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Assessment of Canal Irrigation and Cropping Pattern in Shrigonda Tahsil using GIS Techniqes

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Abstract

Irrigation tends to be the backbone of agricultural practices in the rain-fed agriculture areas. Irrigation has been supportive in sustainable agriculture and its practices in drought prone areas with a high variability of rainfall. Irrigation facilities like economic and technological at institutional and individual levels, however if not utilised in a scientific way may give way to serious problems in the form of water logging and salinization.

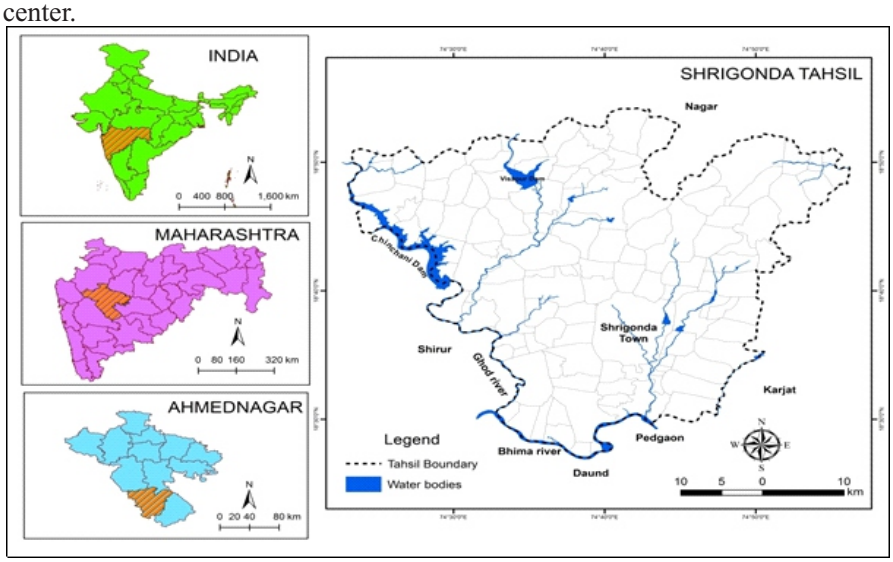
Keywords: *Drought Prone Area, Water Logging, Salinization, Irrigation, Canals, GIS.*

Introduction:

The Shrigonda tahsil in the Ahmednagar district of Maharashtra has been facing similar problems like post the commissioning of the Ghod and the Kukadi canal respectively (Doke, 2013). The present paper attempts a micro level study of evaluation of canal irrigation schemes and their impacts on the area to identify the potentially damaged with the help of GIS techniques. This could be further utilised to suggest sustainable integrative method for the development of agricultural practices in the study area.

Study Area:

The Shrigonda tahsil is located in the southern part of Ahmednagar district. This is a drought prone area. The tahsil situated partly in the central part of the Bhima basin. The length of the tahsil is about 60 Km. from east to west and 51 Km. from north to south. The maximum height of the tahsil is about 600 m. above sea level. General slope of the tahsil is north to south drained by streams like Hanga, Sarswati, and branches of Ghod and Sina rivers. The latitudinal extent is 180 27' 18" to 180 51' 54" north and longitudinal extent is 740 23' 24" to 740 52' east. It is bounded by Parner and Nagar tahsil to the north, Pune district to the west and Karjat tahsil to south – east (see in Figure 1). Population of the study area is about 3, 15,975 according to 2011 census. There are 114 rural settlements with only one urban center.



Objectives

The specific objectives are-

1. To assess the canal irrigation schemes in the study area.
2. To analyse the damage areas in the canal command area.
3. To suggest a sustainable, integrated method for agricultural development in the study area

Database and Methodology

A combination of methods makes it possible to vividly define the achieved research goals, which refer to the basic natural and social characteristics of the considered Geo-space and opportunities for agricultural development. For the data collection related to the analysis of population and settlement wise agricultural practices, we used of Government offices, Census of India, 2011, State Data Storage Centre (SDSC) Hydrology Project, Nashik and Taluka Krushi Adhikari, Shrigonda Tahsil.

The objectives of this study are to apply the integrated use of different research method in drought prone area of Western Maharashtra. The core methodological procedure used in this study is the geographical (spatial) method, whose scope of research is related to Shrigonda tahsil. During the research, following methods has been used i.e. descriptive, causal, comparative method and theoretical analysis. Descriptive and causal methods were used to detect the cause consequential link between Micro-irrigation and agricultural development in Shrigonda tahsil. The methods of theoretical analysis encompassed theoretical basis and previous work related to study area.

Analysis and Discussion:

Irrigation trends to be the backbone of agriculture practices, particularly in areas where rainfall is scanty and variable populations in search drop from an area get to be heavily dependent on irrigation.

Canal irrigation has been particularly successful in the drought prone areas of Western Maharashtra

Table 1: Water storage available for agriculture

Canal	Storage (TMC)		Used for Irrigation (TMC)
	Gross	Live	
Kukadi (LBC) Canal	3.30	2.80	2.80
Ghod Canal	7.640	5.470	5.470
Visapur Canal	0.922	0.904	0.922

Source: Govt. Of Maharashtra, Water Resource Devlopment, Kukadi Irrigation Division

Irrigation not practice in a scientific way may lead to problems of salinity and water logging. Water logging and salinity are dependent on various factors, however, which could be physical or human. Physical factors include geology as the prime factor and slope, soil depth and soil texture. Meteorological and hydro logical factors also have a role play while the first is more physical the latter could be physical and human both. Laser number of canal rotation as a subsequence of decrease in rainfall can be micro-level human factors.

Type of crops under the cultivation influence of the farmers resulting in the length of the irrigation pipelines from main water bodies. Cheap or subsidised electricity non Alliance with proper water conservation techniques eventually leading to water login and salanization can be listed as human factor affecting leading to irrigation related problems. Availability of water for irrigation could bring about variation in areas affected by water logging and salinization. Improper irrigation could aggravate this issue further.

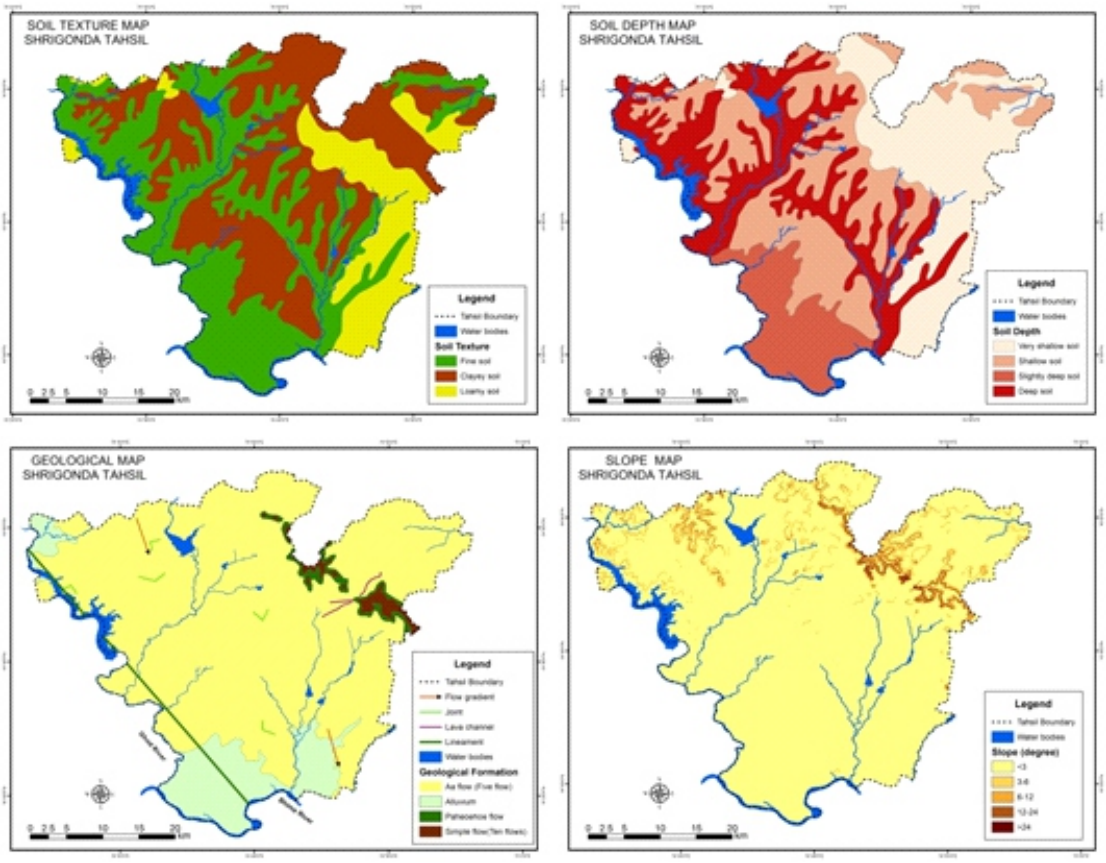
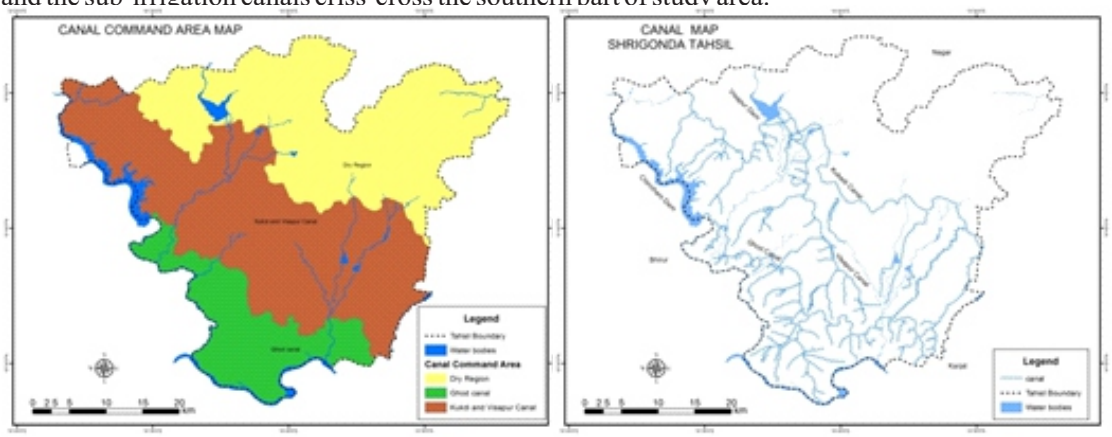


Figure 2: Physiography of Study Area

The Shrigonda tahsil has an considerable network of irrigation Canals in the downstream direction of Visapur and Chinchani dams along the Hanga and the Ghod river respectively. The main and the sub-irrigation canals criss-cross the southern part of study area.



Source: Govt. of Maharashtra, Water Resource Devlopment, Kukadi Irrigation Division.

Figure 3: Canal Command Area

The Irrigation Department of Pune Division has generated statistical data regarding the area

occupied by water logging and salinization along the Ghod (left Bank) and the Kukdi for the last 10 and 15 years respectively. The affected area is further classified as absolute and partial water logged and saline areas respectively.

A Micro level spatial and temporal (decadal) study along the two Canal using GIS techniques could help the reason out, the causative factors and the potential area of impact. This could be used in suggesting solutions and thus improve the agricultural productivity and sustaining the factors affecting this productivity positively and at the same time arresting the factors responsible for loss in the quality of soil and water resources.

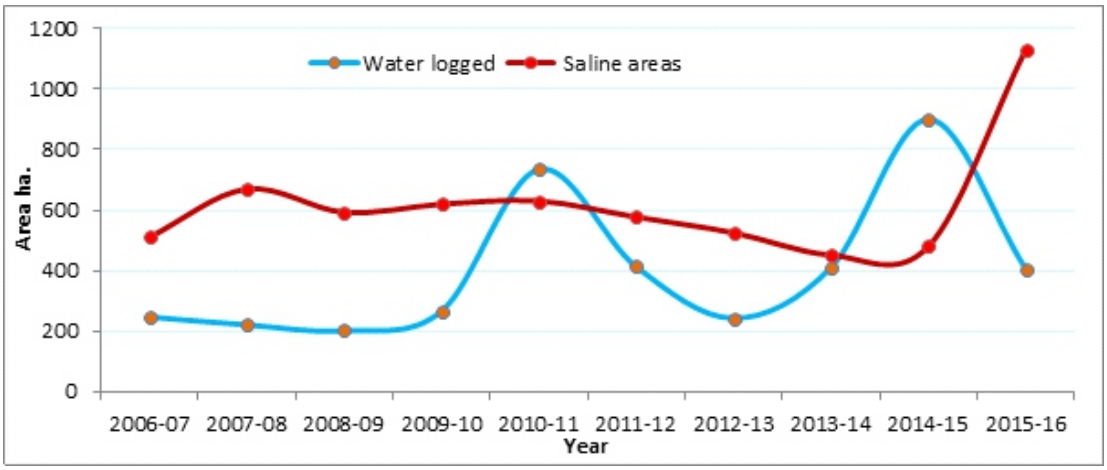


Figure 4: Damage Area under Ghod Canal

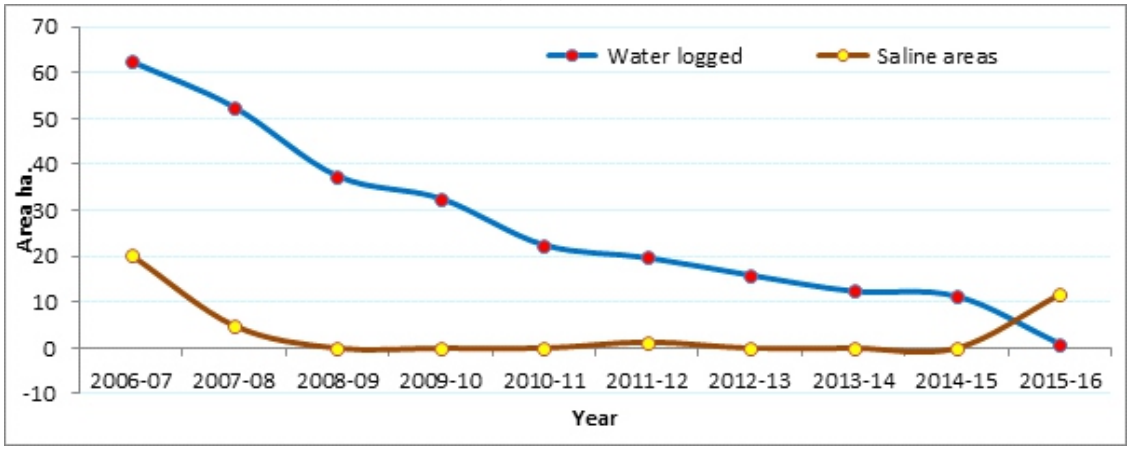
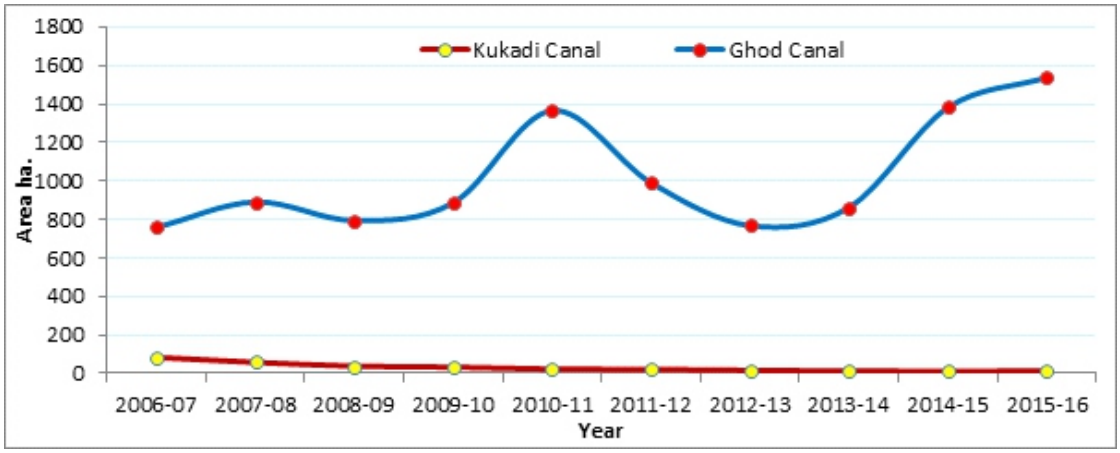


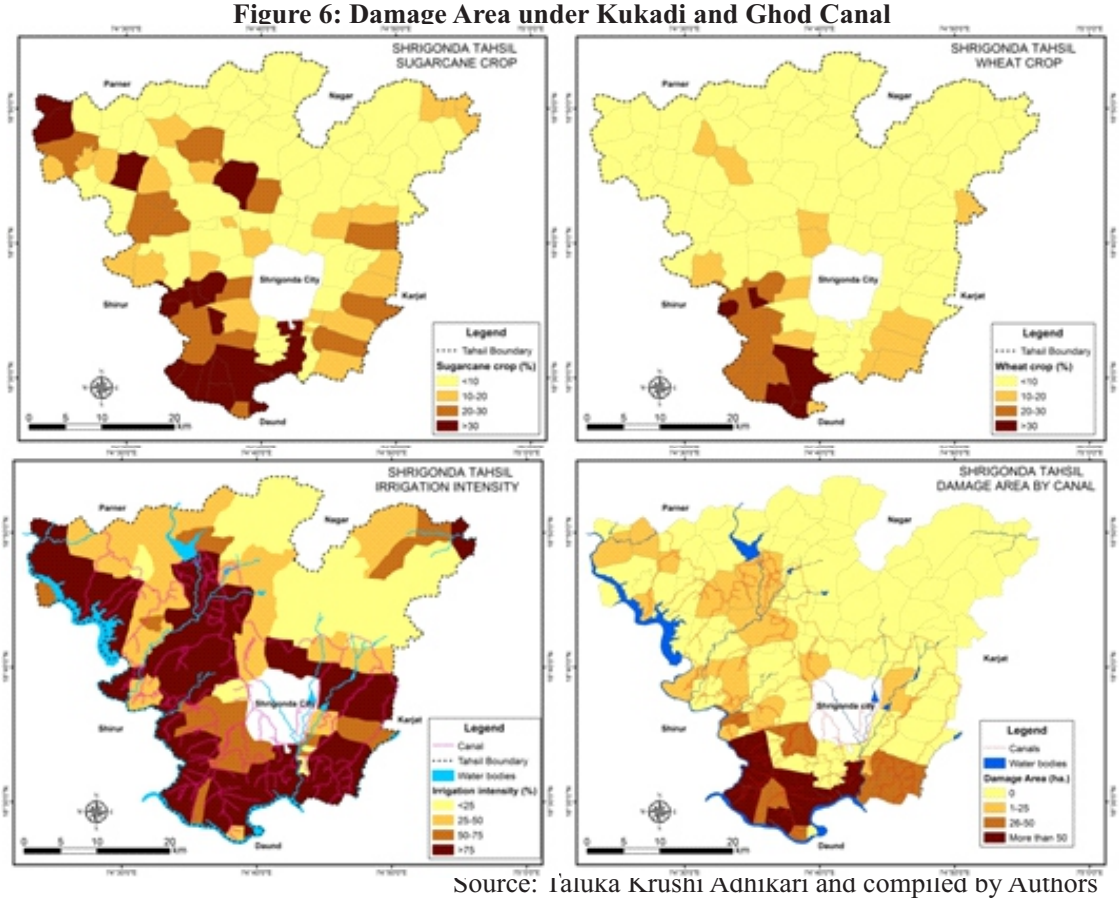
Figure 5: Damage Area under Kukadi Canal

Water logging and the resultant salinization has been seen to be spatially spread along Ghod canal more.Temporal impact of water logging and resultant salinization is seen to be varying which indicates that the availability of water for canal irrigation and the resultant water rotations out of an appreciable monsoon (withdrawing) play a dominating role to cause water logging in particular.



Source: Govt. of Maharashtra, Water Resource Devlopment, Kukadi Irrigation Division.

Figure 6: Damage Area under Kukadi and Ghod Canal



Source: Taluka Krushi Adhikari and compiled by Authors

Figure 7: Damage Area Analysis

Sugarcane crop intensity well co-insides with the salinity areas and thus could be a significant crop impacting the damage. Wheat has a very low cropping intensity as compared to sugar cane. Sugarcane has been the most intense crop in areas with high water logging and salinity.

Irrigation intensity in the tahsil has been particularly high along canals. The damage area due

to excessive irrigation is high (more than 50 percent) towards the southern part of study area. The second highest damage areas lies along the periphery of the core damaged area. Scattered patches of a damage areas up-to 25 percent can be observed along the canal command area.

Conclusion:

Recent cropping pattern trends is seen to have shifted to horticulture; with plantations of Pomegranate and Lemon which are irrigated on Farm ponds are showing increasing results, which has been a cause for fall in the salinity along the Kukadi canal in particular.

References

1 Ali, S. & Malik, R. (2010). Spatial patterns of vegetation with underlying soil properties, prevailing along drain side areas in Islamabad City. Pak. J. Bot. 42(4), 2397–2410.

2 Alvin, S. & David, C. (1984). Principles of water resources planning, the University of California.

3 Bandyopadhyay, S., Jaiswal, R., Hegde, V. & Jayaraman, V. (2009). Assessment of land suitability potentials for agriculture using a remote sensing and GIS based approach. International Journal of Remote Sensing, 30(4), 879–895.

4 Cynthia, P. (2009). Irrigation salinity – causes and impacts. PRIMEFACT 937. www.industry.NSW.gov.av

5 Dhoble, (1993). Reference from Patil, S. (2014). Cost effective use of resources for sugarcane cultivation in Walwa Tahasil of Sangli District (Maharashtra).

6 Doke, A. (2013). A geographical study of agricultural and economic changes in command area of Kukadi canal irrigation project in western Maharashtra. (Unpublished Research Work) SJJTU, Rajasthan.

7 FAO, (1976). A framework for land evaluation, Soil Bulletin 32. Food and Agriculture Organization of the United Nations, Rome, Italy.

8 More, J. (2008). A strategy for sustainable agricultural development in Karmala Tahsil of Solapur District, Maharashtra, (Unpublished Research Work) Pune University, Pune.

9 Saptarshi, P. (1993). Resource appraisal and planning strategy for drought prone areas - a case study of Karjat Tahsil District Ahmednagar, Maharashtra. (Unpublished Research Work).

10 N. Kale, J. C. More(2018), Fluvial Soil Textural Characteristics in upper Ghod Basin using GIS and GPS Techniques, International Conference on Frontiers in Life and Earth Science © IJSRST | Volume 5 | Issue 1

11 Dr. S. Korde, J. C. More, (2018), A Study of Occuoational Structure of Population in Ahmednagar District of Maharashtra, Peer Reviewed International Journal of Maharashtra Bhugolshastra Sanshodhan Patrika Vol-. 35, No.1, pp 1-8,

12 Dhawale, Munde, Devne, More (2020), Evaluation of Blended Irrigation Schemes: A Micro - Level Decadal Study of Shrigonda Tahsil in Drought Prone Western Maharashtra, India, Indonestan Journal of Geography, Vol. 52, No.1, 2020 PP, 92-97.

13 D S Ghungarde & J C More (2021) Impact Analysis of 'Jalyukta Shivar' Scheme, A Case Study of Chas Village in Ahmednagar District. Vol, 8, Issue, 29, PP, 1-5, UGC Care Listed

14 D S Ghungarde & J C More (2021), Environment Analysis of Climate Elements of Ahmednagar District. Akshar Wagnmay, UGC Care Listed, Special Issue Vol, 5, PP, 103-107

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