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**WATER RESOURCES DEVELOPMENT IN K.A.U.**  
**—PRESENT CONDITIONS & FUTURE POSSIBILITIES**



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## FOREWORD

The problem of ensuring adequate water supplies during the dry months at the headquarters campuses of the Kerala Agricultural University has been bothering us for the last several years. At our request the CWRDM was kind enough to undertake a scientific study of this problem. This report is the result of the study conducted by Dr. P. Basak and his associate.

I am happy to say that this attempt at quantifying the water needs against water availability at these campuses is meaningful in the sense that it gives a basis for further assessment, refinement of the quantities involved and action programmes. Apart from its practical utility, it has value also as a scientific document illustrating the methodology for such studies. I am sure that it will prove to be of great interest, not merely for the scientists working in the Kerala Agricultural University, but also elsewhere.

Vellanikkara,  
13-9-'83.

T. MADHAVA MENON  
*Vice-Chancellor*  
Kerala Agricultural University

# **Water Resources Development in K. A. U.**

— Present Conditions and Future Possibilities

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## **0.0 ABSTRACT**

This preliminary report analyses the water demand and availability in the twin campus of KAU at Trichur. Present as well as future water demand upto 2000 A.D are estimated. Specific suggestions are put forth for development of water resources in the twin campus for meeting present and future water demand of the University. Three alternative plans for water resources development are envisaged and explained.

## 1.0 BACK GROUND AND OBJECTIVES

Due to scarcity of water at Kerala Agricultural University, the Director, Physical plant of KAU as per his letter No. A7/1920/83 requested the Head, Groundwater Division to visit Kerala Agricultural University and give recommendation for water resources development in the campus.

As per the request, a reconnaissance survey was conducted on 13-14 May 1983. A preliminary discussion between the Vice Chancellor of Kerala Agricultural University, Director physical plant and the authors was held on the afternoon of 14 May 1983. Based on this discussion, subsequent hydrogeological investigations were carried out by Groundwater Division of CWRDM during May 23-26, 1983. A blank proforma (Appendix. 1) was sent to the University for compilation of some basic information. This report is the result of all the factors mentioned above. The report ends with specific recommendations for further development and utilisation of water resources in the twin campus.

The report is preliminary in nature. Further detailed investigations may be necessary for implementations of the suggestion put forth.

## 2.0 GENERAL INFORMATION OF THE TWIN CAMPUS

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### 2.1 Location and Physiography

The Kerala Agricultural University twin campus at Mannuthy and Vellanikkara lie between latitude  $10^{\circ}30'$  and  $10^{\circ}35'$  and longitude  $76^{\circ}15'$  and  $76^{\circ}25'$ : Vellanikkara campus lies about 10 km east of Trichur on the left side of Trichur-Palghat road and Mannuthy about 6 km east of Trichur on the right side of the same road. Fig. 1 gives the location of the twin campus with respect to Trichur district.

Physiographically the twin campus falls under the general description of midlands of Kerala. Characteristically the surface is covered by laterite cap overlying the bed rock. The average cap thickness varies between 10 to 80 feet.



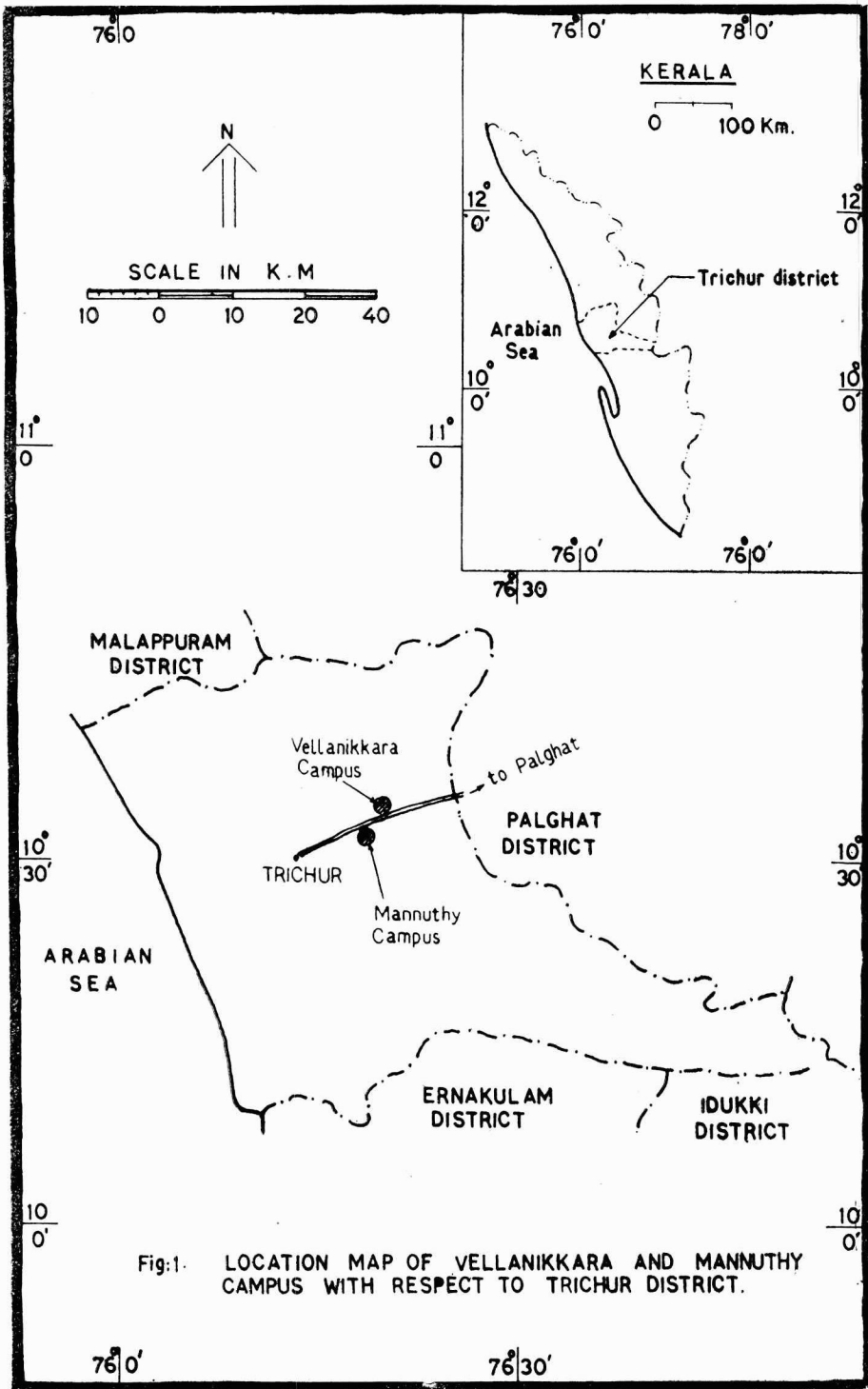


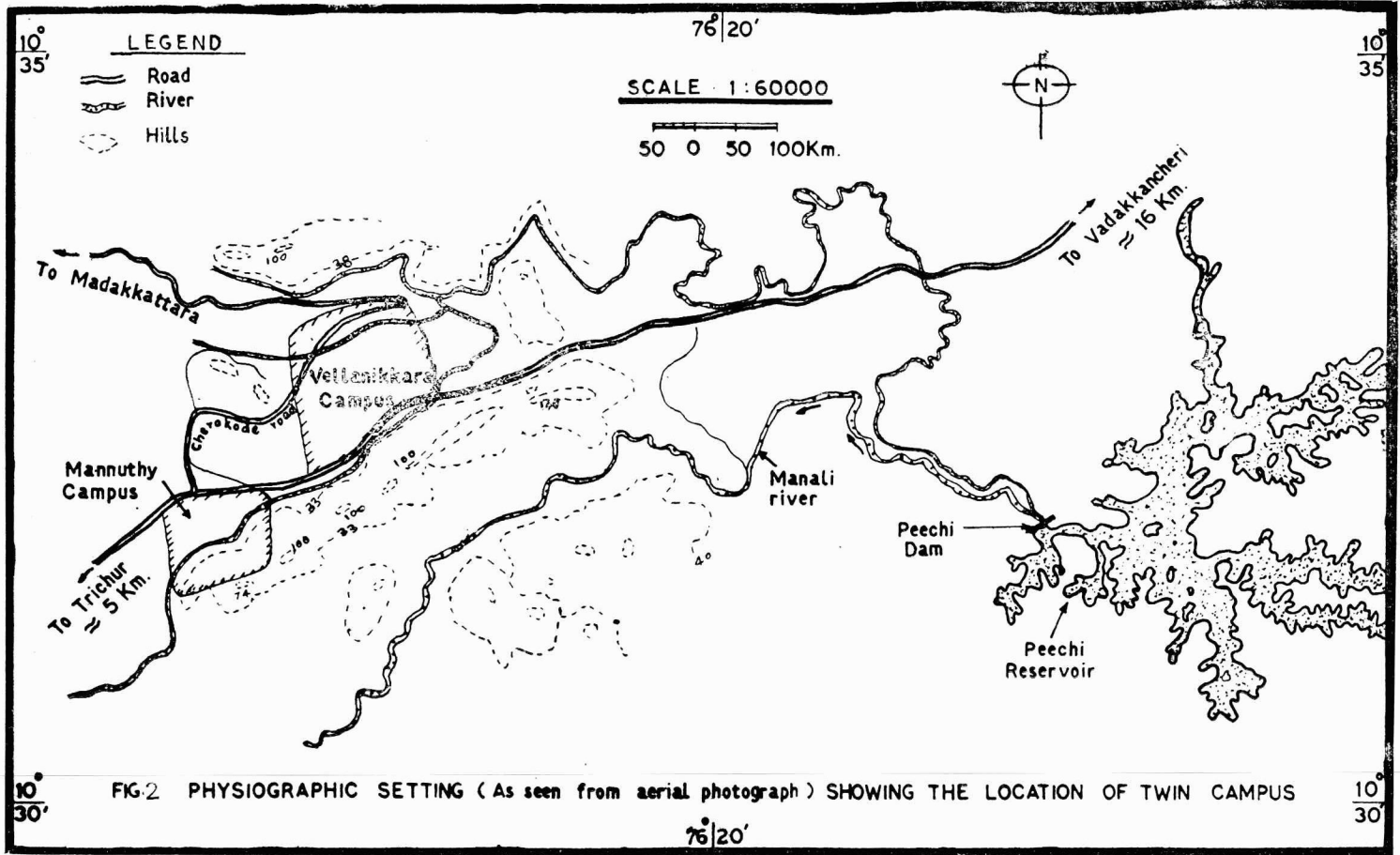
Fig:1. LOCATION MAP OF VELLANIKKARA AND MANNUTHY CAMPUS WITH RESPECT TO TRICHUR DISTRICT.

## **2.2 Physical Setting of the Twin Campus**

The physical setting of the twin campus as seen from aerial photograph as per task No. 570A Run No. 56-8 & 9 and topsheet No. 58 B/6 obtained from the Ministry of Defence is shown in Fig. 2.

As seen from Fig 2, the Vellanikkara Campus is surrounded by Madakkathara Road in the north, National Highway in the south, Peechi R. B. C. branch canal in the east and private rubber estate in the west.

The Mannuthy campus is surrounded by National highway in north, the hills in the south, the Ollukkara branch canal in the east and Krishnapuram Road in the west.



### 2.3 Aerial Extent & Population

The aerial extent and population information about the campus is based on the data supplied by the Director, Physical Plant through the performance— as per Appendix-1.

#### *Aerial extent*

Total area of the twin camps	=804 234 hectares
Total area of Vellanikkara campus	=486.494 hec.
In that, Agricultural area	= 95.36 hec.
Non Agricultural area	=391.44 hec.
Total area of Mannuthy Campus	=317.74 hec.
In that, Agricultural area	= 77.74 hec,
Non Agricultural area	=240.00 hec.

Note: 1 hec=2.471 Acres=0.01 sq/km=10,000 sq/m.

#### *Population*

The present (1983) population of Vellanikkara Campus

In campus	=1000
daily commuters	= 200
	<hr/>
Total	=1200
	<hr/>

The present (1983) population of Mannuthy campus

In campus	= 989
daily commuters	= 389
	<hr/>
Total	=1378
	<hr/>

The projected population in coming 18 years (upto 2000 A. D) is shown in Fig. 3.

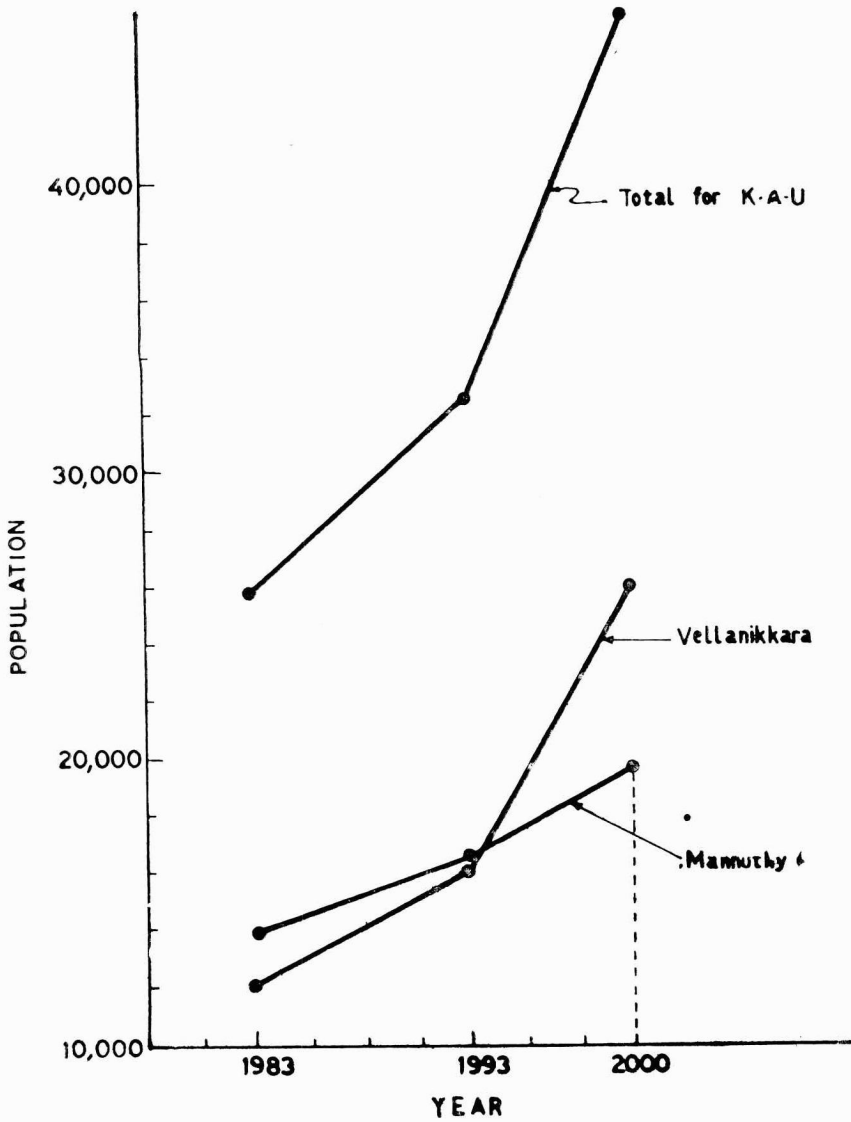


FIG.3 ESTIMATION OF POPULATION RISE IN K-A-U AT TRICHUR

### 3.0 ESTIMATION OF WATER REQUIREMENT

### 3.0 ESTIMATION OF WATER REQUIREMENT

The present and future (upto 2000 A. D) water demand can be divided into,

1. Drinking water demand for population of the campus
2. Irrigation demand for experimental farms.
3. Laboratory demand, and
4. Demand for live stock maintained by the University

The estimate of these demands (present and future) are shown below:

Year	Mannuthy campus				Vellanikkara campus			
	Water Demand in Lit/day for				Water Demand in Lit/day for			
	Drink- ing	Irri- gation	Labora- tory	Live stock	Drink- ing	Irri- gation	Labora- tory	Live stock
1983	206700	1322000	20670	147500	180000	1480000	18000	—
1993	248040	1455000	24804	177000	240000	1790000	24000	—
2000	297648	1600000	28764	212400	390000	2180000	39000	—

Likely variation of these demands in the years to come are depicted in Figs 4 and 5.

The basis for all these estimation are given in Appendix 3.

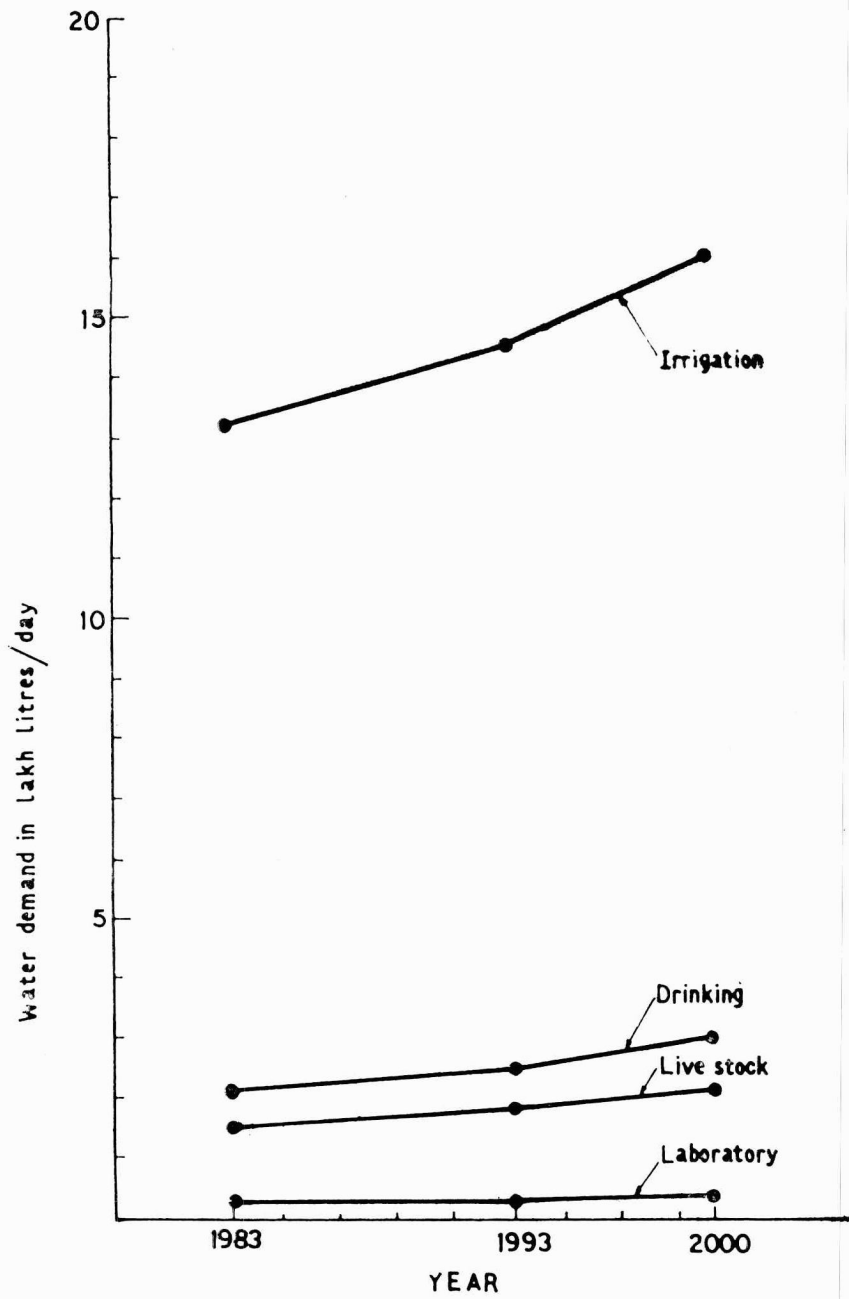


FIG. 4: PRESENT & PROJECTED WATER DEMAND AT MANNUTHY



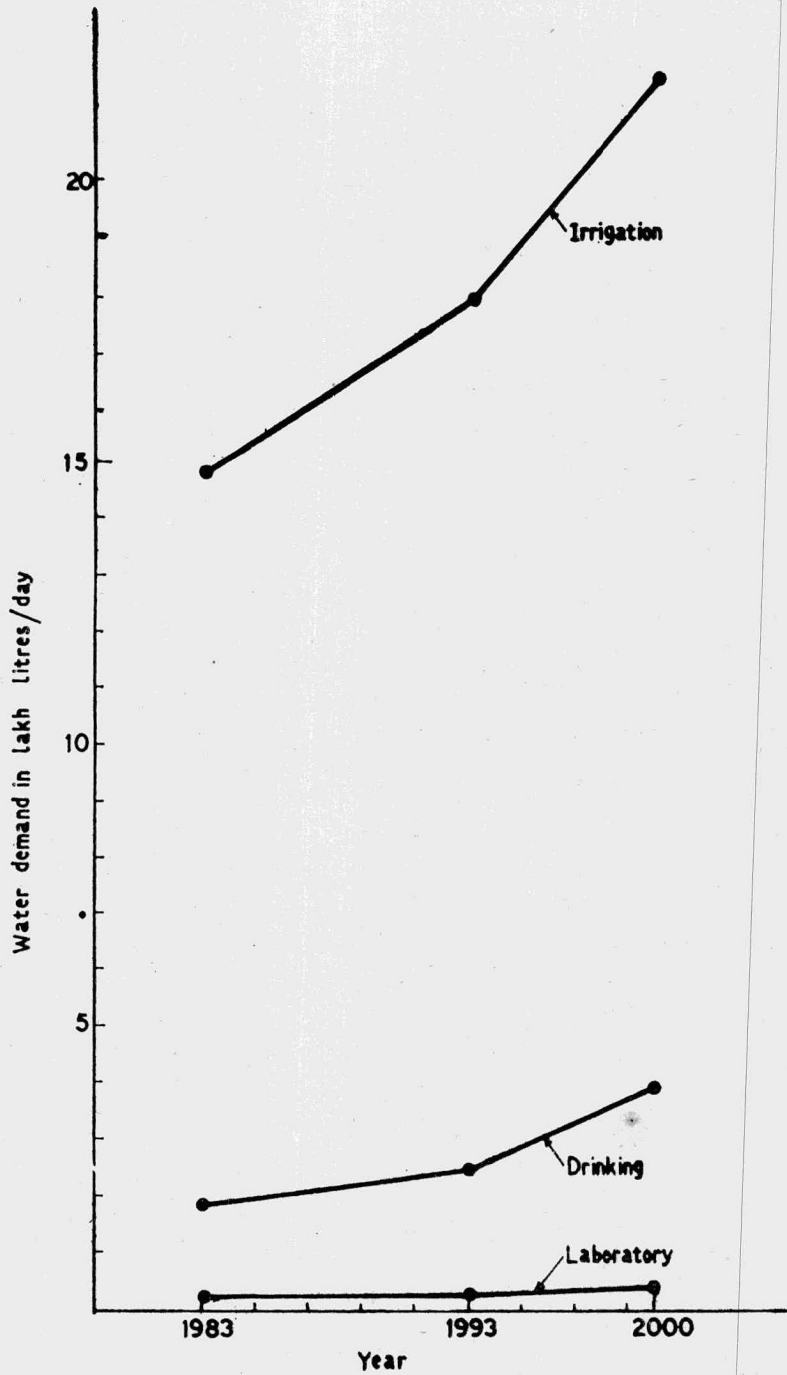


FIG.5: PRESENT & PROJECTED WATER DEMAND AT VELLANIKKARA

#### 4.0 EXISTING SOURCE OF WATER IN THE CAMPUS

#### 4.0 EXISTING SOURCE OF WATER IN THE CAMPUS

The field investigation revealed that Vellanikkara campus has 7 tanks, 5 tubewells and 20 openwells.

Mannuthy campus has 3 tanks, 1 tube well, and 7 open wells. The status of these water bodies with respect to their usage and availability are shown in Fig. 6. The exact locations of these water bodies are shown in Figs 7 and 8.

To get an idea about the present conditions of these hydraulic structures, a few photographs of typical existing tanks, tubewells, and openwells are shown in Figs 9 and 10.

Appendix-2 gives further details about physical description and water availability of these existing water resource elements.

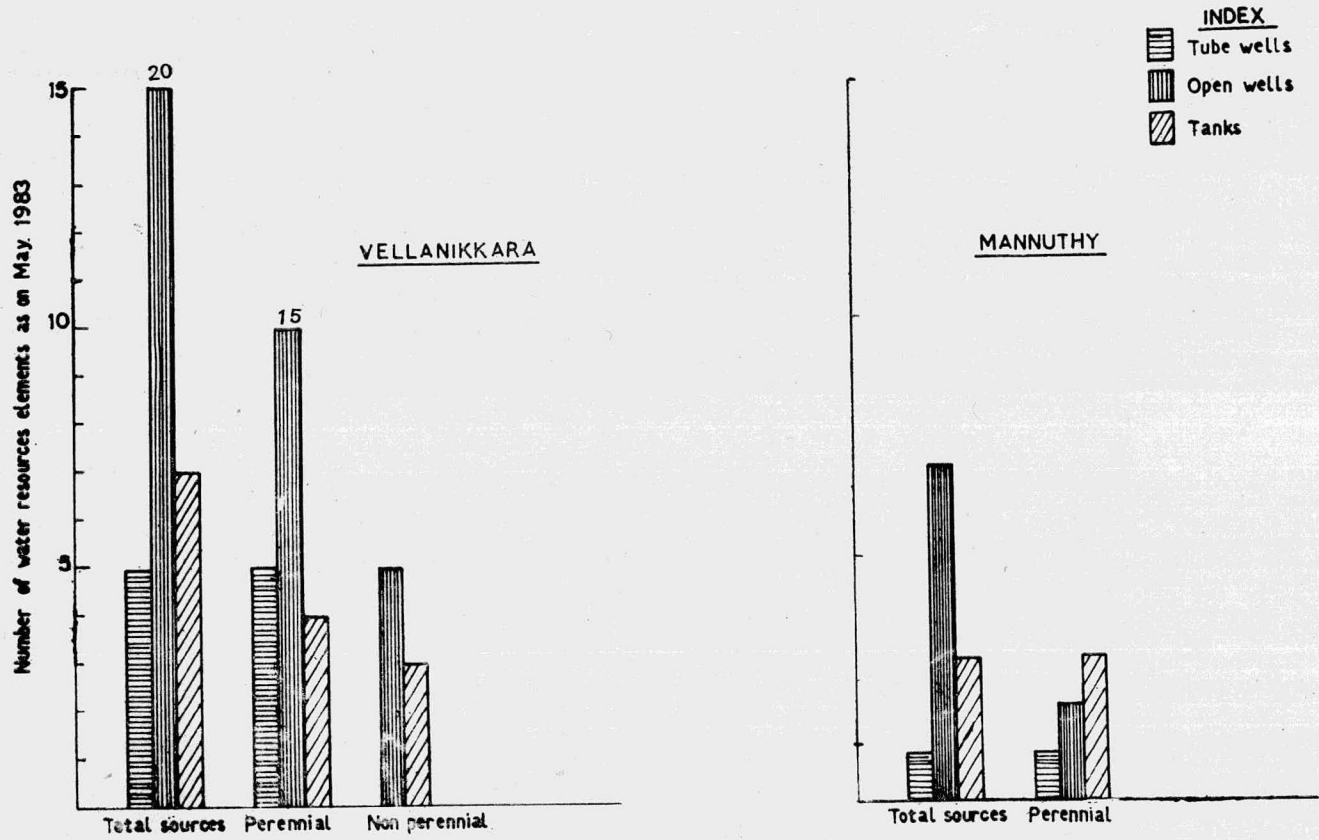
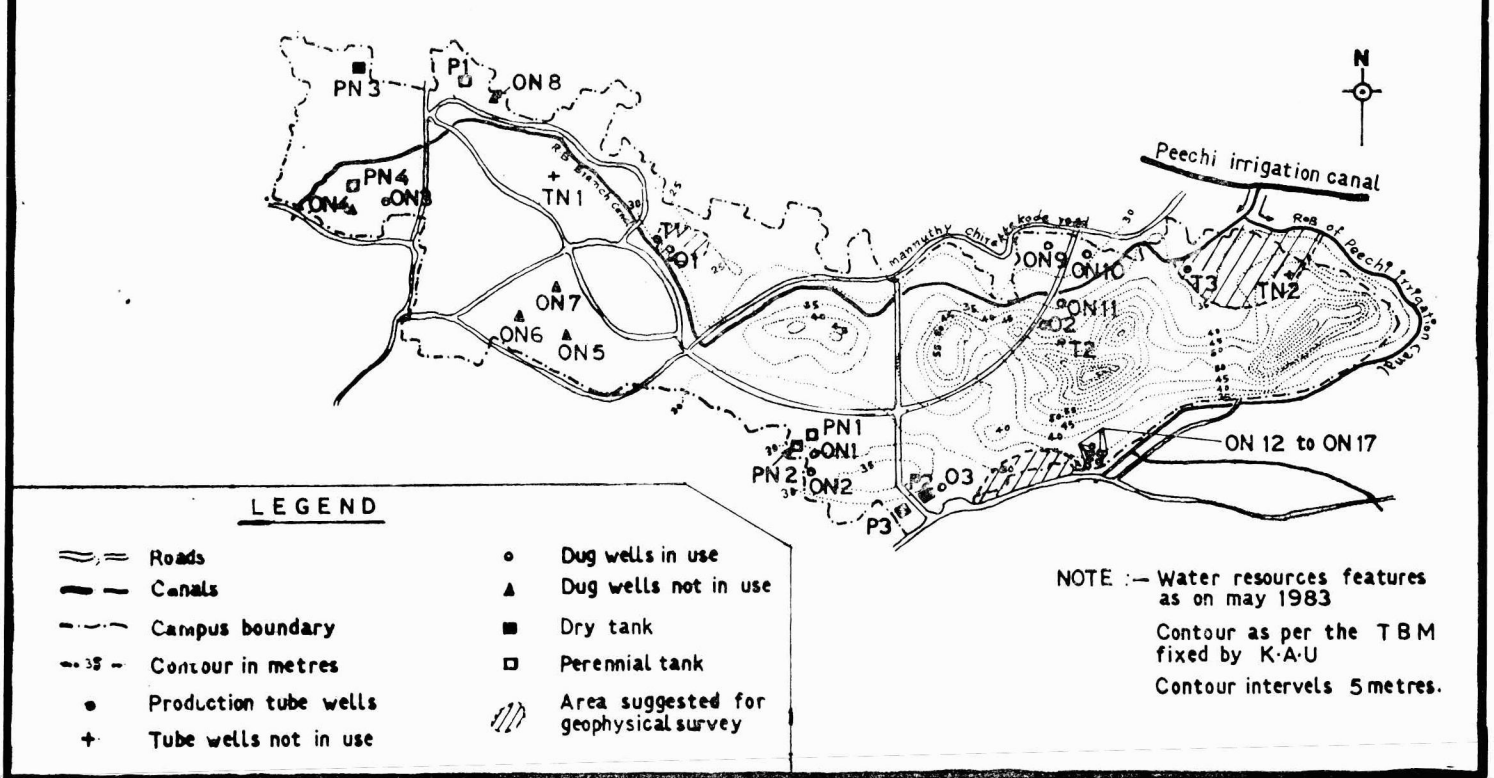
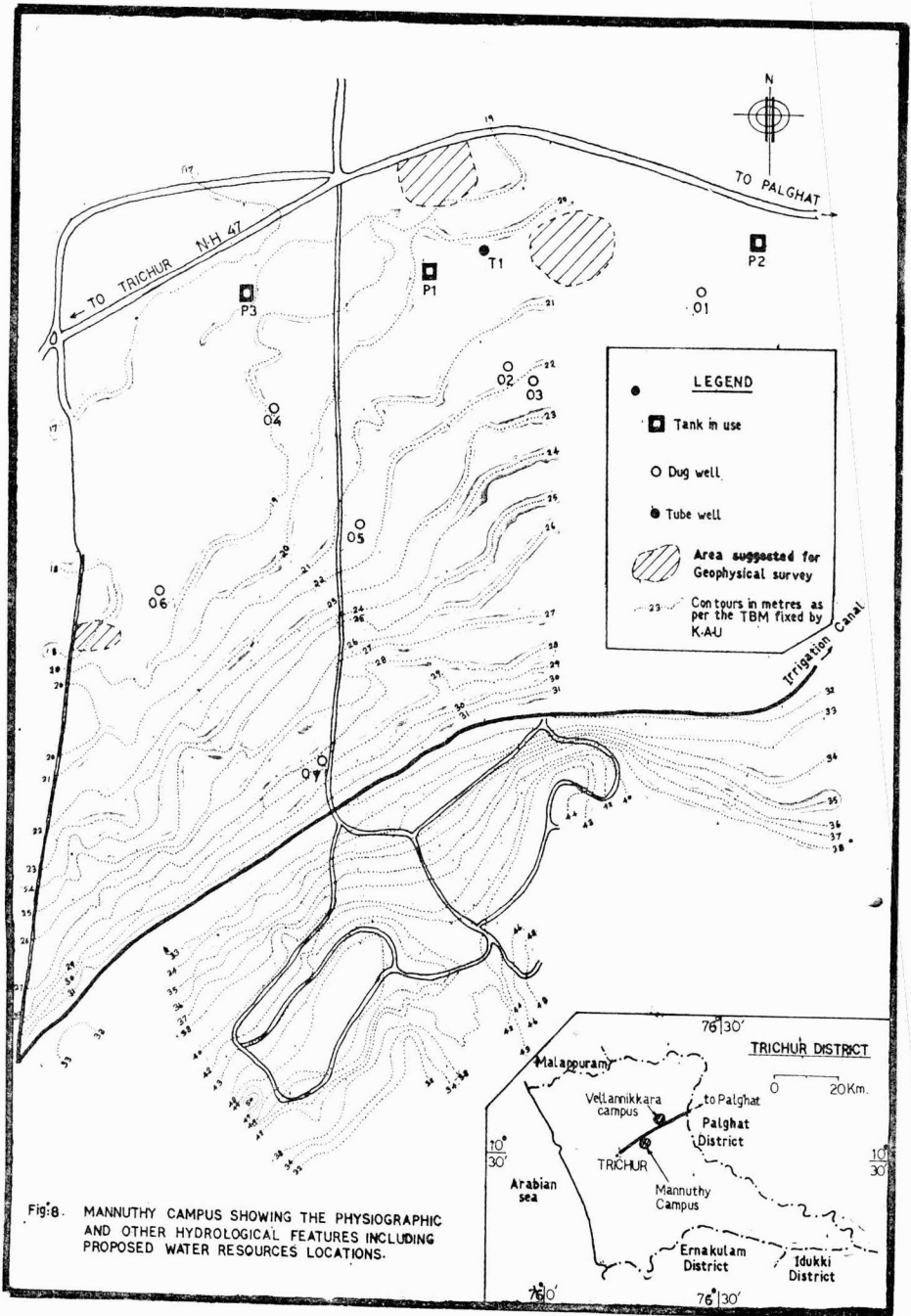


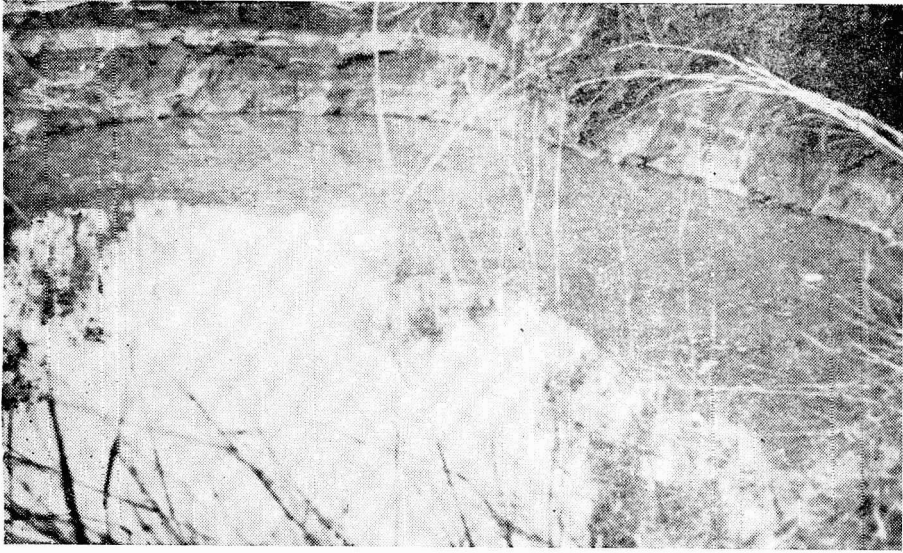
FIG. 6: PRESENT WATER AVAILABILITY AT K.A.U

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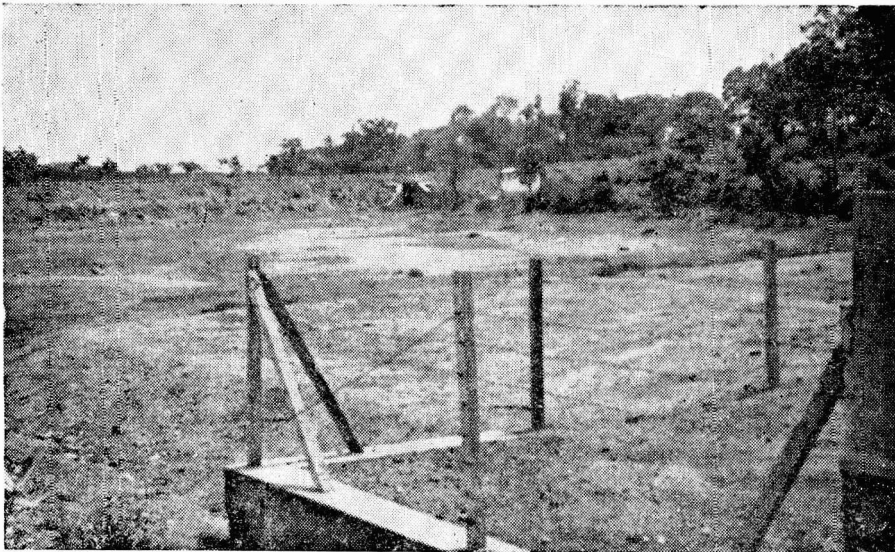
Figure 7: VELLANIKKARA CAMPUS SHOWING THE PHYSIOGRAPHIC AND OTHER HYDROLOGICAL FEATURES INCLUDING PROPOSED WATER RESOURCES LOCATIONS.





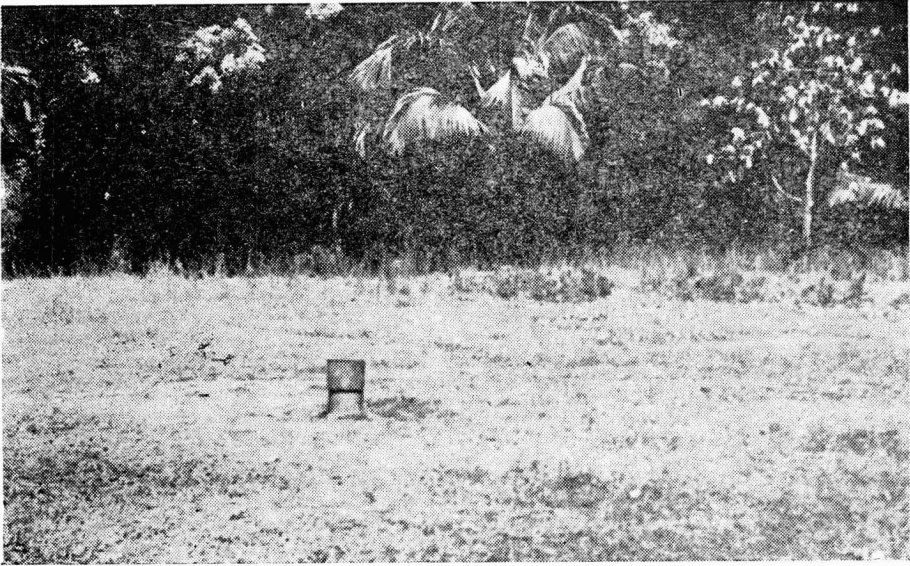


Tank PN4 in the Cashew project—Vellanikkara Campus

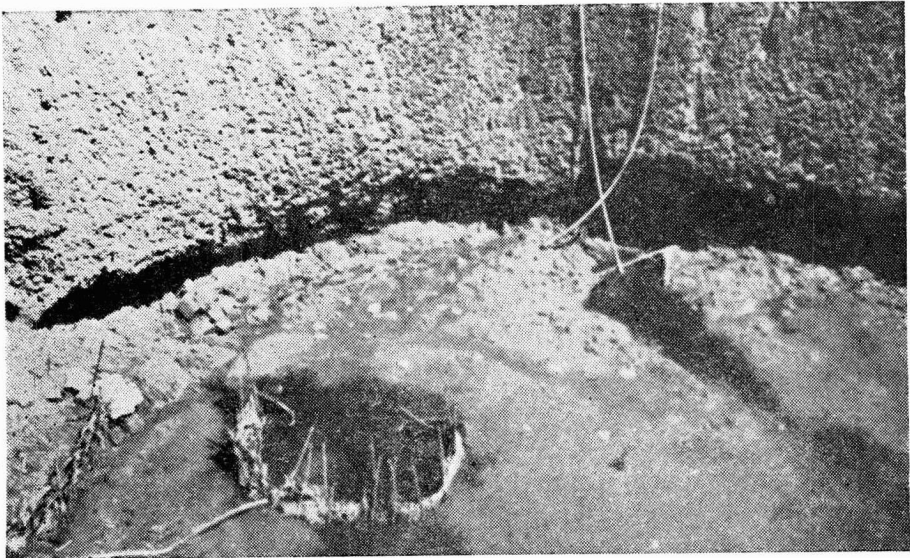


Tank P2 near National Highway—Vellanikkara Campus

Fig. 9

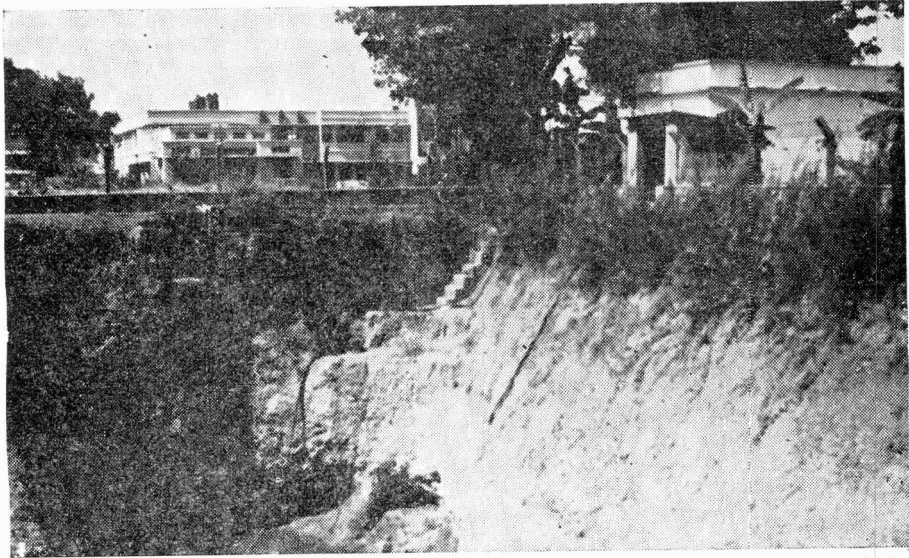


Tube well T5 near Duplex—Vellanikkara Campus (unused)

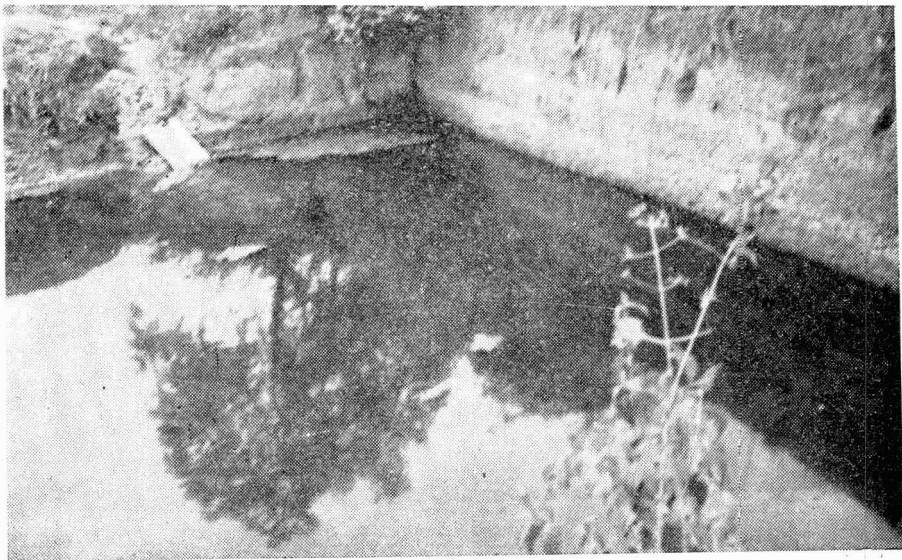


Tank P1 in Rice Research Station—Mannuthy Campus





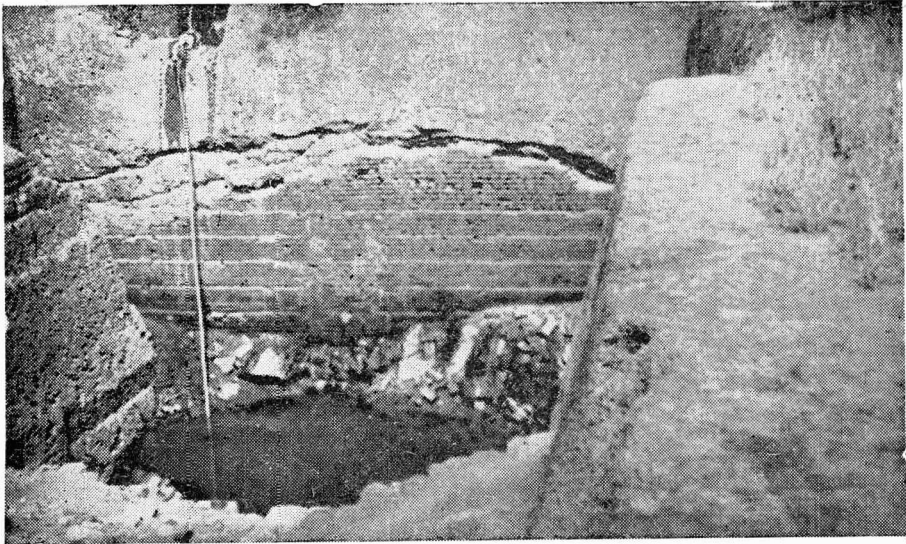
Tank P3 near Men's hostel—Mannuthy Campus



Tank P1 near Pepper Research Station—Vellanikkara Campus



Tank P1 near Pepper Research Station—Vellanikkara Campus



Tank P2 in Rice Research Station—Mannuthy Campus

Fig. 10 (contd.)

**5.0 ESTIMATION OF WATER AVAILABILITY FROM PRESENT  
SOURCE IN THE VELLANIKKARA CAMPUS**

5.0 ESTIMATION OF WATER AVAILABILITY FROM PRESENT SOURCE IN THE VELLANIKKARA CAMPUS

5.1 Tube wells

*Tube wells in use*

Name with reference to Fig. 7	Approximate yield in lit/day
T <sub>1</sub> (Near Boys Hostel)	3,60,000
T <sub>2</sub> (Near Cement Store)	2,40,000
T <sub>3</sub> (Near Duplex)	2,40,000
Total	<u>8,40,000</u>

*Tube well not in use*

TN <sub>1</sub> (Near Boys Hostel)	2,40,000
TN <sub>2</sub> (Near Duplex)	3,60,000
Total	<u>6,00,000</u>

Hence total estimated quantity from tube wells = 8,40,000 + 6,00,000  
= 14,40,000 lit/day.

Note:- T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> data were supplied by Director, Physical Plant  
and TN<sub>1</sub>, TN<sub>2</sub> discharge estimates are based on nearby wells

## 5.2 Open wells

### *Open wells in use*

Name with reference to Fig. 7	Approximate yield in lit/day
O <sub>1</sub> (Near Boys Hostel)	25,740
O <sub>2</sub> (Near Cement store)	36,172
O <sub>3</sub> (Near N. H.)	11,873
	<hr/>
Total	73,785 lit/day
	<hr/>

### *Open wells not in use*

Total quantity estimate from	1,84,086 lit/day
ON <sub>1</sub> , ON <sub>2</sub> , ON <sub>3</sub> , ON <sub>4</sub> , ON <sub>9</sub> , ON <sub>10</sub>	
ON <sub>11</sub> , ON <sub>12</sub> , ON <sub>13</sub> , ON <sub>14</sub> , ON <sub>15</sub> ,	
ON <sub>16</sub> , ON <sub>17</sub>	
(ON <sub>4</sub> , ON <sub>5</sub> , ON <sub>6</sub> , ON <sub>7</sub> , ON <sub>8</sub> are all dry)	
Hence total estimated quantity	=73,785+1,84,086
from open wells	<u>=2,57,871 lit/day</u>

The above figures and the subsequent figures on open wells and tanks are obtained on the assumption that 20 percent of the available water column (as on May 1983) in the tanks and open wells may be pumped and which will be replenished every 24 hours from ground water inflow.

### 5.3 Tanks

#### *Tanks in use*

Name with reference to Fig. 7	Approximate yield in lit/day
P <sub>1</sub> (Near pepper research Station)	80730
P <sub>2</sub> & P <sub>3</sub> in the present (as on May, 1983) condition	0

#### *Tanks not in use*

PN <sub>1</sub> (Near Womens Hostel)	2700
PN <sub>2</sub> (Near Womens Hostel)	4225
PN <sub>4</sub> (Near cashew station)	24000
(PN <sub>3</sub> is dry)	
Total	30925 lit/day

Hence total quantity estimated  
from tanks

$$= 80,730 + 30,925$$

$$= 1,11,555 \text{ lit/day}$$

#### 5.4 Total Availability of Water in Vellanikkara

In Vellanikkara campus, at the worst time of the season (summer of 1983), the total water availability from the present sources, as estimated, thus comes out as,

From existing tube wells	=14,40,000 lit/day
From existing open wells	= 2,57,871 ..
From existing tanks	= 1,11,555 ..
	<hr/>
Total	=18,09,426
	<hr/>

Out of this total availability of say, 18 lakhs litres/day only 10.96 lakhs litres/day are being used (as on May, 1983).

6.0 ESTIMATION OF WATER AVAILABILITY FROM THE PRESENT  
SOURCE AT MANNUTHY CAMPUS



## 6.0 ESTIMATION OF WATER AVAILABILITY FROM THE PRESENT SOURCE AT MANNUTHY CAMPUS

Location of Tube wells, Open wells & Tanks are as shown in Fig.8.

### 6.1 Tube wells

*Tube wells in use*

Name with reference to Fig. 8	Approximate yield in lit/day.
T <sub>1</sub> (Near Rice Research Station)	4,75,200 lit/day

### 6.2 Open wells

*Open wells in use*

O <sub>1</sub> (Near guest house)	3,530 ..
O <sub>2</sub> (Near livestock)	19,690 ..
O <sub>3</sub> (Near poultry farm)	21,590 ..
O <sub>4</sub> to O <sub>7</sub> are limited use may yield	14,130 ..
<b>Total</b>	<b>58,940 lit/day</b>

### 6.3 Tanks

*Tanks in use*

P <sub>1</sub> & P <sub>2</sub> (Near Rice Research Station)	6,22,000
P <sub>3</sub> (Near Mens Hostel)	1,71,360
<b>Total</b>	<b>7 93,360</b>

There are no tanks, tube wells or open wells in Mannnthy which are not in use.

#### 6.4 TOTAL AVAILABILITY OF WATER AT MANNUTHY

#### 6.4 Total Availability of water at Mannuthy

In Mannuthy campus, at the worst time of the season (summer of 1983), the total water availability from the present sources, as estimated comes out as,

From tube wells	=	4,75,200 lit/day
From open wells	=	58,940 lit/day
From tanks	=	7,93,360 lit/day
Total	=	<u>13,27,500 lit/day</u>

Mannuthy campus is utilising the entire available resource (as on May 1983)

Fig. 11 graphically depicts the present water availability situation in the twin campus.

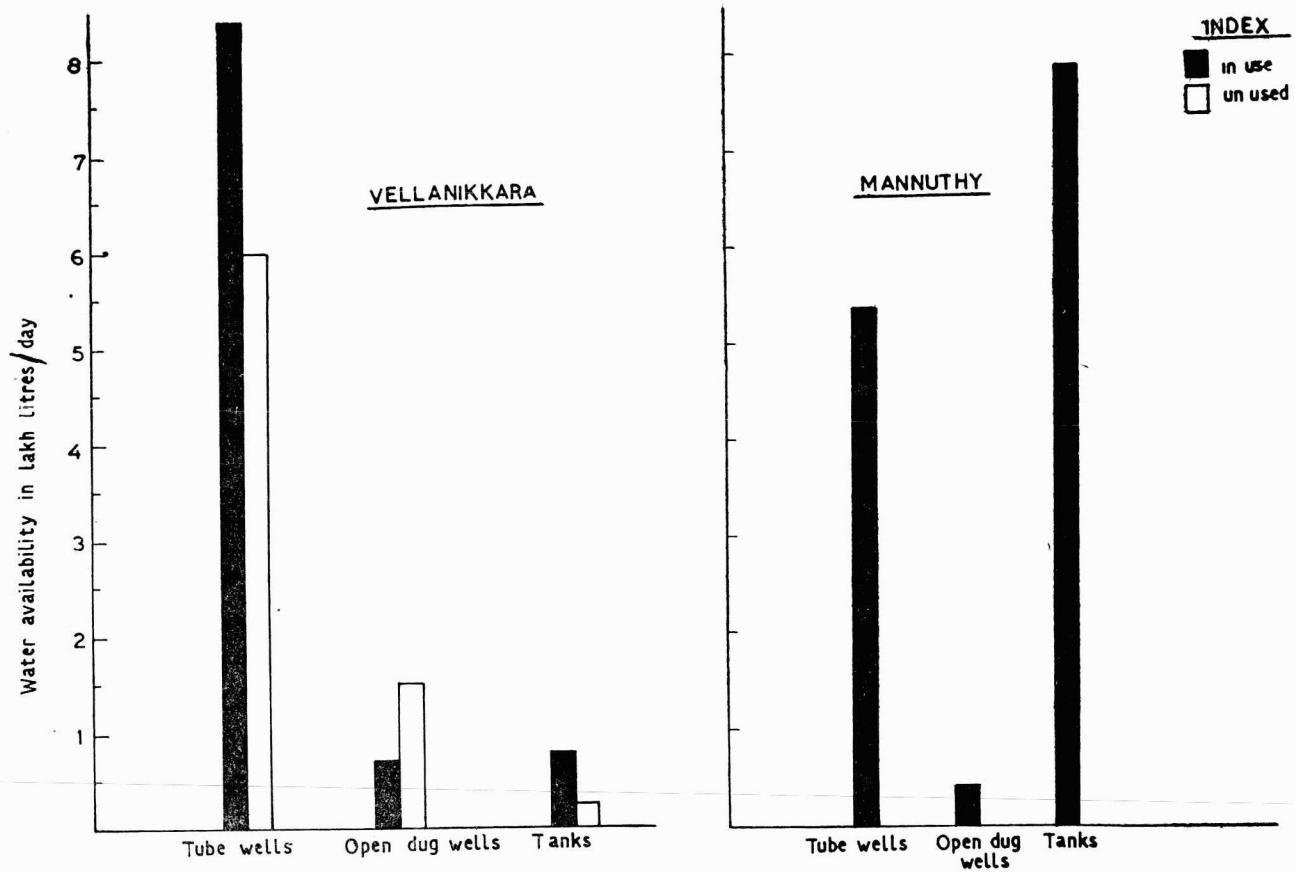


FIG. 11. PRESENT WATER AVAILABILITY AT K.A.U

## 7.0 WATER REQUIREMENT-AVAILABILITY GAP IN THE TWIN CAMPUS

The water requirement and availability gap for Mannuthy and Vellanikkara Campus is as given below.

	Total requirement in lakh lit/day.		Present availability in lakh. lit/day	Present water use in lakh. lit/day	Requirement - availability gap in lakh lit/day			
	1983	2000			1983		2000 A. D.	
					Deficit	surplus	Deficit	Surplus
Mannuthy	16.96	21.39	13.27	13.27	3.69	0	8.2	0
Vellani- kkara	16.78	26.09	18.08	10.95	0	1.31	8.00	0

The requirement—availability gap as seen above indicates that in the Mannuthy campus, present deficit 3.69 lakh litres/day will be increased to 8.2 lakh litres/day in 2000 A. D whereas present marginal surplus of 1.31 lakh litres/day in Vellanikkara campus will be converted into a deficit of say 8 lakh litres/day in 2000 A. D.

## 8.0 HOW TO FILL UP THE GAP BETWEEN REQUIREMENTS AND AVAILABILITY?

As brought out in the previous section, ways and means are to be found out to take care of the present deficit (3.69 lakhs litres/day) at Mannuthy campus and future (2000 AD) deficit of 8.2 lakh litres/day at Mannuthy and Vellanikara campus respectively. This can be done either or in combination of the following plans.

1. Creation and development of further ground or surface water resources within the campus.
2. Importing water from Peechi Reservoir through a suitably aligned pipe line
3. Importing water through an infiltration gallery from Manali river.

The above three plans are discussed in subsequent sections.

## 9.0 PLAN 1 — CREATION OF FURTHER RESOURCES IN THE CAMPUS

### VELLANIKKARA CAMPUS

As mentioned in earlier sections, proper utilisation of the existing water resources from the already installed facilities (Fig. 7) will not only meet the entire present requirements but also will result in a surplus of 1.31 lakh litres/day.

In the year 2000 A. D. with the increased requirements, the campus will face deficit of the order of 8 lakh litres / day. This deficit can be easily met by the following actions.

1. Sinking 4 more tube wells in the areas suggested (Fig. 7) The exact spots have to be found out through geophysical survey. Each well is likely to yield 10,000 litres/hour i.e. around 2 lakh litres/day (assuming 18 hours of pumping each day).
2. Deepening the two existing tanks ( $P_1$  and  $P_2$  in Fig. 7) to a depth of 4.5 meters and from which additional 7 lakhs litres/day per tank can be pumped for various uses. This is based on the assumption that after deepening the tanks by further 4.5 meters, the tanks will have at least 1 meter columns of water (at the worst time in the year) and from which 10 percent of stored water can be pumped every day and which will be duly replenished from the groundwater inflow into the tanks. This assumption is safe and is on the conservative side.

The above two steps will yield an additional amount of 22 lakh litres/day which means in 2000 A. D. Vellanikkara Campus will be having a surplus of above 14 lakh litres/day and this can be transferred to the Mannuthy campus for meeting the likely deficit there.

### MANNUTHY CAMPUS

In case of Mannuthy campus, the present shortage of 3.69 lakh litres/day can be met by installing two tube wells at the suggested sites (Fig. 8) The exact spots have to be found out after geophysical survey. Each well is likely to yield 2 lakh litres/day and hence will meet the immediate deficit faced.

In 2000 A. D. the deficit is around 8.2 lakh litres/day which, as mentioned earlier can be got from Vellanikkara campus.

**10.0 PLAN—2: BRINGING WATER FROM PEECHI RESERVOIR**

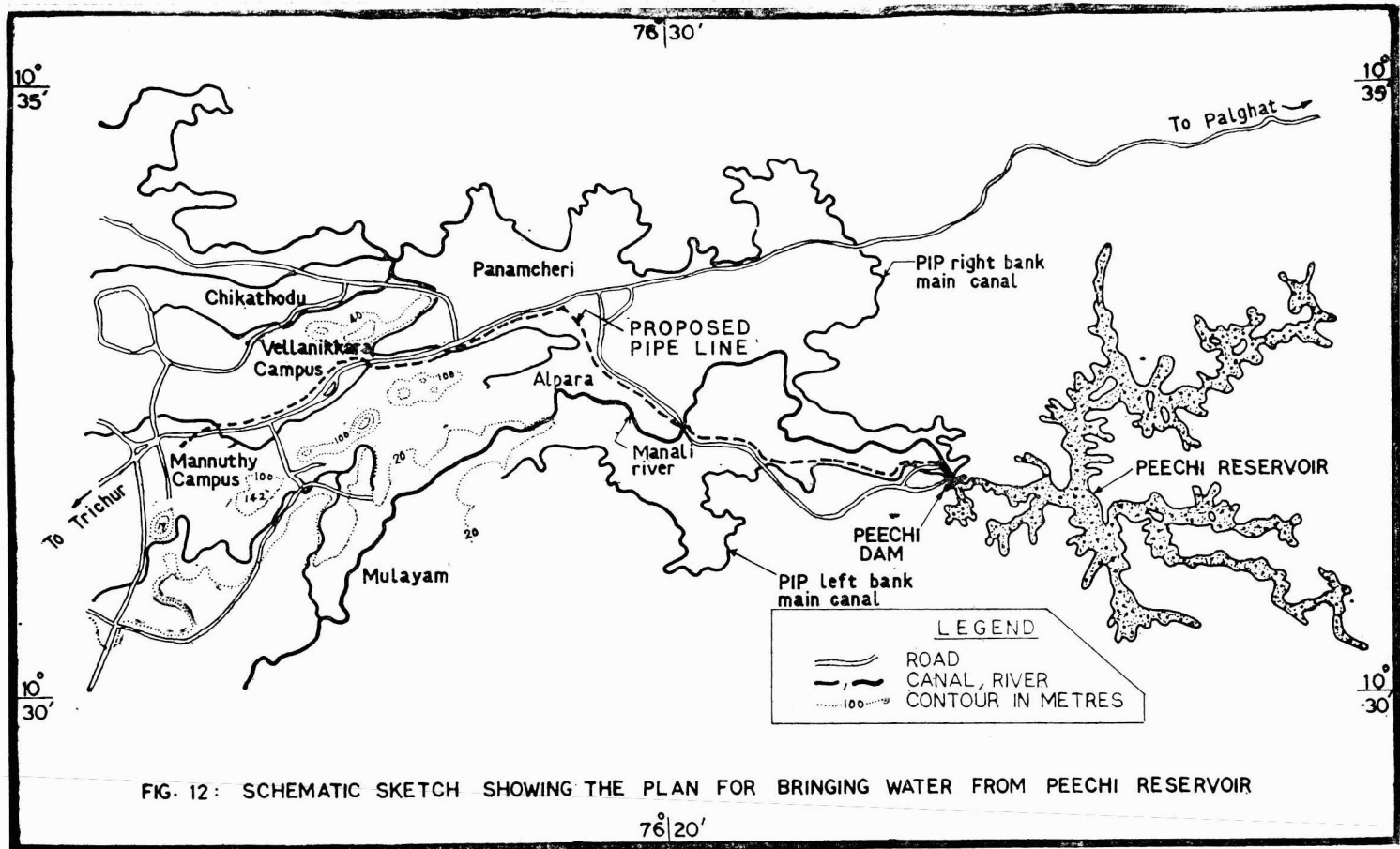


## 10.0 PLAN 2 — BRINGING WATER FROM PEECHI RESERVOIR

This suggestion can be taken into consideration, if any K A U authorities decide to import the entire quantity of excess water required, from Peechi reservoir without further water resources development in the campus. As per personal discussion with S. E. I. R. P. Peechi and Head, Ground water Division, it is understood that P. W. D. may not have any objection if K A U plans to pump water for their drinking water requirements from the Peechi Reservoir.

A schematic sketch of the pipe line to be laid from Peechi to K A U Campus is shown in Fig. 12.

A ground level tank at Vellanikkara campus, of required capacity, may be constructed and the water will get transferred by gravity because of elevation difference of approximately 40 metres.



**11.0 PLAN-3: IMPORTING WATER FROM MANALI RIVER THROUGH  
INFILTRATION GALLERY**

### 11.0 PLAN 3 — IMPORTING WATER FROM MANALI RIVER THROUGH INFILTRATION GALLERY

Another possibility of meeting the demand, is, by providing an infiltration gallery in the Manali river and by pumping water to an over head tank on one of the hills nearby and supply the same to Vellanikkara and Mannuthy campus. The probable location of the infiltration gallery in the Manali river and the storage facilities in one of the nearby hills and then transportation of the same to the campus by gravity is shown in the Fig. 13.

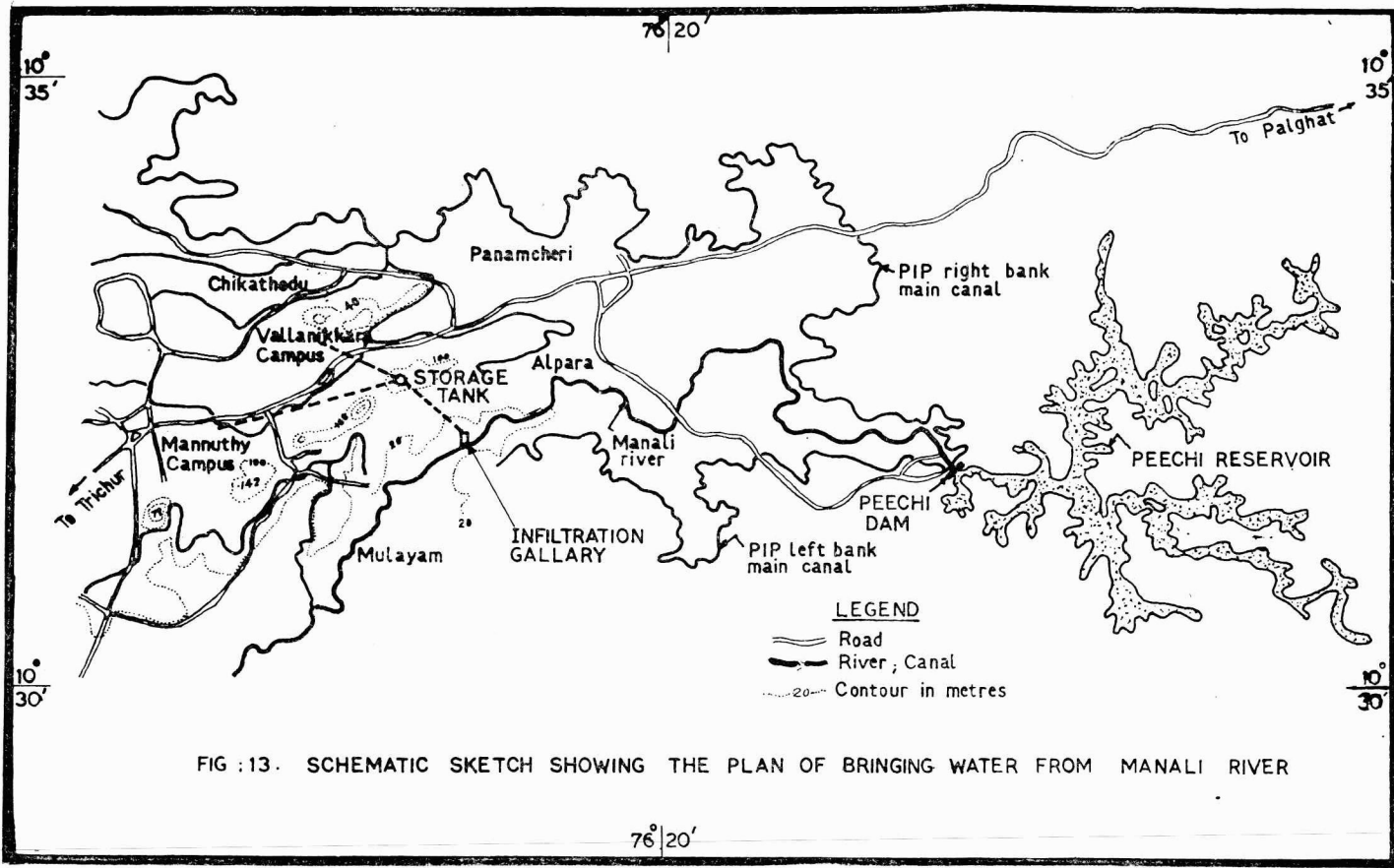


FIG :13. SCHEMATIC SKETCH SHOWING THE PLAN OF BRINGING WATER FROM MANALI RIVER

## **12.0 COMPARISON OF PLANS SUGGESTED**

Preliminary calculations show that the cost involved in implementations of plans 2 & 3 would far exceed the plan 1. Plan 1 has also an inherent advantage of being independent of all the parameters outside the campus.

## 13.0 CONCLUSIONS AND RECOMMENDATIONS

The preliminary reconnaissance survey along with the studies made with the help of aerial photographs, topographical sheets and other relevant materials bring out the following specific conclusions and recommendations.

- 1 a) Vellanikkara campus has 5 tube wells, 7 tanks and 20 open wells. These may yield 18 lakh litres/day. The present water requirement of the Vellanikkara campus is 16.78 lakh litres/day and that of 2000 A. D is 26 lakh litres/day.
  - b) Mannuthy campus has 1 tube well, 3 tanks, and 7 open wells. These may yield 13.27 lakh litres/day. The present water requirement of Mannuthy campus is 16.96 lakh litres/day and that of 2000 A. D. is 21.3 lakh litres/day.
  - 2 a) There is no deficit in the Vellanikkara campus for water requirement in 1983, for meeting the deficit in 2000 A. D, 4 more tube wells in the Vellanikkara campus in the suggested locations along with deepening of the existing two tanks P<sub>2</sub> & P<sub>3</sub> need to be done. This along with other existing resources will yield 22 lakh litres/day, which will result in a daily surplus of 14 lakh litres/day.
  - b) There is a deficit of 3.69 lakh litres/day in Mannuthy at present and for 2000 A. D. the deficit is 8.3 lakh litres/day. For the present deficit, it is suggested to install 2 tube wells in the area recommended and also maintenance of the 3 tanks present in the campus.
- For 2000 A. D the entire daily deficit of 9 lakh lit/day can be wiped off by transporting the surplus water from Vellanikkara.
- 3 Alternatively the entire drinking water demand may be brought from peechi reservoir and stored in ground level tanks in Vellanikkara and Mannuthy as per plan given in fig. 12. The water can be transported by gravity because of the elevation difference of 40 metres. Another alternative can also be thought of by transporting water from Manali river through an infiltration gallery and pumping it to a nearby hill and then transporting it by gravity to the twin campus which is schematically shown in fig. 13.

But from the point of view of cost and time, the last two plans are not positive and hence water resources should be developed within the campus as suggested for meeting the present and future requirements. **O**

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## APPENDIX I—IV

## APPENDIX—I

### PROFORMA FOR COMPILATION OF BASIC INFORMATION

	Mannuthy			Vellanikkara		
<b>1 Area</b>						
Agricultural	————— Acres			————— Acres		
Non agricultural	————— Acres			————— Acres		
<b>2 Population (Students</b>	<b>1983</b>	<b>1990</b>	<b>2000</b>	<b>1983</b>	<b>1990</b>	<b>2000</b>
Staff & all other categories)						
In Campus						
Daily commuters						
Animal population						
<b>3 Estimated water requirements (in</b>	<b>1983</b>	<b>1990</b>	<b>2000</b>	<b>1983</b>	<b>1990</b>	<b>2000</b>
Litres/day)						
Drinking						
Irrigation						
Laboratories						
Livestocks						
<b>4 Present source of water</b>						
Nos. of ponds/tanks						
Nos. of open wells						
Nos. of Tube wells						
Any other (Please specify)						

	Mannuthy	Vellanikkara
5	Estimate of water availability from the present sources at the worst time	
	In litres/day	In litres/day
	Ponds/tanks	
	Open wells	
	Tube wells	
	Any others	
6	Present water storage facilities & their capacity in litres	
7	Present water treatment facilities in the campus	
8	Present drainage facilities	
9	Present sewage treatment facilities, if any	

## APPENDIX—II

### BASIC DATA ON EXISTING WATER RESOURCES AT VELLANIKKARA CAMPUS, SURVEY CONDUCTED BY GROUNDWATER DIVISION OF C. W. R. D. M.

1 Well No.	$T_1$	$TN_1$	$T_3$
2 Well Location	Near Boys hostel	Shown in figure	Near cement store
3 Well dia (or size)	135 mm	135 mm	135 mm
4 Well depth	60.98 m	60.3 mts	82.29 m
5 Depth to water level as on 24-5-83	18.20 m	10.30 m	N. A. due to pump installation over the Tube well
6 Water column depth available as on	—	50 m	—
7 Approximate draft per day in litres	—	—   Not yet —   commis-	—
8 Litholog	—	—   sioned	—
9 Caving details, if any	—	—   due to	—
10 Pump details	Submersible pump	—   power —   supply —   reasons	— — 50.29m
Suction head	141.73 m 83.82 m		
H. P	11 H. P	—	12.5 H. P
Pumping duration	10 hrs/day	—	16 hrs/day
Designed max <sup>m</sup> discharge	3325 the 4260 Gph	—   	—
11 Water quality	Potable	potable	potable
12 Perenniality history	15,000 litres per in worst conditions	—	8000 lit/day

1 Well No.	T <sub>4</sub>	TN <sub>2</sub>
2 Well Location	Near Duplex	Near Duplex
3 Well dia (or size)	135 mm	135 mm
4 Well depth	90 m	60.55
5 Depth to water level as on 24-5-83	28 m	7.15 m
6 Water column depth available as on	62 m	53.40 m
7 Approximate draft per day in litres	—	—
8 Litholog	—	—
9 Caving details, if any	—	—
10 Pump details	Submessible pump	Rate of yield not calculated and the pump not installed
Suction head	54.86 ft (41.1 ft. pump)	
H. P.	5 H. P. (wet type)	
Pumping duration	12 hec./day	
Design max discharge <sup>m</sup>	1320 to 3040 Gph	
11 Water quality	O. K.	
12 Perenniality history	10,000 lit/hour	

1 Well No.	O <sub>1</sub>	O <sub>2</sub>	O <sub>3</sub>
2 Well Location	Near Boys hostel	Near cement store	Near national highway
3 Well dia (or size)	4 m	4.8 m	5.5 m
4 Well depth	10.25	9.00	—
5 Depth to water level as on	3.20	7.00	4.20 Below ground level
6 Water column depth available as on 24-5-1983	2.05	2.00	50 cms
7 Approximate draft per day in litres	—	—	—
8 Litholog	Hard laterite	Hard laterite	Hard laterite
9 Caving details, if any	at a depth of 8 m below ground level	Heaving caving 4.5m below ground level	Nil
10 Pump details	Both diesel and electric pumps used	77/121 m	37.5/62.5 m
Suction head H.P	7.5 H.P	15 H.P	10 H.P+Diesel Engine as stand by
Pumping duration	8 hrs/day	12 hrs/day	1½ hrs
Design max discharge	—	200/400	725/465
11 Water quality	O.K	O.K	O.K
12 Perenniality history	Perennial	get dry during high draught period April and May	Perennial

	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>
1 Well No.			
2 Location	Near pepper research station	Near NH road	Near NH road
3 Well dia (size)	23 x 15 x 65m	70x40x1.20	90x80x1.00
4 Depth of water level 23.5.83	5.47 m	No	—
5 Water column depth available as on 23-5-1983	1.17m	—	—
6 Approximate draft per day in litre	—	—	—
7 Litholog	Hard late-rite upto 1m and lateritic clay yellowish below 5.5 m	—	—
8 Cavity details	Caving below 5.5 m	—	—
9 Pump details	5 H. P diesel engine	—	—
10 Pump duration	3 hrs/day for irrigation	—	—
11 Water quality	Bad	O. K	OK
12 Perenniality history	Perennial	Non-Perennial	Non-Perennial

### DETAILS OF UNUSED OPEN WELLS IN VELLANIKKARA

1	Well No.	ON <sub>1</sub>	ON <sub>2</sub>	ON <sub>3</sub>	ON <sub>4</sub>	ON <sub>5</sub>
2	Location	Near wo- mens hostel	"	Cashew project	"	Rubber Estate
3	Dia in meters	3.0	3.5	3.5	3.0	3.5
4	Total depth in meters	8.5	7.5	8.5	7.0	10.5
5	Depth to water level as on 26-5-83	8.0	7.0	8.2	—	—
6	Depth of water column	0.50	0.50	0.50	—	—
7	Perennial history	Perennial	Perennial	Perennial	dry	dry



1	Well No.	ON <sub>6</sub>	ON <sub>7</sub>	ON <sub>8</sub>	ON <sub>9</sub>	ON <sub>10</sub>
2	Location	Rubber estate	Rubber estate	Pepper research station	Near cement store	Near cement store
3	Dia in meters	3.5	3.0	2.5	5.0	2.5
4	Total depth	10.0	8.0	8.0	6.0	8.0
5	Depth to water level on 26-5-83	5.0	7.5	7.0	5.0	7.5
6	Depth of water column	1.0	0.5	1.0	1.0	0.5
7	Perenniality history	Non perennial	Perennial	Perennial	Perennial	Perennial

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1	Well No.	ON <sub>11</sub>	ON <sub>12</sub>	ON <sub>13</sub>	ON <sub>14</sub>	ON <sub>15</sub>	ON <sub>16</sub>	ON <sub>17</sub>
2	Location	Near cement store	Near estate office	Near estate office	Near estate office	Near estate office	Near estate office	Near estate office
3	Dia in meters	2.5	5.6	3.0	2.0	2.5	2.5	2.5
4	Total depth	8.0	11.2	—	—	—	—	—
5	Depth to water level on 26-5-83	7.0	6.5	—	—	—	—	—
6	Depth of water column	1.0	4.7	1.0	1.0	1.0	1.0	1.0
7	Perenniality history	Pere- nnial	Pere- nnial	Pere- nnial	Pere- nnial	Pere- nnial	Pere- nnial	Pere- nnial

### DETAILS OF TANKS UNUSED

1 Well No.	PN <sub>1</sub>	PN <sub>2</sub>	PN <sub>3</sub>	PN <sub>4</sub>
2 Location	Near womens hostel	Near womens hostel	Near pepper research	Cashew project
3 Dimension	6 x 4.5	6.5 x 6.5	10 x 10	12 x 10
4 Total depth	7.8	6.0	8.0	3.0
5 Depth to water level on 26-5-83	7.3	5.5	—	2.00
6 Depth to water column	0.50	0.50	—	1.00
7 Perenniality history	Perennial	Perennial	dry	Perennial

**BASIC DATA ON EXISTING WATER RESOURCES AT MANNUTHY CAMPUS,  
SURVEY CONDUCTED BY GROUNDWATER DIVISION, C.W.R.D.M.**

	$P_1$	$P_2$
1 Well No.		
2 Well Location	Near Rice Research Station	
3 Well dia (or size)	23 m	14.5 x 18 x 10m
4 Well depth	N. A	—
5 Depth to water level as on 25-5-83	8.8 m	10m
6 Water column depth available as on	N. A	N. A
7 Approximate draft per day in litres	—	—
8 Litholog	Lateritic	Hard laterite upto 5.5 m below ground level.
9 Caving details, if any	Caving depth below 8.8m below ground level	Caving beyond 3.5 below ground level all around
10 Pump details Suction head (N. A) H. PH. P	5 H. P diesel 12 H. P & 5 H. P electric 8. H. P. Dieel	10 H. P
Pumping duration	12 hrs/day	3 hrs/day
11 Water Quality	O. K	O.K
12 Perenniality history	Only 15 minutes pumping during dry seasons	Perennial

1	Well No.	P <sub>3</sub>
2	Well location	Near Mens Hostel
3	Well dia (or size)	Trape odial $24 \frac{(13.4+7)}{2} \times 9.2$
4	Well depth	—
5	Depth to water levels as on	8.5 m below ground level
6	Water column depth available as on	0.70 m
7	Approximate draft per day in litres	—
8	Litholog	Hard lateritic 6 m slightly hard laterite yellowish below 6 m slightly
9	Caving details if any	Caving below 6.5 m
10	Pump details	10. H. P Jet pump used when sufficient water available & 3 H. P. Diesel
	Suction head	3 H. P. Electric used $\frac{1}{2}$ hr./ day in draught seasons.
	H. P	
	Pumping duration	
11	Water quality	O. K
12	Perenniality history	Perennial

1 Well No.	O <sub>1</sub>	O <sub>2</sub>	O <sub>3</sub>
2 Well Location	Near old guest house	Near live-stock	Near poultry farm
3 Well dia (or size)	3 m	56 m	4.6 m
4 Well depth	9.8 m	11 m	10.30 m
5 Depth to water level as on	9.3 m below ground level	10.2 m below ground level	9.0 below ground level
6 Water column depth available as on	0.50 m	0.8 m	1.3 m
7 Approximate draft per day in litres	—	—	—
8 Litholog	—	—	Hard laterite
9 Caving details, if any	—	—	Caving below 8 m
10 Pump details	—	—	—
Suction head	—	—	—
H. P	5. H. P.	Jet pump	2.5 H. P.
Pumping duration	3 hrs/day	8 hrs/day	3 hrs/day
			(monsoon season)
11 Water quality	O. K	O. K.	O. K
12 Perenniality history	Perennial	Perennial	dry

1	Well No.	T <sub>1</sub>
2	Well location	Rice Research Station
3	Well dia (or size)	15 cm
4	Well depth	Not available
5	Depth to water level as on	Not available
6	Water column depth available as on	Not available
7	Approximate draft per day in litres	—
8	Litholog	—
9	Caving details if any	Nil
10	Pump details	Submersible pump at
	Suction head	33 mt depth installed
	H. P	12.5 H. P
	Pumping duration	16 hrs/day
11	Water Quality	O. K
12	Perenniality history	19300 lit/hour (330 lit/minutes as per Groundwater Division)

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**Remarks About Specific Water Bodies**

*Vellanikkara Campus*

- T<sub>1</sub> = Maximum discharge is not utilized due to some technical problems of the starter.
- T<sub>2</sub> = Due to lack of sufficient head to the tank, water is pumped to the open well O<sub>3</sub> (Fig. 7) and then pumped back to a ground tank.
- T<sub>4</sub> = Still higher horse power pump could be used for increased discharge
- P<sub>1</sub> = Water is not used for drinking purposes due to quality reasons

*Mannuthy Campus*

- P<sub>1</sub> = This well has roughly 5 ft, of silt deposit which has not been removed for the past 10 years
- P<sub>2</sub> = Mainly used for Irrigation purposes, well needs maintenance

Out of the 7 open wells as per survey in Mannuthy campus, only 3 wells are in use others O<sub>4</sub>-O<sub>7</sub> are of limited use and are between 3-3.5 m diameter and 8-10 m deep.



## APPENDIX—III

### ASSUMPTIONS INVOLVED IN VARIOUS ESTIMATES IN THE REPORT

- 1 A requirement of 150 lit/day/person is estimated for drinking purposes.
- 2 40 acres/cusecs is required for paddy crops and 400 acres/cusecs for cash crops.
- 3 10% of the drinking demand for Laboratory purposes.
- 4 100 lit/day/cattle and 30 lit/day/100 birds is estimated for livestock requirement.
- 5 An increase of 20% rise in population has been assumed for Mannuthy campus for 1993 and 2000 A. D.
- 6 Vellanikkara details for population and aerial extent was supplied by Director, physical plant.
- 7 20 percent of the available water column (as on May 1983) in the tanks and open wells may be pumped and which will be replenished every 24 hours from groundwater inflow.