Interlinking of Water Courses

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***Abstract*—India is one of the few countries in the world endowed with reasonable land and water resources. Water is rechargeable natural resources. Being a monsoon country the rainfall is erratic, unevenly distributed and hence water scarcity in some parts and floods in other parts frequently occur. In order to produce to feed the expected population of 1650 M in 2050, there is a need to bring about 150 M Ha under irrigation from 100 M Ha at present. As more than 65% of the flow in the rivers is not utilizable and goes to sea every year, it is necessary to interlink all the rivers in the North and South to provide water to the deficit basins. Government has created a National Water Development Agency to study and implement the programme. Regional water transfer is an attempt to redistribute water from "surplus" to "deficit" zones within India. The Interlinking of River project in India envisions linking 37 rivers of 20 major basins in the country through 31 links and canals. The project has been promoted as a solution to the 'paradox of floods and drought' in India and will also provide water for irrigation and power generation. The economic prosperity of a country depends upon its natural resources and their sustainable uses The paper is a solution to guide the surplus monsoon water to the social tanks of the region and allow to use by the population of area concerned.**

***Index Terms*—economic prosperity, scarcity, sustainable uses, water resources**

I. Introduction

Dhule is a one of the major cities in India situated on the banks of Panzara River. Dhule is located at $20.9^oN74.78^oE$. It has an average elevation of 250 metres (787 feet). Dhule lies in the Khandesh region, which forms the northwest corner of the Deccan Plateau. This region consists of residual hills and dykes of poor dry and stony soils intervened by well watered valleys of the eastward trending upper courses of streams with somewhat better soils and intense agricultural activity based on canal and well irrigation. This region is one of the few regions in Maharashtra with well developed canal irrigation even in Pre-British times, probably on account of the rivers flowing in a region of light soils derived from the slow weathering of the dykes. The soils of Tapi valley region are extremely fertile except in some portions near the main river and its tributaries.(3)

A. Objectives

1) To connect natural water courses for sustainable development of region.
2) Self sufficiency in basic water requirement for society.
3) To provide livelihood and employment opportunities for regional population.

II. Methodology

In the state of Maharashtra, Dhule region facing the scarcity of water. To solve this problem we have selected this region. Thus for further implementation of work we collected topographical maps from Survey of India Department. From this topographical features of the region is known and further tracing of location of point of interest is done. Catchment area of each tributary is marked and calculated with the help of planimeter. Best suitable path for canal is selected. After finding out the catchment area, rainfall intensity data from Meteorological Department for last 20 years was collected and discharge is found out. For total stretch of 16.75Km, the canal is designed.

A. Site Map

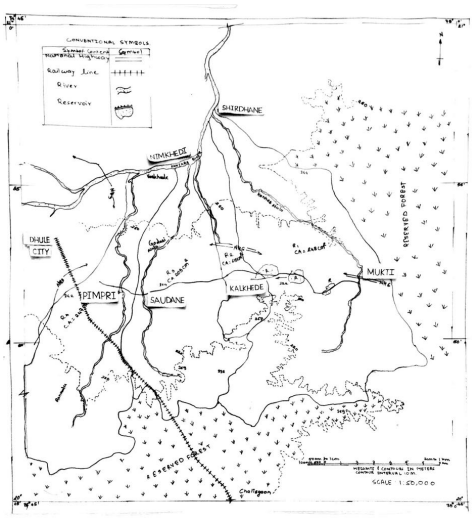

Fig. 1. Location of map (Scale: 1: 50000)

Table 1. Contents of the map

S. No.	Contents	Symbol
1	Reserved forest	
2	National highways	
3	Proposed canal	
4	Railway line	
5	Reservoir	

By studying the contour map of Dhule region, the best contour path is selected. For construction of canal the alignment passes through three reservoirs which comes under R.L.280

passing throughout the region. For each reservoir check dam is provided for controlling silt content.

Total length of the canal=16.75Km The first reservoir is located at village Mukti and canal is stretch from village Mukti to village Kasvirur. Reservoir is receiving water from Kanher Nala And it covers area of Bhirdai, Bhirdane village. The length of first phase canal is 1.12 Km. The second reservoir is located near village Kasvihir. The length of second canal stretch is 0.66km. The third reservoir is located near village Ajang. Canal stretch from second reservoir to third reservoir is 0.7km. The last stretch is from village Kalkhede and passing from village Saundane, Vadjai, Pimpri which is 14.27 km long. The water that will be passing through the canal will provide and fulfil the water requirement for irrigation and the excess water will be carried to the Dhule city. The canal constructed will increase water availability ,thus this will provide employement and livelihood to the people.

B. Annual Rainfall Data

From the data obtained from Meteorological Department of India, the annual rainfall data for Dhule region is obtained for past 20 years as follows:

Table 2. Annual rainfall data

Year	Rainfall (mm)
1997	573
1998	772
1999	490
2000	339
2001	546.6
2002	412
2003	718
2004	851.5
2005	318
2006	727.5
2007	668
2008	492
2009	568
2010	641
2011	500
2012	367.3
2013	71.1
2014	597.7
2015	512
2016	501.5

III. RESULT

A. Site Model

Dhule city located at the bank of Panzara River has four small water courses which are divided into four regions as shown in the Fig. 1 and Fig. 2.

B. Catchment Area

Region 1 comes in Mukti village in which Kanher Nala tributary of Panzara river passes.The highest elevation of region is 344m while lowest elevation is 322m.The total area of region 1 is 61.970 sq.km.

The canal passing through region 2 Kalkhede village of which highest elevation 357m and lowest is 254m,this region includes 16.125 sq.km. area.

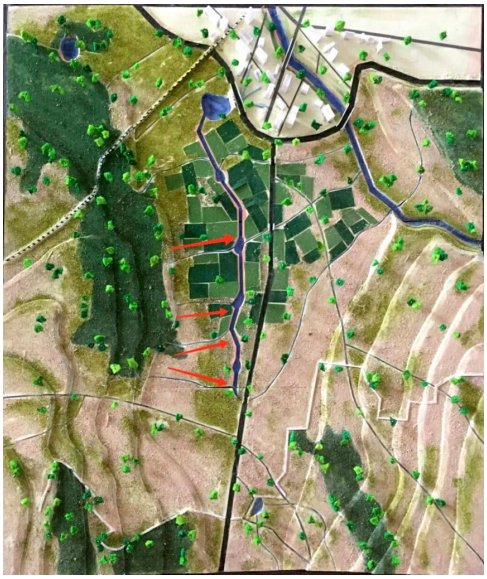

Fig. 2. 3D representative model of Dhule region (Not to the scale and not published)

Godavari Nala tributary of Panzara River in Sudane village having the highest elevation 359m whereas lowest elevation is 304m of Region 3 including area of 50.750 sq.km.

The Region 4 includes village Ranmala and Pimpri .Also, having railway line passing through Dhule City to Chalisgaon. The highest elevation of that region is 342m and lowest is 260m consisting of area 61.870 sq.km.

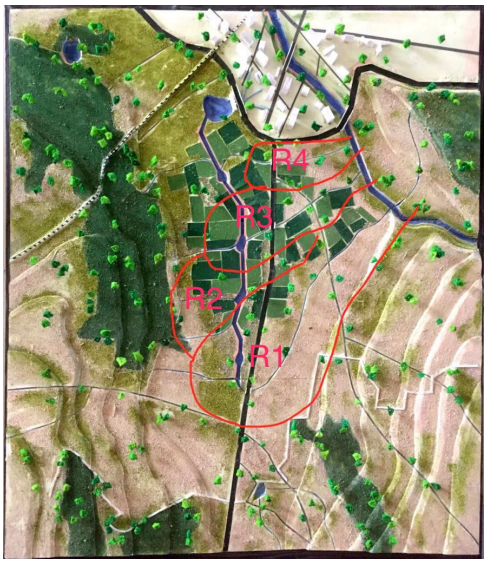

Fig. 3. Catchment region (Not to the scale and not published)

Total average rainfall = 11306.1/20 = 565.305 mm

C. Discharge

$$Q = C \cdot I \cdot A \tag{1}$$

Where, Q= Total Discharge, C= Coefficient of runoff, I= Intensity of rainfall, A= Area of catchment

D. Canal Cross Section

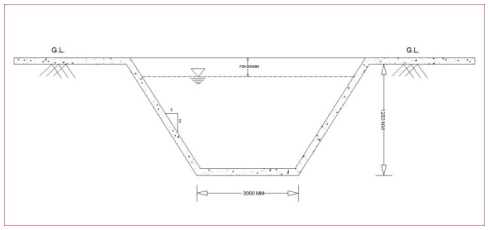

Fig. 4. Cross Section of the Canal

From the average annual data, total annual average discharge is calculated. As per designed,

- Width=3000 mm
- Depth=610 mm
- Slope = 1H:2V

By considering future scope,

- Width= 3500 mm
- Depth=1200 mm
- Slope=1H:2V

Total Canal Length=16.75 Km

E. Future Scope

In case, the actual discharge exceeds the design capacity of canal, flooding condition arises and to counteract this recharge wells are to be constructed in the vicinity of canal. This will help to increase ground water level of the surrounding area.

IV. Conclusion

Successful implementation of the project will provide sufficient water to the Dhule City. Agriculture and employment will increase. Although the initial cost of construction will be higher but it is more beneficial in long run. Domestic water security and supply will be achieved.

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