

TANK INFORMATION SYSTEM OF KUNIGAL TALUK TUMKUR DISTRICT, KARNATAKA USING GEOINFORMATICS

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Abstract

Tanks are very important water bodies serving as a reservoir for many ground water arteries. Tanks revival/restoration is a much discuss about subject in the recent years. The present study Kunigal taluk of Tumkur district Karnataka state the entire area of kunigal taluk is an 981sqkm comes within six SOI toposheet, numbers are 57C/16, 57G/4, 57D/13, 57H/1, 57C/12, 57C/9 (scale 1:50000). An attempt has been made in this study to know the physical and hydrological information of the 480 tanks in Kunigal taluk and lake conservation and its operation and maintenance during restoration work for further development of irrigation and drinking water system. i.e., for Marconahalli reservoir, Mangala tank, Kunigal doddakere, Begur amanikere and Kothakere tank by using software like ERDAS Ver 9.1 and Arc GIS Ver 9.1, this tank information system is further help full to know tank capacity, harvesting structures and improvement techniques.

Keywords: Restoration, physical and hydrological information, ERDAS V9.1 and Arc GIS Ver9.1 etc...

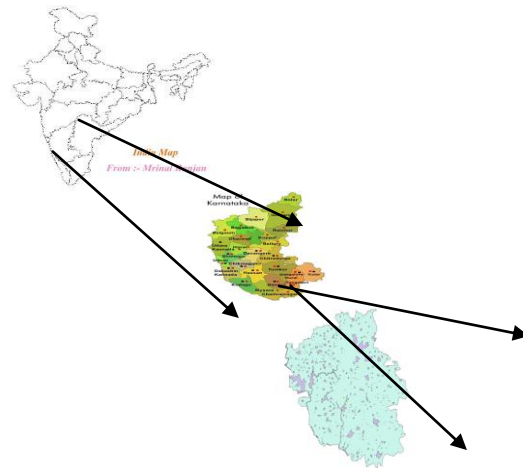
1. INTRODUCTION

Tanks have been the lifetime of the rural settlement because they are the traditional source of drinking water and irrigation in the areas, which depends on monsoon rains for their needs. The present study of Kunigal taluk in Tumkur district Karnataka state, the total area of kunigal taluk is 981sqkm comes within six SOI toposheet, numbers are 57C/16, 57G/4, 57D/13, 57H/1, 57C/12, 57C/9 (scale 1:50000). It has an average elevation of 773 meters (2536 feet). The rainwater and the seasonal runoff streams and rivers during monsoon period are stored in the tanks and this utilized for drinking and irrigation purposes in the later part of the year. The major uses of tanks are listed below. Increase in the irrigation facility leading to better crop yield, recharge of groundwater, which will bring up water table near to the surface. This will benefit water supply for domestic purpose and irrigation for crops and orchards during post monsoon months. Tanks could also be used profitably for aquaculture purpose, water for livestock, animal husbandry activities, and prevention of flooding and damage to crops during periods of heavy rains in monsoon by storage of excess water. Silt extracted by tanks bed is economically used as manure for agriculture fields and recreation uses like boating and water sports and developing surrounding area into a park. Tanks have the ability to control microclimatic condition of their surroundings

1.1 Location Map and Objectives of Study

The study area of Kunigal taluk is located in the southern part of Tumkur district, Karnataka state, the taluk covers an area of

981 Sqkm. The area is bounded by the latitude North 12°44'38.74" to 13°8'1.16" and the longitude East 76°49'43" to 77°9'57" of SOI toposheets shown in Map1. To study of tank features, drainage system and catchment area, the amount of water inflow to the tank can be calculated. Digitizing and calculating areas of all the tanks, we can classify the tanks based on the area.



Map 1: Location Map of Kunigal taluk

1.2 Tanks and Tank System

Tanks have been the traditional source of drinking water, irrigation and domestic purposes in the areas of low and

erratic rainfall for many centuries. The tanks are existing on the earth naturally and also peoples built artificial tanks which serves the human necessities the tanks are serially connected finally it reaches the sea. tanks refer to a section of irrigation reservoir including small and medium sized water bodies. The peninsular tanks are water bodies created by dams built of rubbles, earth stones and masonry work across seasonal streams, as against reservoirs which are formed by dams built with precise engineering skill across perennial or long seasonal rivers or streams, using concrete masonry or stone, for power supply, large-scale irrigation or flood control purposes and it involves tedious work, seasonal run off from streams and minor rivers, particularly during monsoon season is stored in tanks and this water is released for drinking or irrigation purpose during post monsoon months.

The tank irrigation systems have existed since Vedic times. rock inscriptions of Chalukyas and Kalyanas, dated back to 973 AD, have praised local rules for building tanks. Some of the old rules and socialists had regular programme of construction tanks in the river courses in a systematic way, which culture is now fading off. In Karnataka, tanks are one of the important sources of irrigation which irrigated around 2,33,522 hectares (DES 1999-2000). There are around 36,696 tanks existing in Karnataka and the water of these is utilized for irrigation and domestic needs. Of these tanks, those with a command area of less than 40 ha are owned and managed by Zilla Panchayats. Remaining tanks are under the control of the Department of Minor Irrigation. Tanks are classified into major, medium and minor, based on water spread area. The size of the tanks varies from around 2ha to 2000 ha and it is found that the sizes of majority of them (83%) are under 20ha.

2. METHODOLOGY

In the present study, the maps showing tank details have been prepared from digital data of IRS1C and 1D of LISS III and SOI Topomaps. These satellite image and Toposheets have been geo-referenced using ERDAS Imagine (V9.1) and Arc GIS (V9.1) software.

The tanks have been delineated using SOI Toposheets on 1:50,000 scale. Field work has been carried out and the tanks areas are considered for the analyses are summarized in detail in table no 1. Arc GIS software have been used for digitization and computational purpose and also for the output generation is shown in fig1 & 2.

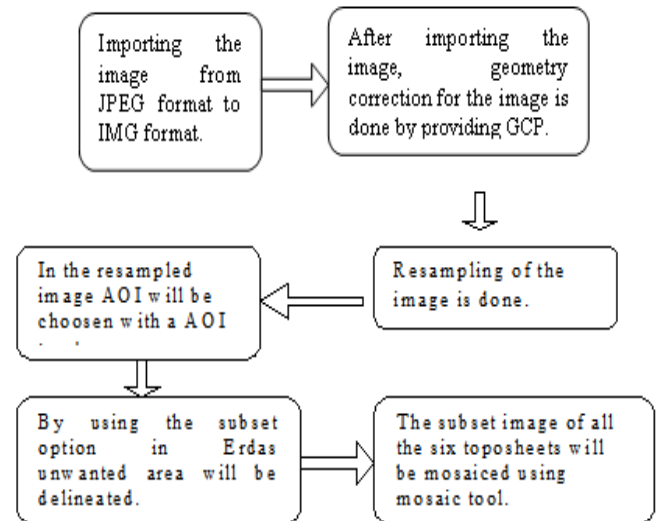


Fig 1 ERDAS Imagine methodology chart

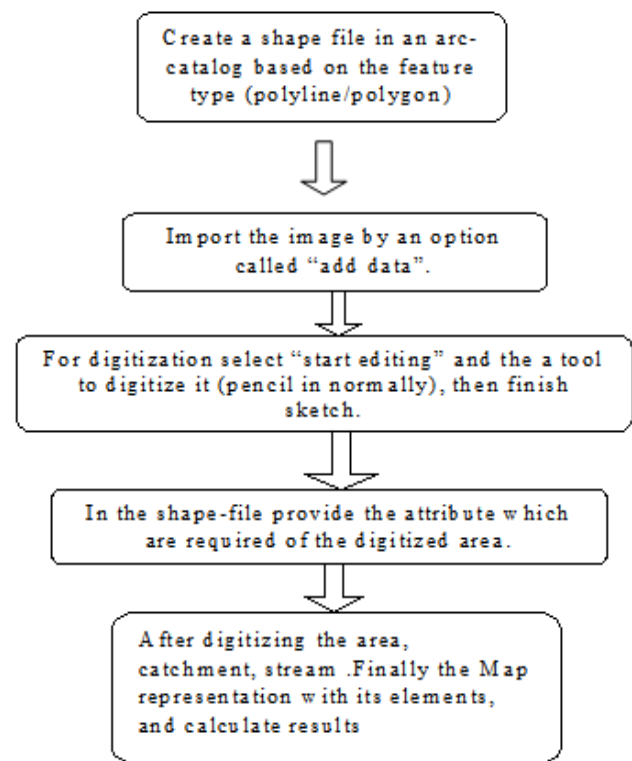


Fig.2 Arc GIS Methodology chart

3. RESULTS AND DISCUSSIONS

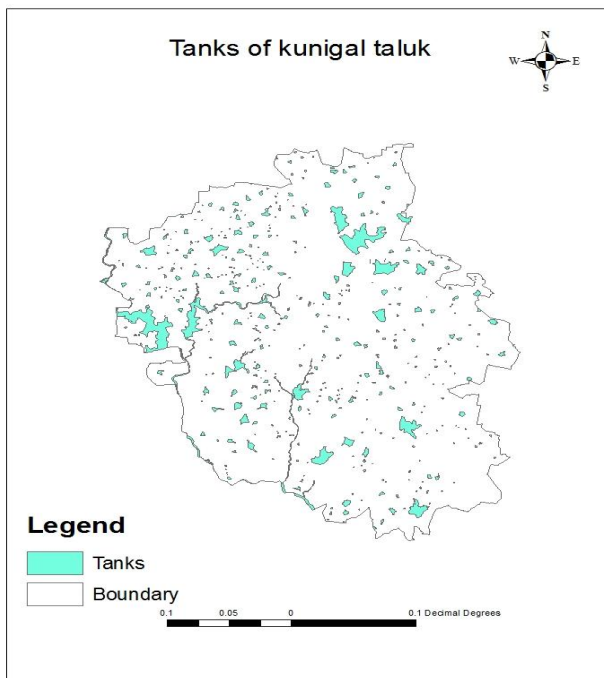
The tank information system is analyzed by the Arc GIS and ERDAS Software and compiled the results by above methodology as shown in Table 1

Table 1 Categorization of tanks

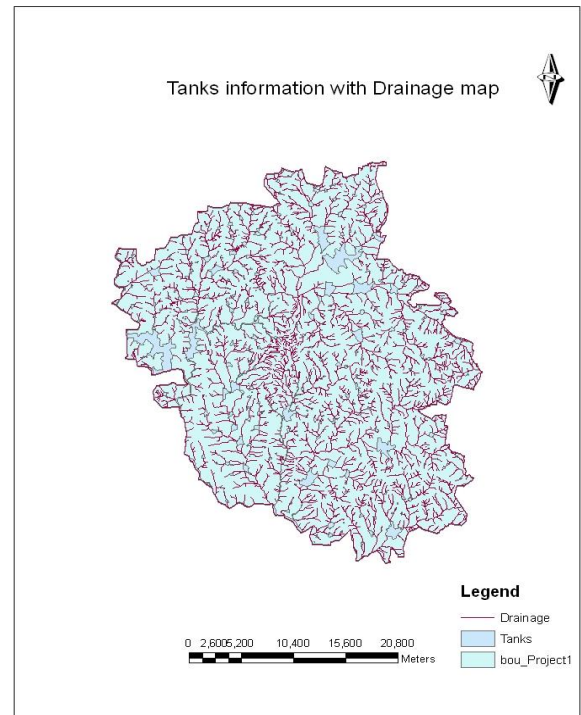
Kunigal taluk	Number of tanks/lakes of different classes (480 tanks)					
	Minor tanks	Small tanks	Medium tanks	Large tanks	Very large tanks	Total
	< 2 Ha	2 to 8 ha	8 to 25 Ha	25 to 50 ha	> 50 Ha	
Number of tanks	259	114	77	11	19	480

Out of the 480 tanks the 53.9% of the tanks categorized under the minor tanks, 23.7% of tanks categorized under the small tanks, 16% of tanks are medium tanks, remaining 7% of tanks as large and very large tanks. The digitization of tanks is show in Map 3. Drainage network of the Kunigal taluk is as shown in the Map 3 . Markonahalli dam is constructed in the year 1938 to 1940 and built across the river Shimsha having a catchment area of 4103sqkm. Mangala dam very near to this dam which has catchment area of 746 sqkm, like this Kunigal doddakera, Beguramenikere, kothakere tank and many more tanks are situated in Kunigal taluk we need to develop the tanks data base to all 480 tanks.. The entire tank information system is shown in the Map 2 and drainage network along with the tanks is shown in the Map 3.

The above map shows the 480 tanks in the Kunigal taluk as we compare digital data of IRS 1 C and 1 D of LISS III image and the SOI topomaps ,the digitization of the tanks is using Arc GIS software and the overlay of IRS 1C LISS III image on SOI , we found that there is a changes in the land use and land cover of tanks. from this study we need to improve the tank area and rejuvenate all entire tanks in the Kunigal taluk. With proper maintains of the tanks.



Map 2: Tanks of Kunigal taluk



Map 3: Tanks with drainage map

4. CONCLUSIONS

According to the digitized tank measurement of all 480 tanks, classified as minor, small, medium, large, very large tanks based on their water spread area. From Arc GIS software environment we can quickly analyze data easy and predications will made for the further development. The above information is to meat a demand of groundwater scarcity to improves surface water resources, the rainfall in the taluk is annually is average 802mm but we need to improve the tanks for the surface water conservation, if surface water conservation is takes place the automatically groundwater recharge will improves the groundwater level is increases considerably, with this to serve the future water scarcity problem for the further generation. From the above work water spread areas and catchment areas are calculated. From the calculated catchment area and water spread area, amount of water inflow (runoff) into the tank is calculated and also

further percolation and evaporation losses to be calculated and also water budget equation is calculated to entire taluk. This data can also make use of Groundwater estimation committee.

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