

Water Scarcity Analysis for Perambalur Town by using Arc-Gis

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ABSTRACT -The water course section surveying has become more and more important in engineering reconnaissance nowadays. Based on ever urgent social demand for water course section surveying, this paper analyses the subject of how to improve the water course section surveying and plotting efficiency for Perambalur city. Using Arc-GIS the entire water bodies are measured by the concept of Remote Sensing and Georeference images from satellite. Finally it's concluded that the integration of field and office working pattern for section surveying can effectively increase the section surveying and plotting efficiency.

1.INTRODUCTION

1.1. GENERAL

Water constitutes one of the important physical environments of man and has a direct bearing on his health. There is no gainsaying that contamination of water leads to health hazards.

Water is precious to man and therefore WHO refers to "control of water supplies to ensure that they are pure and wholesome as one of the primary objectives of environmental sanitation".

Water may be polluted by physical, chemical bacterial agent. Therefore protected water supply is a sine qua non public health community.

This revised manual taken into account the recent technical advances and trend in development of protected water supply system, some of the major changes and addition as highlighted in the following area.

- Ground water potential and its development in hard rock regions
- Well development failure of wells and remedial measures.
- Ground water abstraction through radial wells
- Measurement of flow

1.2. Survey activities

Field survey activities were started by Major Project Sub Division II, perambalur from Jan 2017. The GIS bench mark located in the perambalur junction 302.000m was considered as the reference bench mark. Temporary bench marks were established in the permanent structures like temples, buildings and parapet of culverts for carrying out the survey. The team started the work from state bank colony to ammapet. The survey work was completed.

1.3. TOOLS

The following tools have been used in this project, are:

- Arc GIS
- AutoCAD

2.DATA COLLECTION

2.1. GENERATION OF DATA MODEL FROM GIS

After completing the above procedure, using Arc-GIS the reading are noted and it is taken as the input for CAD. Now after marking the co-ordinates, the graph is plotted. So we have done the following

Steps: 1. Adding CAD files to a Data view

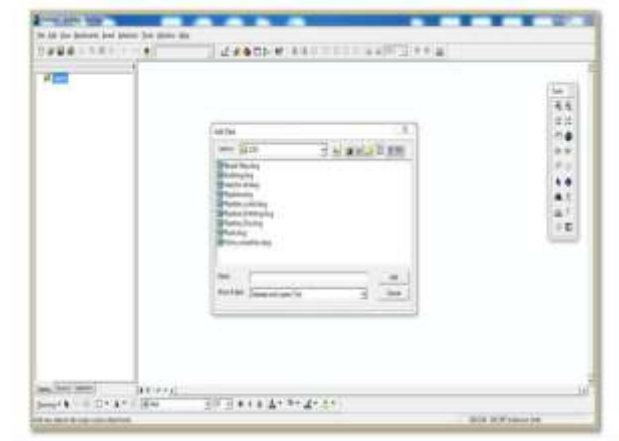


FIG.NO.1

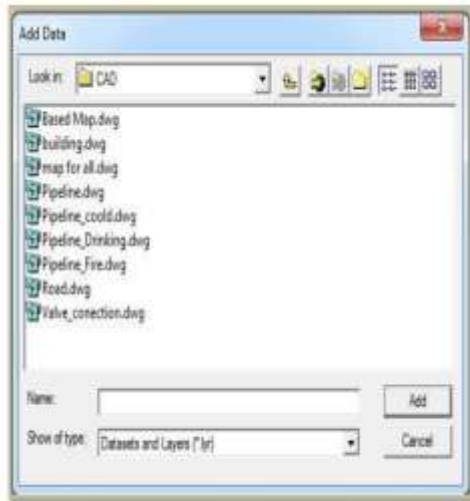


FIG.NO.2

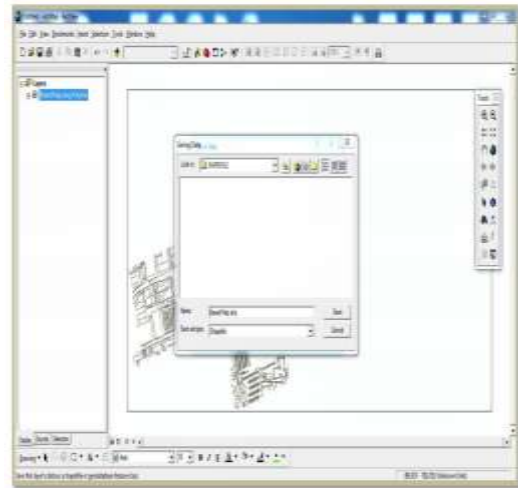


FIG.NO. 5

2. Export CAD data as Shapefiles

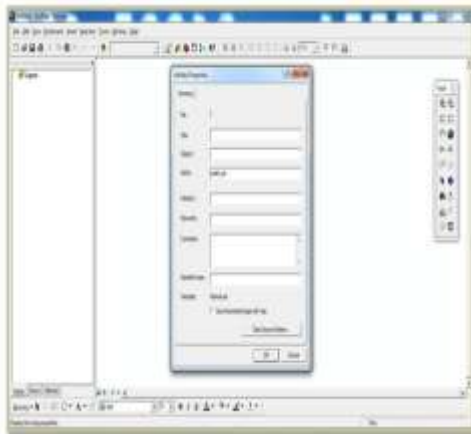


FIG.NO. 3

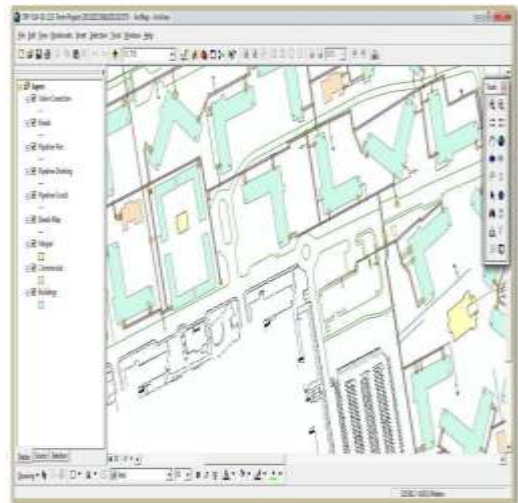


FIG.NO. 6

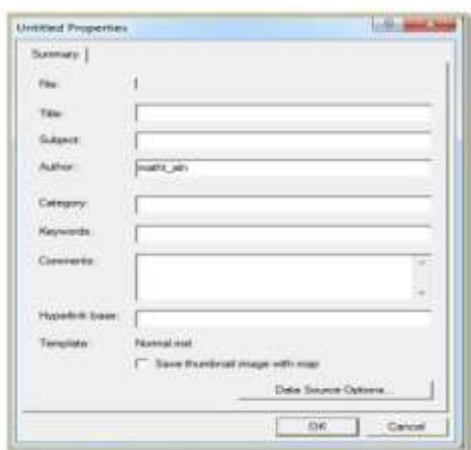


FIG.NO. 4

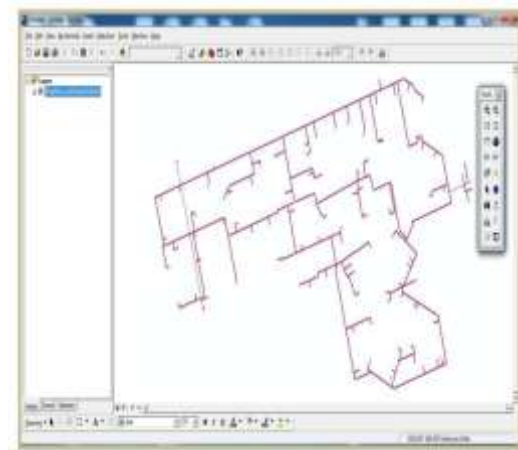


FIG.NO. 7

3. Creating ArcMap from data Shapefiles

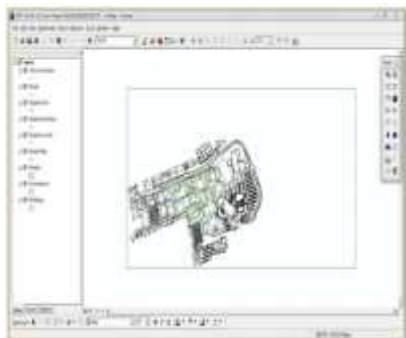


FIG.NO. 8

Name	No	Area	No. of Floor	No. of Room	No. of Staff	FIB	Stage	Enroll
Housing Student	027	029	3	102	204	10	Periya	10.00
Housing Student	028	029	3	102	204	2	Periya	10.04
Housing Student	029	029	3	102	204	14	Periya	10.08
Housing Student	040	029	3	102	204	10	Periya	10.12
Housing Student	041	029	3	102	204	8	Periya	11.14
Housing Student	042	029	3	102	204	8	Periya	11.20
Housing Student	043	029	3	102	204	4	Periya	11.4
Housing Student	044	029	3	102	204	20	Periya	10.3
Housing Student	045	029	3	102	204	10	Periya	10.9
Housing Student	046	029	3	102	204	10	Periya	11.05
Housing Student	047	029	3	102	204	7	Periya	12.3
Housing Student	048	029	3	102	204	6	Periya	12.11
Housing Student	049	029	3	102	204	10	Periya	12
Housing Student	050	029	3	102	204	17	Periya	12.1

FIG.NO.11

4. Constructing attribute features

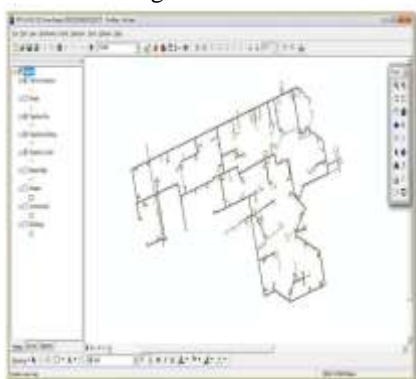


FIG.NO.9

Name	No	Area	No. of Floor	No. of Room	No. of Staff	FIB	Stage	Enroll
027	029	10	102	204	10	Periya	10.00	
028	029	10	102	204	2	Periya	10.04	
029	029	10	102	204	14	Periya	10.08	
040	029	10	102	204	10	Periya	10.12	
041	029	10	102	204	8	Periya	11.14	
042	029	10	102	204	8	Periya	11.20	
043	029	10	102	204	4	Periya	11.4	
044	029	10	102	204	20	Periya	10.3	
045	029	10	102	204	10	Periya	10.9	
046	029	10	102	204	10	Periya	11.05	
047	029	10	102	204	7	Periya	12.3	
048	029	10	102	204	6	Periya	12.11	
049	029	10	102	204	10	Periya	12	
050	029	10	102	204	17	Periya	12.1	

FIG.NO.10

3.TOWN PROFILE

3.1. LOCATION

Perambalur is the one of district of Tamilnadu state.

Latitudes – 11.23°N, Longitude – 78.88°E, Area – 1744.71 sq.km, Total population - 565223

3.2. CLIMATE

The temperature in Perambalur town is rise between the following.

- Minimum temperature - 25°C
- Maximum temperature - 41°C

3.3. HUMIDITY

Humidity is varies from the following

- Summer season – 44% to 52%
- Winter season – 70% to 85%

3.4.RAINFALL

Rainfall in Perambalur district is,

- Actual rainfall of Perambalur - 525.8mm
- Normal rainfall of Perambalur district – 440.9mm
- Average annual rainfall – 908mm

3.5.STUDY AREA

The Perambalur district bounded by

- East – Ariyalur district
- West – Namakkal and Trichy district
- North – Cuddalore district
- South – Trichy district

7.RESULT AND DISSCUSSION

3.6. LAND USE

The regional directorate of town and country planning had conducted the land use survey in 2014 (year) for perambalur town, the area is included in the planning area.

Table 1: Land use analysis for Perambalur town

S.NO	LAND USE	AREA IN Sq.hec.	AREA IN %
1.	Abondonned quarries with water	45019.83	0.000868
2.	Water bodies	137189052.6	2.646297
3.	Croped land	4133157597	79.72622
4.	Waste land	509019332.7	9.818688
5.	Fallow land	94136684.98	1.815842
6.	Industries	797071.95	0.015374
7.	Land with scrub	92943282.99	1.792822
8.	Maintaining and industrial waste	490405.65	0.00946
9.	Plantations	120026223	2.315236
10.	Salt affected land	54356782.04	1.048511
11.	Town /cities(Urban)	4369101.77	0.084277
12.	Villages (Rural)	37658175.26	0.726404

7.1. ARC GIS DATA

7.1.1.What is ArcGIS Online?

ArcGIS Online is the place to explore data, create maps, and share stories. With ArcGIS Online, you can use and create maps and scenes, access ready-to-use maps, layers and analytics from Living Atlas of the World, publish data as web layers, collaborate and share, access maps from any device, make maps with your business data, customize the ArcGIS Online website, and view status reports.

7.1.2.Explore data

ArcGIS Online includes interactive maps and scenes that allow your entire organization to explore, understand, and measure your geographic data.



FIG.NO.12 Views of lakes in Perambalur

7.1.2. TOTAL CAPACITY OF THE LAKES IN PERAMBALUR

Table 2 . Total capacity of lakes in perambalur

LAKE BODIES	DEPTH (M)	AREA(Sq. Ft)	VOLUME(Cu. Ft)
Eravadi lake	3.27	5571557.99	1823.38
Kiravadi lake	3.66	3096340.86	112.96
Aruchinatalake	3.93	9824996.99	387.30
Kuruchinatalake	4.29	6901603.33	296.08
Sengam lake	4.42	4478444.7	197.99
Tharamangalam lake	3.34	2902382.87	149.19
Periyannampalayam lake	3.75	2817706.4	105.68
Venkat lake	3.24	4187083.42	219.40
Sengjettanar	5.47	5807999.02	306.75
Kappambalur lake	5.93	5991803.19	301.94
Thandamambalur lake	3.77	4579383.8	172.81
Kilimambalur lake	6.58	11194466.8	679.38
LEB lake	7.74	4235772.22	329.39
Athiyar lake	6.06	17088091.3	108.28
Total capacity of lake=4925.98 cu.ft			

7.2. EVAPORATION LOSS

7.2.1. ERAIYUR LAKE

In Perambalur the monthly evaporation loss is 99.9mm. So the evaporation loss per annum would be 1198.8mm.

Evaporation loss per month = 99.9mm
 Evaporation loss per annum = 99.9×12
 = 1198.8mm
 = 1.198m

Total loss per annum
 = 1040000×1.198
 = 1245920 cu.m
 = 1245920000 litres
 The total loss = 43.99 mcft

The area of lake is 1040000 sq.m. The total capacity of the lake is 678.38 mcft. The overall loss in this lake will be 43.99 mcft per annum.

Total loss = Area \times Evaporation loss
 = $517594.18 \text{ sq.m} \times 1.198$
 = 620077.82 cu.m.
 = 620077820 litres

(1 mcft = 28316846.59 litre)

Total loss = $\frac{620077820}{28316846.59}$
 = 21.89 mcft

The area of **Eraiyr lake** in Perambalur is 517594.18 sq.m. The overall capacity of Eraiyur lake is 1821.76 mcft. In this the evaporation loss is 21.89 mcft per annum.

7.2.2. ARUMBAVUR LAKE

Area of Arumbavur Lake = 915559.18 sq.m
 Total loss per annum = 915559.18×1.198
 = 1096839.898 cu.m
 = 1096839898 litres
 Total loss = 38.73 mcft

The area of **Arumbavur lake** is 915559.18 sq.m. The total capacity of Arumbavur lake is 387.30 mcft. The overall loss in this lake will be 38.73 mcft per annum.

7.2.3. KIZHUMATHUR LAKE

Area of the lake = 1040000 sq.m

7.2.4. LBK LAKE

Area of the lake = 395374.18 sq.m
 Total loss per annum = 395374.18×1.198
 = 473658.26 cu.m
 = 473658260 litres

Total loss = 16.72 mcft

The area of lake is 395374.18 sq.m. The total capacity of the lake is 329.39 mcft. The overall loss in this lake will be 16.72 mcft per annum.

7.2.5. KURUMBALUR LAKE

Area of the lake = 641188.31 sq.m
 Total loss per annum = 641188.31×1.198
 = 768143.5954 cu.m
 = 768143595.4 litres
 Total loss = 27.12 mcft

The area of lake is 641188.31 sq.m. The total capacity of the lake is 197.99 mcft. The overall loss in this lake will be 27.12 mcft per annum.

7.2.6. KIRAVADI LAKE

Area of the Lake = 286730.43 sq.m

Total loss per Area = 286730.43×1.198

$$= 343503.0551 \text{ cu.m}$$

$$= 343503055.1 \text{ litres}$$

$$\text{Total loss} = 12.13 \text{ mcft}$$

The area of lake is 286730.43 sq.m. The total capacity of the lake is 112.96 mcft. The overall loss in this lake will be 12.13 mcft per annum.

7.3. REQUIRED WATER BODIES

Total capacity of the lake in

$$\text{Perambalur district,} = 4935.98 \text{ mcft}$$

Population of

$$\text{Perambalur} = 585223 \text{ persons}$$

(according to 2011 census)

$$\text{Per capita demand per person per day,} = 135 \text{ lcpd}$$

$$\text{Forecasted for 2050 with 80\% incremental} = 1053401.4$$

$$\text{Water required for the population / day} = \text{per capita demand/day} \times \text{population}$$

$$= 142209189 \text{ lcpd}$$

$$\text{Therefore water required for the population per day,} = 142209.18 \text{ cu.m}$$

$$\text{Therefore water required for the population per day, in mcft} = 50.18 \text{ mcft}$$

$$\text{After loss of water the available water} = 4935.98 \text{ mcft}$$

$$= 3775.4 \text{ mcft}$$

$$\text{Water supply possible with surface water bodies alone} = 3775.4 / 50.18$$

$$\text{No of days for possible supply} = 75 \text{ days}$$

7.4. DISCUSSION & SUMMARY

From the above result the surface water supply from lakes proposed will be only sufficient for 75 days. If we need to improve this supply by five times of the current supply means,

$$\text{Required lake capacity} = 3775.4 \times 5$$

$$= 18877 \text{ mcft}$$

If the water bodies capacity of Perambalur town is increased as mentioned above, then the water scarcity of the town will be manageable upto the 2050.

CONCLUSION

According to the study, the water bodies capacity parameters shows that there is very limited water for most of the places. Based on the information collected through Arc-GIS, the following suggestions can be implemented to meet the great demand of water.

- ❖ From the mentioned forecasting, the population possible in the year 2050 will be 1053401 persons.
- ❖ The present water bodies in perambalur town will not be enough to fulfill the water supply.
- ❖ Water bodies of perambalur like lake, pond, pool should be improved 5 times more than the present water bodies to increase the capacity of water to be stored.
- ❖ The above mentioned points are to be considered and immediate action is required shortly to meet the demand of the people by the year 2050.

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