IRRIGATION AND ECONOMIC DEVELOPMENT

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CHAPTER 14

DRAINAGE AND IRRIGATION MANAGEMENT SYSTEM IN UDUMALPET TALUK, TAMILNADU UTILISING GIS

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Abstract
Irrigation is the artificial application of water to the land or soil. Irrigation is used to assist in the growing of agricultural crops, maintenance of landscapes, and revegetation of disturbed soils in dry areas and during periods of inadequate rainfall. Thus the subject of effectual irrigation water management has been the talk of the last few decades. It has been accentuated that proper monitoring and evaluation is the key to successful management. Subsequently, irrigation systems do not supply the right quantities of water at the right time. Irrigation authorities are seeking the ways in which the water is used very resourcefully. The first phase of this achievement is to increase in effectiveness of irrigation management. Investigative large amount of data is necessity for management of irrigation projects. Data must be collected, stored and interrelated with each other in such a way that the data are readily accessible. The aim of this study is to present a Geographic Information Systems (GIS) for Udumalpet Taluk Tamilnadu irrigation and drainage project located in the southern part of india.GIS was developed to provide a influential tool to analyze large volumes of geographic data.

Introduction

Irrigation is thesupplementation of rainwater with another source of water. The main indication behind irrigation systems is that your lawns and water is a insubstantial natural resource and we have to incorporate methods to conserve it and not over-use it. The implementationof an irrigation system will support to conserve water, while saving you time, money, preventing weed growth and increasing the growth rateof your lawns, plants, crops and flowers. Plants arepreserved with the minimum amount of waterrequired.

Types of Irrigation Systems

DitchIrrigation

Ditch Irrigation is a traditional method, where ditches are dug out and seedlings are planted in rows. The plantings are watered by placing canals or furrows in between the rows of plants. Siphon tubes are used to move the water from the main ditch to the canals.

Terraced Irrigation

This is a very labour-intensive method of irrigation where the land is cut into steps and supported byretaining walls. The flat areas are used for planting and the idea is that the water flows down each step, while watering each plot.

Drip Irrigation

This is known as the most water well-organized method of irrigation. Water drops right near the roo zone of a plant in a dripping motion. If the system is installed properly we can steadily reduce th loss of water through evaporation and overflow.

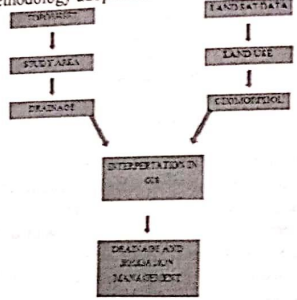
Sprinkler System

This is an irrigation system based on overhead sprinklers, sprays or guns, installed on permanen risers. We can also have the system buried underground and the sprinklers rise up when wate pressure rises, which is a popular irrigation system for use on golf courses and parks.

Rotary Systems

This method of irrigation is best suited for larger areas, for the sprinklers can reach distancesof up t 100 feet. The word"Rotary" is indicative of the mechanical driven sprinklers moving in a circula motion, hence reaching greater distances.This system water salarger area with small amounts o water over alonger period of time.

The methodology adopted in this study shown in Figure



Geographic InformationSystem

In order to develop the GIS of Udumalpet Tamilnadu project, the first phase was to digitize all maps and available information and data. These information and maps were divided into two categories One category was those maps and information which were constant in time such as canal and drainage locations, observation wells, farm layouts, roads and railroads. The second category was those maps which are variable through time. Crop pattern, groundwater level, and farm productivity are in thiscategory.

The second phase after data entry was to develop the necessary tools and subprograms for evaluating and calculating the system management elements. Calculating the irrigation requirement based on the crop pattern, area of farm, evapotranspiration and crop coefficient was one of those implements. The information and data related to each layer and infrastructure in GIS has a database connected to the object in the map. The developed tool is able to sortdifferent kindsof queries either on maps or on related tables.

A Study Area

Udumalpet Taluk

Udumalpet taluk comes under Tiruppur district, a recentlyformed district of Tamilnadu, was previously under Coimbatore district. Udumalpetis the headquarters of Udumalpet taluk and popularly known as" Poor man's Ooty" dueto its cool climatic conditions. Udumalpet taluk is in south western end of the Tiruppurdistrict. Udumalpet usually referred as Udumalai, is about 65 kms south of the districthead quarters Tiruppur and is in between Pollachi and Palani. The altitude of Udumalpet is 1208 feet above MSL and the total area of thetaluk is 1436.76 square kms. Administratively Udumalpet taluk has 3 panchayat unions[blocks] namely, Gudimangalam, Madathukulam and Udumalpet. The Amaravathi River, a tributary of the river Cauvery, is flowing east of Udumalpet bifurcating Udumalpet andPalani taluks. Agriculture is the major occupation of rural populace. The main cerealsare paddy and corn. Commercial crops like cotton, sugarcane and oil seeds are cultivated.Coconut tree farms and plantations are the common sights in villages. The chief sourcesof irrigation are wells, bore wells, river, canals and rain fed tanks. The PAP [Parambikulam-Aliyar Project] a network of irrigation canal system is a boon to theagriculturists of Pollachi. Palladam and Udumalpet taluks. For Udumalpet municipaldrinking water supply scheme, Thirumurthy reservoir is the source. Rural water supplyschemes have been provided from Thirumurthy, Amaravathi dams and as well as fromthe Aliyar river.

Rain Fall

The annual normal rain fall of the old Coimbatore district is 702 mmbased on the IMD data for 50 years. North east monsoon predominantly contributing 46%of annual rain fall, south west monsoon contributing 28% and pre monsoon rains 26%.[Source CGWB]. As per CGWB statistical analysis [APP 2005-2006] of long term of rainfall data for 100 years from 1901 to 2000, the normal rain fall of Coimbatore districtranges from 560.3 to 866.6 mm. The total drought year over the Coimbatore districtranges from 11 to 22%. The frequency of occurrence is rather high. Since Nilgiris placeCoimbatore in the rain shadow region, there are water shortages in water supply withregard to domestic, industrial and agricultural sectors.

Rivers

Major parts of Udumalpet taluk falls in Parambikulam- Aliyar basin. The riverAmaravathy originates in the Anjana Valley in Kerala between Anamalai hills & Palaniof Western Ghats, is flowing about 13 kms east of Udumalpet and is ephemeral innature. Chinnar also raises in Anamalais joins with Amaravathi River. The river Palar, atributary of Aliyar, originates from the Anamalais and flows north westward throughUdumalpet & Pollachi taluks & confluences with Aliyar near Ambarampalayam. Nallaranother river rising in Anamalais confluences with Palar river near Devanurpudur. TheThirumurthy dam has been constructed on the Palar River. . Uppar odai and Perumpallamare the two major streams.

Ground Water Potentials

The ground water potential mainly confines to thegeological structures like, folds, faults and lineaments which serve as conduits for groundwater movement especially in hard rock areas. In Udumalpet taluks, the bore wells drilledin the lineament zones have discharged good yields ranging

from 100 to 500 lpm. InPukkulam- Sadayapalayam lineament 90 % of the bore wells drilled have yielded > 100lpm. In the Poolavadi - V.Vallakondapuram lineament also 50 % of the bore wells drilledhave yielded > 200lpm. Many bore wells have been drilled in this lineament zone forrural water supply by TWAD Board. A bore well drilled at Bodipatti of Udumalpetunion, for agricultural purpose in 2002, to a depth of 940 feet has yielded 612 lpm, whichis the highest yield struck among this 107 bore wells drilled from 1988 to 2009. The highyield may be attributable to deep seated fractures in charnockites. The success rate of bore wells in the lineament area is nearly 98%. The bore wells drilled in Pukkulam andSanuppapatti Vallakondapuram areas have met with boulders of big sizes & potentialaquifers at deeper depths confirming the deep lineaments. In one of the bore wells drilled@ Malaikoil near Pedappampatti, to a depth of 220 feet in 1990 has yielded 500 lpm and@ a depth of 210 feet coarse sand with gastropod shells have been encountered. But aftersubsequent droughts those aquifers got depleted. The potential of the aquifers were suchthat drilling could not be proceeded due to high yield.

Groundwater Management Strategy

Groundwater Development

The development of ground water for irrigation in the district is mainly through dug wells tapping the weathered by recent alluvial deposits. The yields of dug wells are enhanced at promising locations by construction of extension bores, which are 40 to 75 m. deeper bore wells, have also become popular as the source for irrigation in the district in recent years.

Groundwater Related Concerns & Glitches

The development of ground water in the district is high. As many as 14 out of20 blocks in the district havebeen categorized as over exploited. The trend analysis of historical ground water level data also indicates a long-term fall in a major part of the district. Based on the factors mentioned, it is inferred that a major part of the district could be considered vulnerable to various environmental impacts of water level depletion such as declining ground water levels, drying up of shallow wells, and decrease in yield of bore wells and increased expenditure and power consumption for drawing water from progressively greater depths.

Incidence of fluoride in ground water in excess of approved limits for drinking has been reported from parts of the district. Pollution of ground water isdue to industrial effluentsis another major problem in the district. A number of industrial units including textile units, sugar mills and sago factories exist in the district, the discharges from which have triggeredpollution of surface and ground water resources.

Due to lack of appropriate controls, a huge amount of irrigation water is discharged into the drainage system; only a part of drainage discharge is reused by scheme. Drain discharges, though, are not measured on a routine basis. As a result, the water balance of irrigated areas is inaccurate. The scheme does not obtain a direct flow from river because of the reservoir upstream, but it does not suffer from water shortages because its main source, the river, has no storage facilities. Water development proposals are under investigation. One of the fundamental proposals is to construct a new reservoir at the upstream of the river basin which considers the water users of river basin as the target beneficiaries. This proposal could restrict water inflow to the scheme. In addition, to irrigate additional 5200 ha in the scheme left bank is currently in progress. This new extension is located in

the lower part of the study area where the annual rainfall is less than900 mm and the soil types are well drained RBE soils and poorly drained LHG soils.

The Department of Irrigation ofIndia, has more than hundred years of experience, is responsible for preparing development proposals for water resources as well as implementing such proposals. In coordination with other line agencies, the Irrigation Department and the Authority of Tamilnadu manage all major irrigation schemes i.e. the irrigation schemes where the command area is greater than 400 ha. The Irrigation Department designs appropriate programs to improve performance of the schemes under its management and also implements such programs while providing irrigation facilities to the farmer community. The only water law in the country is the Irrigation Ordinance (1946) as amended by the Irrigation Act in 1994. The Irrigation Ordinance stipulates conservation of water through following functionsand

- Powers entrusted to farmer organizations and theirduties.
- Formation of Project Management Committees for major irrigation schemes and theirduties.
- Constitution of district agriculture committees and theirduties.
- Construction and maintenance of irrigationsystems.
- Protection of irrigation systems and conservation ofwater

Conclusion

Drainage and irrigation system managers are fronting with large volumes of data and information which aremost of them digital. Though they are not classified and difficult to use all of them properly, a geographic information system can organize the spatial and attribute data in one environment. In this article, application of latesttechnologies in irrigation and drainage system management has been scrutinized and as a case study, Udumalpet, Tamilnadu irrigation and drainage system was selected to apply the developed tool. One of the major problem in using GIS is the time consuming procedure in digitizing maps and entering data into computer. On the other hand, the obtainabilityof remote sensing images helps to collect digital information easier but usually these images are expensive. The developed tool for Udumalpet, Tamilnadu system consists of spatial and attributed data which show the manager the condition offarms and canals. The GIS has provided the platform for the integration ofpreviously incompatible data sets from different agencies and in different formats. More over management aspects than the ones presented in this paper can be processed with the power of the GIS developedinthis project.The system is lively and has the ability to update based on new information. The challenge now is the integration of GIS into the everyday lives of government departments and drip irrigation managers.

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