABILITY,
COSTS, RETURNS)

1969

OVERALL ECONOMIC & FINANCIAL PLANNING

(BUDGETARY,
EMPLOYMENT, SOCIAL
BENEFITS, ETC.)

STUDY OF SELECTED PROJECTS

FINANCING (LOCAL & FOREIGN)

CONSTRUCTION

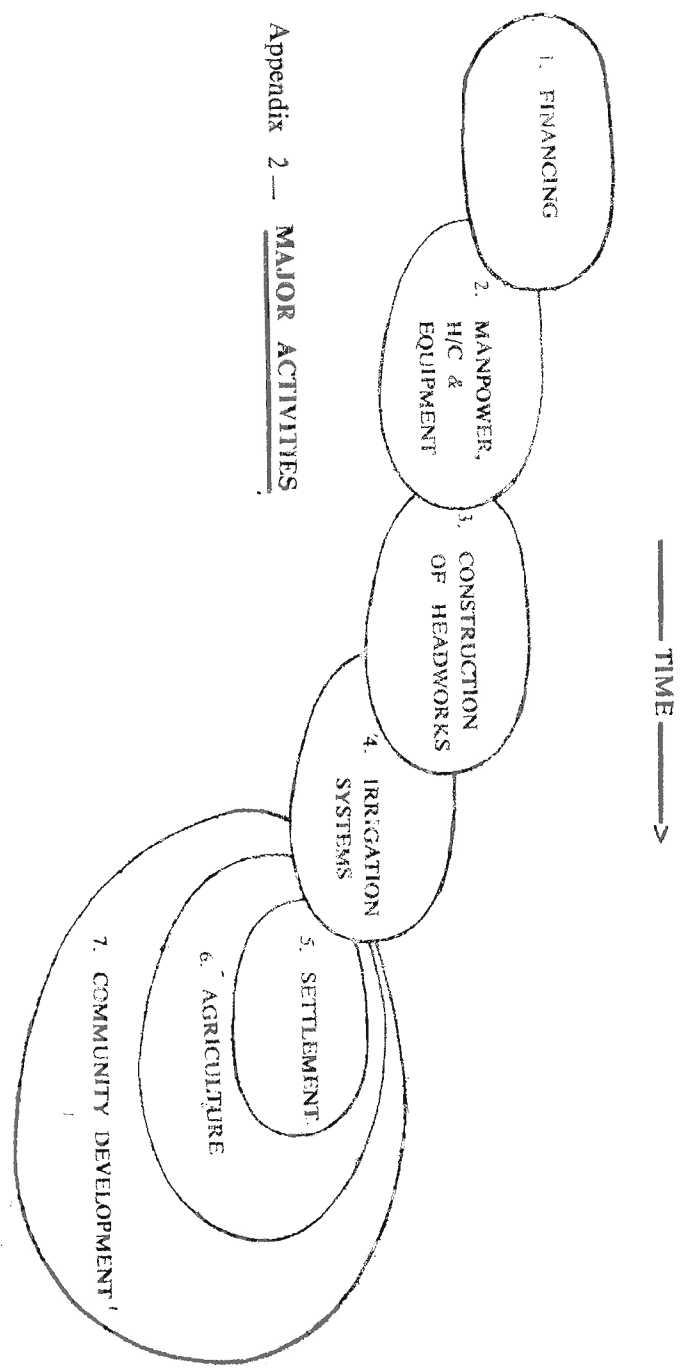
(LOCAL & FOREIGN) AGENCIES

SETTLEMENT AGRICULTURE & POWER GENERATION

DEVELOPMENT

EVALUATION OF BENEFITS

Appendix 2



Appendix 2 — MAJOR ACTIVITIES

Appendix 3

1977 — 1983

PERIOD →

1983

POLITICAL & SOCIAL COMMITMENTS

1977

FINANCING

(LOCAL & FOREIGN)

CONSTRUCTION

(LOCAL & FOREIGN AGENCIES)

MAINTENANCE & OPERATION

OF IRRIGATION & OTHER FACILITIES

SETTLEMENT

AGRICULTURE

POWER GENERATION & DISTRIBUTION

COMMUNITY DEVELOPMENT

& INFRASTRUCTURE SERVICES

EVALUATION

OF BENEFITS & RESULTS

*Some Aspects of Settlement Policy of the Mahaweli Development Scheme at the Initial Stage of Settlement**

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When the Mahaweli Development Scheme is completed in five or six years time, the regulated flow from the Mahaweli river and its tributaries will provide irrigation facilities to about 900,000 acres in the Mahaweli and Maduru Oya basins and the North Central Province. Of these lands, about 246,000 acres are presently under irrigation and will receive supplementary water supply for the continuous cultivation of two crops a year. The other 654,000 acres are new lands presently in jungle. After completion of the scheme 225,000 peasant farmer families are expected to be settled on the new lands¹.

According to project plans in the North Central Province, 2187 families were expected to be settled by 1975. The programme envisaged further settlements: 1976 - 7342; 1977 - 6381; 1978 - 11,220; a total of 27,113 families. Due to various delays, apparently in construction work as well as settlement programming, only the first batch of 2189 families had been settled by 1976. Recently a second batch of settler families are also reported to have been settled.

The settlement policy and programmes seems to have seen considerable discussion in official circles at that time. There was also a feasibility report² which discussed at length many 'sociological' issues such as supportive services, patterns of leadership, unit allotment and subsidies, education and health facilities, recruitment and selection, etc. Perhaps as a result of those discussions, a very sophisticated settlement plan was evolved emphasizing clusters of villages, proximity to cultivations integrated service centres, etc. However, as a result, land development policies developed over the decades seem to have been thrown overboard. There were 'new' policies on recruitment, subsidies, etc.

The manner in which the settlement programme works out, tested by reality over time, is yet to be seen. At the initial stage at least, the new policies seem to have led to much hardships for the settlers, hardships which may have been averted if the policy-makers had some sympathy for the settlers who were the persons who have to live through the new programme of rural settlement.

The initial stage of settlement is not as unimportant as policy-makers imagine. If the irrigation system is to work, if a new level of advanced farming and investments are to be initiated by these 'peasant' families with their 2-1/2 acres of lowland and 1/2 acre homestead, initially itself, facilities should have been available to begin investments at a higher level. At least, there should have been minimum health and other facilities so that their health would not be impaired during the initial stages.

The experience of the first batch of 2187 families is of special interest because this is the programme through which 225,000 or so 'peasant' families of whom so much is expected will have to go through when their time comes for settlement and the new future. It may also be added that now that all the Mahaweli projects are scheduled to be completed in five or six years, this would be the phase of settlement many of them would be in when the construction works are completed.

Findings of the Field Survey

The field survey was conducted in May 1976 in the H 1 area on the left bank of Kalawewa. The Sample Frame was the Project allotment lists scheduling about 2013 settlers who had been allotted land. The sample was selected on block stratified random basis. At interview level, some substitution had to be made, settlers mentioned in the allotment lists not being available for interview and substitution being made by interviewing the settlers in the adjacent plot. The sample interviewed consisted of about 3.5 percent of the settler families.

The survey area covers the first area developed for irrigation and new settlements under the Mahaweli Development Scheme through the distributory canal on the left bank of Kalawewa in the North Central Province, the area marked H 1 in the Mahaweli project maps, and consists of about 6,000 acres. According to project files, 2197 settlers had been allotted 2-1/2 acres of irrigable low-lands for each family. However, only about 1900 families had taken possession of the land. The additional 1/2 acre for homestead envisaged in project plans had not been demarcated or allotted.

About 10 percent of the area (about 600 acres) consisted of old (purana) villages, and the rest government forests. The old village land had been taken over by the project and reallocated, not necessarily to the former owners.

The forest land marked out as low-lands had been cleared by the project. There was some construction work going on in the smaller distributory canals and the water outlets to the fields, the project schedules delayed reportedly due to the non-availability of sufficient bulldozers and tractors in working order. Construction work was mostly by private contractors.

The water had not yet been issued to the fields. At the time of the survey, the settlers were preparing the lowlands for irrigation, clearing the roots and mounds left by project clearing and constructing ridges to retain water when issued.

*This article is based on a DISCUSSION PAPER READ AT THE MINISESSION ON "MAHAWELI" HELD ON 5 AUGUST 1978, SPONSORED BY THE SRI LANKA ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The settlers had constructed temporary huts in the allotments, some living with their families in the temporary huts. Of the settlers, about 250 families were those displaced by the reservoir at Bowatenna in the Matale District.

At the time of the survey, the settlers had received two types of financial assistance from the project: Rs. 100/- to construct a hut and Rs. 250/- for subsistence at Rs. 50/- a month for five months, some allottees receiving the money in one payment. A further payment of Rs. 750/- was expected as costs of constructing the ridges once those are completed.

There had also been a subsistence allowance in kind which was expected to be for a year; a ration of dry milk, flour and sugar and sometimes dhal, on a basis of issuing rations upto four members of a family under the World Food Programme. These issues had been received several times though not on a regular basis. Those displaced by the reservoir had been provided with transport to bring their possessions to the project area.

The settlers had not been paid any compensation for loss of land or displacement.

These areas had by that time experienced severe droughts, reportedly for five consecutive seasons, making even 'chena' cultivation difficult: only the land irrigated by the tank waters of Kalawewa had been successfully cultivated in the area.

The area was accessible by jeep though the gravel roads were already difficult to travel in.

The new 'integrated service centre' had been constructed and inaugurated though the 'centre' seemed to be remote and deserted at that time.

The agro-identity cards were being issued as a prelude to registering all settlers in primary (branch) co-operatives.

The project officers were planning consultations with the settlers after they form farmers' societies.

The soil surveys envisaged in the project plans had not been communicated to the settlers.*

As seen from the following tables, the settler families do not seem to have been selected very carefully. Most adults had limited education, and there was a high dependency ratio. They did not seem to have much savings or a capacity for a high level of investment. A detailed discussion of the following tables has been published by the People's Bank Research Department.³ The tables provide an over-view of the socio-economic conditions of the first batch of settlers of the Mahaweli Development Scheme.

Discussion

(a) Advanced 'Alienation'

The first batch was settled while the construction works in the smaller distributary canals were going on. The lowland allotment of forest land was cleared by the project, the gravel roads cut, and the settlers were invited to take possession of the land. The rationale was apparently that settlers would get employment in the construction work, and that they would prepare the ridges and the land for cultivation by the time water could be issued.

This was in the left bank of Kalawewa, where some land had been cultivated from the tank waters. The vast remaining area is parched dry land. There had been severe droughts for several seasons in the area. Even 'old' villagers could not find a sufficient income in the area, even 'Chena' cultivations being damaged or destroyed. Construction was sub-contracted, and the contractors did not give work regularly. For an income, work had to be done as casual labourers, and when that was done the field could not be prepared.

As the forest was cleared and the natural rhythm broken down, sickness was always a threat. Those families who had come with their children and babies (those displaced from the Bowatenna reservoir area) seemed to be particularly at a loss. The nearest dispensary was a number of miles away and the hospital even further away. Public transport was difficult and there were no school facilities. If the settlement was delayed till construction was completed and the water capable of being issued to the fields and the services organized, all this could have been spared.

(b) Minimum 'Subsidies'

For settlement in new land, as for any other investment, one needs finance whether as savings, aid or loans. It is not a question of 'subsidies'. However, apparently on the principle of 'self-help', these settlers were given minimum assistance: Rs. 100/- to construct a hut, Rs. 250/- for subsistence at Rs. 50/- a month for five months. A further payment of Rs. 750/- was to be made when the ridges were constructed. Those displaced from the Bowatenna reservoir area had been provided with transport to bring their possessions. Under the World Food Programme, an issue of dry milk, flour and sugar, and sometimes dhal, was received for upto four members of a family though not regularly.

The result was that the 'peasants' could not build more than a bare hut. The settlers from the 'old' villages in the nearby areas stayed in their houses, however facing the threat of eviction soon. The lack of adequate housing assistance was particularly harsh on those displaced from Bowatenna who lived in huts with their possessions piled up under a temporary shelter. Building a more permanent and healthy shelter was useless, even if they

* According to the field informants, the Soil Surveys had not been done. But an official of the Department of Irrigation clarified that in the H I area, the Soil Surveys had been completed. The remaining task was to superimpose the Soil Survey maps on the settlement maps. However that may be, the settlers had not been advised regarding appropriate crops. This was expected to be done at a later stage.

could afford it, because they had not received their homestead yet.

These were of course, 'new' policies. Even as far back as 1941, Rs. 250/- was given for a 'cottage'. The unit cost of a cottage was Rs. 2700/- in 1951, Rs. 1600/- in 1953 and 1956. In 1976, what kind of cottage could be built with Rs. 100/-?

The aid given at the initial stage should be considered grossly inadequate by any standard.

(c) 'Delayed' Compensation

The settlers had not received any compensation for loss of property. Such compensation was to be paid after the claims are checked, etc. Why could not the compensation be assessed earlier and given to the 'peasants', so that at least some of the families would have had some savings to start the new life?

Apparently, no compensation was even envisaged for displacement. New settlements involve relocation of the schooling of children, etc. and should have been given at least some consideration.

(d) 'Displacing' all Families

Under the new policies, all families, including those from the 'old' villages were displaced. The land was taken over by the project and reallocated. This was apparently necessary for physical planning to irrigate the low-land areas. It may also have been necessary in the context of fragmentation, etc. However, apparently there were no physical planners associated with such 'planning'.

(e) Alleged Equality of 2-1/2 acres for each family

The principle of allowing 2-1/2 acres to each family for low-land cultivation and 1/2 an acre for homestead may be reasonable so that a large number can be given an adequate plot of land. However, 2-1/2 acres in the different areas will have different economic potentials. The result is that receiving the better land depends on luck or 'patronage'.

(f) Recruitment Principles as a 'Non-issue'

Recruitment of settlers was allegedly according to economic viability criteria and after a number of 'land kacheeries'.

However, there were families of various sizes, one with 14 members. In one family, there were only an aged lady and gentleman, both over 60. There was a high dependency ratio. Most were uneducated, specially the women.

There may have been genuine difficulties in recruitment with the necessity to give land to those displaced from the old villages, etc. It may also be true that given the Sri Lanka extended family, it would be difficult

to ascertain the precise membership of a settler family. However that may be, there was no evidence of any careful selection procedure.

(g) Project Officials who 'could' not meet the 'peasants'

There were Development Assistant Community Development Officers on the project. However, they had no contacts with the settlers. As these officers did not have facilities to assist the settlers, they were apparently waiting for happier times to 'organize' the community.

(h) Advice on Agriculture and Investments

At the time of the survey, the soil surveys had not been communicated to the settlers. As such, it may be supposed that no advice as to appropriate crops, etc., could have been given. In any case, the settlers had only a very vague idea about the cropping plans of the project etc., and were envisaging paddy cultivation when water was available, and some limited 'chena' cropping till such time.

(i) Services

Though the project has elaborated plans for an integrated service centre and the provision of adequate health and educational services, at the time of the survey only the integrated services centre building had been completed. There was an obvious delay in the provision of health and other social services and facilities.

In conclusion, it may be said that many aspects of the initial stage of settlement create an environment for subsistence agriculture at a low level of investment and seem to be inappropriate to an irrigation system that is to usher in an era of new investments in the irrigated areas of the Mahaweli Development Scheme. Some reasonable aid and assistance at the initial stage of settlement or timing of settlement to a time when water can be issued to the field and other services provided seem to be essential if the Mahaweli settlers are to usher in a new era in our economy and country on the basis of a firm beginning and foundation.

References:

1. Mahaweli Development Board, 1977, *Mahaweli Ganga Development — Sri Lanka: Summary Report on Projects.* p. 2.
2. Mahaweli Development Board and Sogreah, Grenoble, France, 1972, *Mahaweli Development Project I — Feasibility Study for Stage II, Vol. VII and VIII — Settlement Planning and Development.*
3. Karunatilake, Dingi, 1976, *A study of the Socio-economic Conditions and Investment Potentialities of the Settlers of the Mahaweli Development Project.* — The report of a Field-Survey of the First Stage of Settlers. (People's Bank, Research Department, Study Papers, 1976, Cyclostyled).

TABLE 1 — AGE STRUCTURE

<i>Age Group</i>	<i>Males</i>	<i>Females</i>	<i>Total</i>	<i>%</i>
0 — 5	48	29	17	17
5 — 10	34	43	77	17
10 — 15	32	26	58	12.9
15 — 20	24	28	52	11.9
20 — 25	22	25	47	10.4
25 — 30	15	19	34	7.5
30 — 40	16	28	44	9.7
40 — 50	20	13	33	7.3
50 — 60	15	2	17	3.9
Over 60	5	7	12	2.6
Total	231	220	451	100.0

TABLE 2 — FAMILY SIZE

<i>Family Size</i>	<i>Number of Households</i>
1	...
2	...
3	...
4	...
5	...
6	...
7	...
8	...
9	...
10	...
11	...
12	...
13	...
14	...
Total	74

TABLE 3 — EDUCATIONAL STANDARD

<i>Standard of Education</i>	<i>No. of Persons over 5 years</i>	<i>%</i>
Uneducated	103	27.54
Upto 5th standard	173	46.26
5th Standard to G. C. E. 'O' Level	93	24.87
Above G. C. E. 'O' Level	5	1.33
Total	374	100.00

TABLE 4 — MINIMUM EDUCATIONAL SKILLS OF THE SETTLER FAMILIES

	<i>No. of families</i>	<i>%</i>
No. of persons educated	5	6.76
At least one person educated upto 5th standard	60	81.08
At least one person educated upto G. C. E. 'O' Level	4	5.41
At least one person above G. C. E. 'O' Level	5	6.75
Total	74	100.00

TABLE 5 — EMPLOYMENT (as Self-Classified)

					<i>Number</i>	<i>%</i>
Full time agriculturalists	...	...	...	...	71	26
Part-time agriculturalists	...	...	...	...	189	68
Labourers	...	...	...	...	13	5
Traders	...	...	...	...	1	---
Other	...	...	...	...	4	1
Total					278	

TABLE 6 — AVAILABILITY OF LAND PER PERSON

	<i>Number</i>	<i>Low-land Acreage</i>	<i>Acres per person</i>	<i>Entire Acreage</i>	<i>Per person</i>
Population over 15	239	185	0.77	222	0.93
Males over 15	117	185	1.60	222	1.90

TABLE 7 — ANNUAL INCOME OF SETTLER FAMILIES DURING THE PREVIOUS YEAR

<i>Income Group</i>	<i>No. of Families</i>	<i>%</i>
Upto Rs. 500	7	9.5
500 — 1000	11	14.9
1000 — 1500	7	9.5
1500 — 2000	9	12.2
2000 — 2500	12	16.2
2500 — 3000	6	8.1
3000 — 4000	12	16.2
Over 4000	10	13.5

TABLE 8 — INDEBTEDNESS

	<i>No. of Families</i>	<i>%</i>
Below Rs. 500	10	13.5
500 — 1000	3	4.05
1000 — 2000	3	4.05
2000 and above	2	2.7
No. not reporting	56	75.6

TABLE 9 — OWNERSHIP OF LAND PREVIOUSLY

	<i>No. of Families</i>	<i>%</i>
No Land	42	56.7
Upto 1 acre	8	10.8
1 to 3 acres	15	20.2
3 to 5 acres	9	12.16

TABLE 10 — ASSETS

	<i>Value Below Rs. 1000</i>	<i>Rs. 1000— Rs. 2000</i>	<i>Rs. 2000— Rs. 3000</i>	<i>Rs. 3000— Rs. 4000</i>	<i>Over Rs. 4000</i>
Movable assets such as bicycles, sewing machines	4	1	3	---	---
Cattle	2	3	1	---	6
Agricultural Equipment	1	---	---	---	---
Value of house that had to be abandoned	8	3	5	1	31

(21 families stated that they had no house of their own previously — 5 not reporting)

Settlement Planning in Area H

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One of the major objectives of the Mahaweli Programme is the development of agriculture in the Dry Zone through a process of land settlement based on family farms. In pursuance of this objective, plans have been drawn up to settle 24,512 families in area H located in the basin of the Kala Oya. Of this, 6007 families have already been settled and it is expected that the remainder will be settled within the next few years.

Area H which is approximately 70,000 acres in extent has been divided into six main sections based on topography and drainage. Each of these sections in turn has been sub-divided into blocks based once again on micro-level variations in topography and drainage. Within each block, an allottee has been given 2-1/2 acres of irrigable land and 1/2 acre of unirrigable land to serve as his homestead.

The blocks are of different sizes and in consequence the number of holdings vary accordingly. This can be seen from Table I which gives the total number of irrigable holdings and homesteads in the blocks that have already been settled within areas H1 and H2.

TABLE I

Distribution of Irrigable Holdings and Homesteads in areas H1 and H2.

Area	Blocks	No. of Irrigable holdings	No. of homesteads
H1	301	271	577
	302	681	881
	303	217	535
	304	602	829
	308	258	367
H2	305	567	601
	306	481	475
	307	355	356
	309	413	467
	310	248	362
	311	317	470
	313	447	683
	314	488	482

Source: Settlement Planning Division, Mahaweli Development Board.

In all of the previous land settlement schemes, the homesteads have been physically separated from the irrigable holdings because of micro-level variations in topography and the development of irrigation systems based on gravity flow. Since the prevailing topographic conditions and the irrigation system in area H

are similar to those of other areas, the physical separation has been unavoidable. All the same, the Mahaweli authorities have attempted to minimize the deleterious effects of such separation by ensuring that an irrigable holding is located less than 2-1/2 miles from the corresponding homestead.

The type of settlement that has been planned for area H also differs from those in the other land settlement schemes. Hitherto, in almost all of the land settlement schemes, the unirrigable holdings or "homesteads" have been distributed in a linear fashion. The linear type of settlement gave rise to a multiplicity of problems, the chief amongst which are (1) the long distances separating the homesteads from the irrigable holdings, (2) the difficulties involved in the provision and utilization of public facilities, (3) the problems in fostering better relationships and solidarity amongst the farming population and (4) the lack of self-identification by the settler.¹ Because of these problems the linear type of settlement has been abandoned in favour of the cluster type, each cluster corresponding to an irrigation block.

Within each block the homesteads have been grouped into several hamlets. The number of hamlets per block and the number of homesteads per hamlet vary from one block to another depending on the size of the block and the local environmental conditions. This can be seen from Table II which gives the number of hamlets and the number of holdings per hamlet in certain selected blocks within the H1 area.

TABLE II

Distribution of Hamlets and Homesteads in Blocks 301, 302 and 308.

Block	Hamlet	Number of homesteads per hamlet
301	1	117
	2	120
	3	176
	4	164
302	1	96
	2	140
	3	156
	4	128
	5	223
	6	138
308	1	127
	2	113
	3	128

Source: Settlement Planning Division, Mahaweli Development Board.

A hamlet with approximately 100 to 150 families was considered to be an ideal size because it was expected to "correspond generally to the peasants conception of a manageable and comfortable social unit".¹ Furthermore, it was pointed out that "for villagers and for old colonists such a dimension is the ideal to permit the smooth play of solidarity ties for any purpose. It facilitates the managing of a new village by its own leaders, their control of social order and the correct operation of cultivation schedules without depending on the external authorities".¹

One of the major problems in many of the previous land settlement schemes was the high degree of cultural and social heterogeneity even within individual settlements. This problem arose partly because of the linear type of settlement that was established and partly because of the inadequate attention given to social and cultural factors when grouping people together. These in turn promoted individuality and prevented the settler identifying himself with a social group. The Mahaweli authorities have attempted to minimize these problems and at the same time promote cohesiveness and solidarity amongst settlers by grouping together as far as possible in hamlets, people having a similar geo-cultural background, a similar social status and wherever practicable, similar caste affiliations.

The selection of allottees and settling them on family farms is only one aspect of land settlement. An equally important aspect is the provision of infrastructure services needed by the settlers not only for the pursuance of their agricultural and other economic activities but also for their day-to-day living. In the previous settlement schemes their services were not adequately provided and the little that was provided were often at the wrong locations. Clearly, all of the services needed by the settlers cannot be provided at every service centre because of the huge expenditure involved and the problem of an adequate threshold. Consequently, the plans for area H envisages the provisions of these services on a hierarchical basis at 3 different levels, i.e. hamlet centre, village centre and township. The distribution of these different centres within area H can be seen from Table III.

TABLE III
Distribution of Hamlet Centres, Village Centres and Townships in Area H

Area	Blocks	Hamlet Centres	Village Centres	Townships
H ₁	5	23	2	1
H ₂	9	43	2	1
H ₄	10	79	12	2
H ₅	11	67	10	2
H ₇	4	26	2	2
H ₉	5	21	3	1
Total	44	259	31	9

Source: Settlement Planning Division, Mahaweli Development Board.

The services that will be provided at these centres have been divided into 7 categories i.e. administration, commercial, agricultural, educational, cultural,

health and others such as cemeteries and public toilets. The range of services to be provided at each centre varies with the level of settlement. The hamlet centre will serve 100 to 125 families which would amount to 200 to 600 persons. Being the lowest order service centre, the hamlet centre is not expected to perform any administrative functions. The next order centre is the village centre designed to cater to the needs of 4 to 6 hamlets that would include 500 to 700 families. The total population to be served would vary between 2500 and 3500 families. The village centre because of its larger size and location will have more functions and provide a wider range of services than the hamlet centre. Next to the village centre is the township centre which is expected to serve 5 to 6 clusters. These clusters will have 3000 to 3600 families and a total population varying between 15,000 and 20,000 persons. Being a higher order centre, the township is designed to provide a much wider range of services than the other two types of centres. The range of services that will be provided at each level can be seen from Table IV.

It is noteworthy that plans have also been drawn up to provide a suitable industrial base for the village centres and townships. At the village level, the industries include a textile weaving centre, cottage industries and smallscale paddy and fibre-processing mills. The larger industries are to be located at the township level. These include a textile mill, rice processing mills and other mills for agro-based industries such as groundnut oil and straw ware.

Plans that have been drawn up, to be of practical significance should be implemented quickly and efficiently. This is particularly true of service facilities. In the past, there has been a wide time gap between the settling of people and the provision of even the basic service facilities. Furthermore, even after some of the facilities have been supplied, it has taken a long time for them to be developed to a satisfactory standard.

This has not only forced the settlers to face a lot of unexpected difficulties but has also prevented them from sending their roots into the area. An equally serious problem has been the unplanned growth that has inevitably resulted from the delay in the implementation of plans. Some of the unplanned growth has no doubt been salutary. But much of it has been unsatisfactory partly because it has retarded the development of the planned service centres and also because it has led to the emergence of patterns of land use often contrary to what has been planned. All of these problems will have to be avoided in area H if the new settlements are going to emerge as healthy viable communities.

It is clear that a great deal of thought has gone into settlement planning in area H and the net result has been a healthy and welcome departure from the type of settlement planning that has gone on in the past. Several new concepts have been incorporated in the planning process and of these the cluster type of settlement and the hierarchical approach to the provision of services appear to be particularly significant. All of the concepts have no doubt been introduced with certain specific objectives but the extent to which they will be realized depends on the manner in which the plans are implemented.

TABLE IV
INFRASTRUCTURE SERVICES

SETTLEMENT LEVEL	ADMINISTRATIVE	COMMERCIAL	AGRICULTURAL	EDUCATIONAL	CULTURAL	HEALTH	OTHERS
Hamlet 100—125 Families (500—600 persons)		Co-operative Depot Post Box Boutiques	Farmer's organisation Representative	Primary School	Area to be reserved for Recreation, Religious & Community Activities.	Mobile Dispensary	Cemetery (One for two hamlets)
Village Cluster for 4—6 Hamlets 500—700 families (2500—3500 persons)	Grama Sevaka's Office Range Office (One for every two clusters)	Branch Co-operative Society and Co-op. Depot. Sub Post Office (One for two clusters) Repair Shops Shops and Sunday fair (Pola Grounds)	Fertilizer Store Paddy Store Tractor Repair Station Project Office (Cluster level)	Primary Educational Institutions Junior Secondary School Play Ground	Community Centre Multipurpose Hall, Reading Room Library Play Ground, etc. Archaeological and Architectural Ruins to be preserved Religious Institutions Temple, Church Kovil, Mosque, etc.	Public Health Midwife Dispensary (Visiting) (One for two clusters)	Bus Stops Parking Area Green Belts Cemetery Public Toilets.
Township 5—6 Clusters or villages 3000—3600 families (15000—20000 persons)	Town Council Range & Regional Office Police Station	Multipurpose Co-operative Society-Primary Co-operative Retail Depot. Post Office, Banks Central Market Shops Repair Shops Filling Stations Cinemas	Agricultural Training Centre Sub-area farmers Committee Office Paddy Store Fertilizer Stores Agricultural Service Centre	Senior Secondary School & Play Ground Other Educational Institutions Technical & Commercial	Community Centre Multipurpose Hall, Library Play Ground Cinema etc. Religious Institutions Archaeo- logical & Architectural Ruins to be preserved	Central Dispensary & Maternity Ward Public Health Centre Hospitals (Peripheral Unit or Rural) (For type or distribution see F studies)	Bus Stand (Main) Bus Stops Railway Station (If Passing through) Parking Lots Green Belts Public Toilets Cemetery & crematorium

Source: Settlement Planning Division, Mahaweli Development Board.

The Importance of Control of Malaria in the Mahaweli Development Project

A. N. A. Abeyesundere

Anti-Malaria Campaign

The vector which transmits malaria in Sri Lanka is the female *Anopheles culicifacies*. This mosquito breeds in collections of non-polluted, stagnant or slow flowing fresh waters. It prefers sunlight to shade. This mosquito is essentially a Dry Zone species where it is extensively prevalent in the jungle-covered plains and villages. It prefers to bite animals rather than man for its blood meals. The preferred breeding places of *A. culicifacies*, during drought periods are the sand pools and rock pools in the river beds. These may extend to manmade irrigation channels and streams, especially during droughts when a free flow of water cannot be maintained and pooling in the bed of the channel or stream occurs.

Therefore in largescale development projects such as the Mahaweli Development Scheme, where rivers are diverted, essentially to irrigate new areas and augment the already existing water supplies to the Dry Zone, the malariogenic potential can be increased in areas which are already hyperendemic.

Jungles are cleared, water courses are increased and the animals are driven away. Aggregations of populations such as the colonists are placed in these areas. Most of these populations may be from less malarious or non-malarious areas and their immunity level is low, so that if infected by the malarial parasite they could have a more severe clinical attack of malaria than the local residents of the area. The mosquito itself has its natural animal hosts removed and for its continued survival it has to attack the human population, as it needs blood meals for its existence.

It thereby enhances malaria transmission. Most of the malaria as it now exists in Sri Lanka is manmade. The receptivity and the vulnerability of the areas are thus both enhanced by largescale Development Projects of this nature and the malariogenic potential is increased several fold.

However, one must hasten to add that it is not one's intention to maintain that just because the malariogenic potential can be increased, such Development Projects should not be undertaken. On the contrary, it is our primary objective to indicate that timely measures be initiated in these areas before such projects commence. To fulfil this objective it is essential that the Anti-Malaria Campaign be involved from the planning stage of these projects.

The five-year intensive malaria programme for the malarious areas of Sri Lanka commenced around October, 1977. This includes all the areas which have to be developed under the Accelerated Mahaweli Scheme. The major objectives are :

(1) To reduce overall malaria transmission to a very low level at the end of five years, so that malaria will no longer be a major public health problem, and

(2) To eliminate malignant malaria progressively in the ensuing 5 years. The primary activities are :—

(I) **Residual Spraying** of 1 million households and outhouses in the malarious areas at 2gm/sq meter of Malathion on a 3 monthly cycle.

(II) **Drug Administration :**

(a) 5 days radical treatment is given to all clinically diagnosed and suspected cases of malaria by all Government Medical Institutions, — Anti Malaria Campaign field personnel and specially trained volunteers in remote areas.

(b) Prophylactic treatment is given to officers and workers engaged in development schemes in the malarious areas, as well as to those entering the malarious areas from non-malarious on a temporary basis.

(III) **Case Detection :**

Malaria case detection is carried out by 36 Special Indicator Institutions, Activated Medical Institutions and Active Case Detection Agents.

(IV) **Entomological Investigations :**

12 Entomological teams carry out entomological investigations in the malarious areas of the country. Their studies include monitoring of the effectiveness of the insecticide (malathion) under field conditions, impact of the insecticide spraying on the vector population and any behavioural changes of the vector population.

(V) **Other control methods that are in the process of development are as follows:—**

(a) Intermittent flushing of streams and irrigation channels and proper maintenance of irrigation systems, to eliminate vector breeding, with the cooperation of the River Valley Development Board, Mahaweli Development Board and the Irrigation Department.

(b) Prevention of the creation of manmade vector breeding places, with the cooperation

of the Social Services Department, Highways Department and the Gem Corporation.

- (c) Biological Control Methods such as the use of larvivorous fish.
- (d) Use of Chemical Larviciding Agents such as Abate.

(VI) Training and Health Education:

The Malaria Training Centre is the pivot for all training programmes for Anti-Malaria Campaign workers, Medical and Paramedical personnel, other Government Department Workers and Rural Community Health Workers.

Health Education programmes for the Community are carried out by the Health Education Bureau of the Ministry of Health with the close collaboration of the Anti-Malaria Campaign.

(VII) Research and Field Trials:

Research and Field Trials are designed and undertaken by the Anti-Malaria Campaign to overcome certain technical and operational problems that could arise, and also to develop new methods that could supplement the present methods of control.

Already after 3 rounds of intensive spraying with Malathion there has been an overall reduction of malaria with a dramatic decline of malignant malaria. This has been evident in the Kalawewa Area (H Project, Area) and even in Systems, A, B and C which are to be immediately developed under the Accelerated Scheme. The evidence of this is obtained both from hospital statistics as well as from Special Mass Surveys and Field Surveys carried out by the campaign personnel in these areas.

However with the intensification of these development schemes the malariogenic potential can be enhanced as described earlier. The activities set out in detail must be intensified in these developing areas. Activities such as the Malathion spraying of houses and waadies before occupation and after, the administration of prophylactic treatment to colonists and Board personnel entering these areas are essential.

It must be reiterated again that the Anti-Malaria Campaign **must be an active participant** with the Mahaweli Board from the Planning Stage to the final stage of *fulfilment*. With the acceleration of activities and the telescoping of these activities from 30 years to 6 years, the Anti-Malaria Campaign needs more insecticide, personnel, equipment and transport to carry out its activities in the Accelerated Scheme Area. Project Reports have already been submitted for these additional requirements.

Emphasis must also be placed on other activities such as Water Management and Water Manipulation.

In 1976, with the diversion of the Mahaweli at Polgolla, the river downstream on its original course started pooling during drought periods up to Haragama and areas with little or no malaria suddenly had localised epidemics of malaria. With the collaboration of the Mahaweli Board the problem was solved by flushing out the river and destroying the mosquito larvae, once a week with a release of 2,000 cu. secs. of water for 3 to 4 hours. This is now carried out as a matter of routine during drought periods in Polgolla. Such methods can be extended wherever feasible in other areas in the Accelerated Development Area. The proper maintenance and repair of broken irrigation channels, the prevention of pooling in irrigation channels and streams is also an important prerequisite for reducing the malariogenic potential in development areas. Here, too, the Campaign must work in close collaboration with the Mahaweli Board.

It has also been noted with regret that a few officials and employees do not get their houses sprayed, nor do they take the prophylactic treatment.

At present, due to the intensive malaria control programme, the malaria transmission is low in all these areas and these personnel do not have a felt need for taking these precautionary methods, but they would surely come down with malaria when the seasonal transmission peak is reached. Special film shows and Health Education programmes are now being carried out in these areas to activate these officials and employees on the absolute need of getting their houses sprayed and taking their regular weekly prophylactic malarial drugs. It is also ironical to note that these are the very people who vehemently protest that the Health Services have not provided them with adequate precautions when they do come down with malaria.

Treatment of malaria cases is already been done at all medical institutions in the area and at special **volunteer** treatment centres manned by volunteers selected from the colonies with the cooperation of the Community Development Leaders and other officials of the Mahaweli Board.

The Anti-Malaria Campaign has joined actively with the Health Education Bureau of the Ministry of Health in holding seminars and group discussions at grass root levels, to convince the workers and colonists of the need to get their houses sprayed and the need to take the prophylactic treatment.

It is important to note that a worker could lose 5 man-working days from a moderate attack of malaria. If complications occur or a worker gets a more serious attack, many more days could be lost and work targets may not be achieved.

If, however, the finances, logistics and transport are provided for the intensification of the Anti-Malaria activities in the Accelerated Mahaweli Project area and the full co-operation of the officials, workers and colonists is obtained, there is no reason at all to believe that malaria would impede the successful implementation of this massive and essential development scheme.

Some Health Problems Associated with the Mahaweli

Tissa Vitarana

Medical Research Institute

When one talks of health it is no longer only in the negative sense of freedom from illness but also in the positive sense of optimum mental and physical well-being. In Sri Lanka, we are still mainly concerned with attending to the former. Even in this respect, the Mahaweli Project Area is about the worst supplied in the island with health facilities, both curative and preventative, and this includes primary health care. Dr. Percy de Silva's survey showed that for his sample of about 1000 families there was not a single adequately qualified health worker.

Therefore, as things stand, much needs to be done to provide an adequate health service for the existing population. But in view of the displacement of many of them and the disruption of their life styles, which in the case of the Purana villages has extended from ancient times, one can anticipate an increase in all types of health problems and in particular psychiatric disturbances.

But there will be a massive influx of construction workers and, in the course of time, of new settlers. Therefore an immediate increase of the "health load" can be anticipated.

The nature of this health load has to be inferred from the limited data available but for convenience it could be divided into (a) an increase of the existing pattern of disease and (b) the new disease problems that are likely to arise.

(a) Increase of the existing pattern of disease.

The data available is not satisfactory, as no proper surveys have been carried out, and is based on hospital figures, which nevertheless give some idea of the prevalence of disease in this area. Malaria is clearly a major problem. But bowel diseases appear to be as important or even more so. Malnutrition and anaemia, worm infestations and viral and bacterial infections are also problems.

Dr. Munasinghe, Deputy Director (Planning), Ministry of Health, in his document on the Proposed Health Care Facilities for the Kala oya Scheme Area has drawn attention to this:

"The morbidity pattern of the area indicated that Malaria and Bowel Diseases appear to be the biggest health problems. The incidence of these diseases have shown an upward trend during the past years and malaria is endemic. With the opening up of a network of new canals and tanks there would be a number of shallow pools of water which would be ideal breeding spots for malaria mosquitos. The canals and water tanks could also be polluted without a proper method of disposal of night soil. These health hazards together with the increasing population and the present inadequate health facilities would spell disaster to the development programme."

The solution to these problems lies mainly in prevention. Proper housing and sanitation, with proper sewage disposal and a safe water supply are the basis of this approach. In addition, there should be sufficient personnel for a programme of health education to instruct people on the causation of disease and its prevention. These are all measures that should be considered at the planning stage of the Mahaweli Project if they are ever to be implemented. After all, the project is to serve the people and without a healthy population the whole project would be a failure.

On inquiring from Dr. Abeygunawardena of the Mahaweli Development Board it would appear that the Board is not providing houses nor is there a type plan. Each settler is free to construct the house as he wishes. The Board will provide a free squatting plate and Rs. 60/- for each settler to construct a latrine. One wonders whether settlers who are short of money and unaware of the importance of proper sanitation are likely to expend money and energy in this direction. Settlers clearly have other priorities as, for instance, in past colonisation schemes where the state provided latrines have been used to store firewood! The question of water supply has not been finalised. Money was to be obtained from an International Agency to construct wells — but it has not been decided whether to have one for a group of 10 or 20 houses as in the past, or one per house. Even with the latter, pollution is still possible unless there is proper sewage disposal and the totality of the question — soil porosity, water drainage, pollution of soil and water courses — is looked into.

Dr. Munasinghe's report has drawn attention to the need to expand the existing curative services by providing more institutions, personnel, medicines and vehicles. But these are going to take some years to provide and in the interim the provision of Primary Health Care drawing in volunteers, from the community and outside should be explored.

(b) New disease problems

There is bound to be a significant problem of occupational diseases. Accidents associated with construction work and the mechanization of agriculture have to be anticipated. Chemical intoxication due to pesticides is likely to be a hazard particularly among new settlers. They should be instructed in the use of these chemicals and encouraged to wear protective clothing. Provision of atropina tablets and instruction in their use has also to be considered. Proper labelling of pesticide containers is essential to minimize accidental poisoning.

The displacement and change in the traditional lifestyle of the present population and the problem of adjustment of new settlers is bound to lead to an increase in psychiatric problems of all types. Action to counter this will be needed both at individual and group or community levels.

With the opening of jungle land, besides an increase of problems like snake bites, malaria, and leptospirosis the possibility of new diseases from animals and insects has to be kept in mind. The example of Kyasanur Forest Disease in Mysore State, South India, which was thought to be typhoid, haemorrhagic fever, malaria and even yellow fever before the casual virus was isolated is a case in point. It would be foolish to label as malaria every fever with chills and their proper investigation supported by adequate laboratory and research services is essential.

(c) Course of Action.

The action that needs to be taken is evident from what has been said before but the following aspects need to be stressed. (1) An efficient Accident Service, with adequate surgeons and, may be an orthopaedic surgeon, should be set up with Anuradhapura Hospital at its centre. This should include an adequate ambulance

service. (2) There should be one or more Psychiatrists stationed at Anuradhapura and they should run clinics at the district and peripheral hospitals. (3) The laboratory at the Anuradhapura hospital should be fully equipped and staffed with a resident Pathologist, who has been trained in Bacteriology, or with an additional Bacteriologist. Though the latter could pay some attention to epidemiological aspects it would be better to have a full time Epidemiologist as well. This unit could call on the services of the Medical Research Institute and the Universities where necessary for research purposes. (4) There is also a case for a specialized Poisons Unit, which may include those already interested in this field (like the Medical Faculty, Colombo) to monitor the situation and adopt control measures.

The idea of a separate Deputy Director of Health for the Mahaweli Project is an excellent one. This would help to eliminate much of the red tape and to expedite the implementation of the plans.



Any information concerning scientific activities, projects and current research as well as comments and viewpoints will be received with the greatest interest. As the publication is mainly for information purposes, the National Science Council takes no responsibility for the views adopted by the authors, the facts presented or the interpretation of these facts.

Vidurava is published quarterly in March, June, September and December.

Publication is in English, Sinhalese and Tamil.

Manuscripts for publication and all related correspondence should be addressed to:

The Editor Vidurava,
National Science Council,
47/5, Maitland Place,
Colombo 7.

☐ Requests for permission to reprint papers from this bulletin should be sent to the Editor.

☐ Subscription enquiries to:

Accountant,
National Science Council,
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☐ Published by the National Science Council.