Flood Routing Analysis to Maximize the Tank Water Storage in Kancheepuram District

Perumal Raja N
Department Of Civil Engineering
M.E (Environmental Engineering)
Tagore Engineering College.Chennai-127.

Mr. L. Iyappan
Project Supervisor:
Senior Assistant Professor
Department Of Civil Engineering
Tagore Engineering College.Chennai-127.

Abstract:- **The aim of the research is to analyses the flood routing analysis to maximize the tank water storage which means the tanks are over flooded due to heavy rain during the monsoon season. The over flooded waters are severely affected the usable land such as cultivated lands, Residential areas, Roadways, Railways etc., due to the improper pathways of flood routes. For this research, I have selected the place which is located in kancheepuram district. In that area flood routes are not properly maintained so that it affects the areas. The satellite imagery data has collected from kancheepuram district in order to take a survey on flood routing analysis. By using QGIS software in GIS and RS Techniques, the research will try to explore the proper flood routes without affecting the nearby areas.**

Keywords: Flood Routes, GIS and RS Technique, Q GIS Software.

INTRODUCTION

Flooding is a substantial natural hazard and can have significant effects on the long –term economic growth of a region. Reservoir is generally functioned as a storage. It is used for raising the water level. The reservoir has multipurpose functions such as for water supply, irrigation, hydroelectric power, flood control and fishery. we can imagine how important is the function of the reservoir for human life.

Rapid urbanization, land degradation, globalization, socio-economic poverty, global warming and climate change are the main factors that cause the severity of natural disasters. In the last few decades disasters like earthquakes, tsunamis, floods, landslides, hurricane etc claimed lot of life and monetary damages worldwide. As more than half of the world's population live in urban areas, disaster risk reduction in urban areas becomes more significant based on different conditions of hazard, exposure and vulnerability.

India's geo climatic zone with large land mass located in vulnerable areas along with its physical, social, economic vulnerability of people living in high risk areas make it one of the most disastrous prone countries in the world. Floods, earthquakes, cyclones, hailstorms, etc. are the most frequently occurring disasters in India. Out of 36 states & union territories in the country, 27 are disaster prone. Almost 58.6 per cent of the landmass is prone to earthquakes of moderate to very high intensity; over 40 million hectares (12 per cent of land) are prone to floods.

We cannot prevent flood but can be well prepared to face it. Vulnerability and exposure assessment of disasters can go a long way in this preparedness. Based on the study, decision makers can take steps for flood management and mitigation measures.

STUDY AREA

Which is an Ancient town of TamilNadu, which held and still holds a lot of historical significance is prominent during the pallava dynasty. 'Kanchi' in Tamil literature was also one of the seven celebrated holy cities of ancient and medieval India. Kancheepuram District consists of 11 Taluks, 13 Panchayat unions, 8 Municipalities and 18 Town Panchayats.

The prominent geomorphic units identified in the district through interpretation of satellite imagery are i) Chengalpat - Tirukkalukkunram Surface (Erosional) ii) Palar Surface (fluvial and iii) Mamallapuram (Mahabalipuram) surface (Marina) etc.

The area of this district is 4433 Sq. Km. and the length of the coastal line is 87.2 Km. It has Chennai district and Bay of Bengal on the East, Tiruvallur and Chennai on the North, Thiruvannamalai and Vellore Districts on the West and Villupuram District on South. This district is flat and having small hills in Chengalpat and MathuranthagamTaluks.

Kancheepuram district generally experiences hot and humid climatic conditions. The district receives the rain under the influence of both southeast and northeast monsoons. Most of the precipitation occurs in the form of cyclonic storm caused due to the depressions in Bay of Bengal chiefly during northeast monsoon period. The southwest monsoon rainfall is highly erratic and summer rains are negligible. The normal annual rainfall over the district varies from 1105 mm to 1214mm. It is the minimum in the western and northwestern parts of the district around Uttiramerur (1105 mm) and it is the maximum around Kovalam (1214.2 mm).The minimum and maximum temperature are 20°C & 37°C.

Kancheepuram town is located in the South West direction at a distance of 76km from Chennai. It is situated at 120 50' North Latitude and 790 – 42'east longitude. The

town has an average elevation of 275' (83-82m) M.S.L. The mainland lies on the northern bank of the holy river Vegavathi, a tributary of the river Pallar.

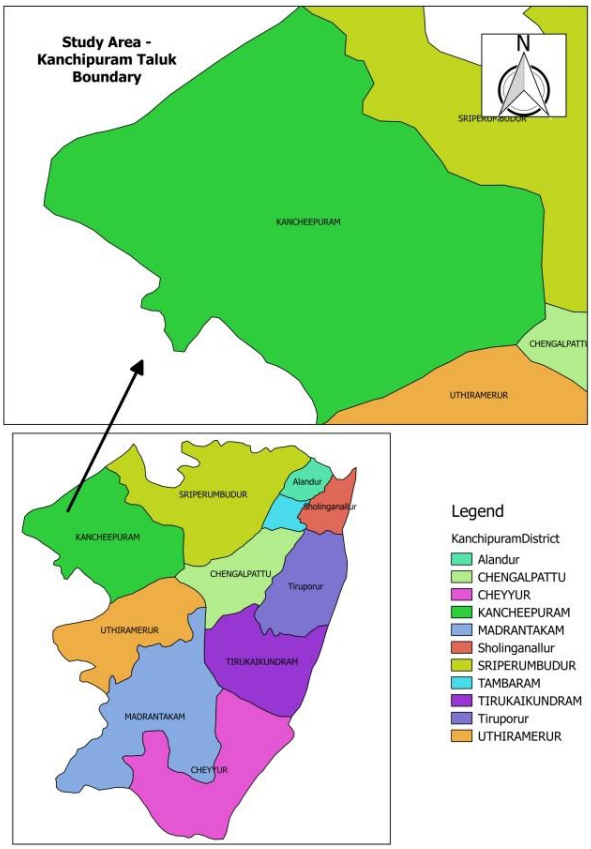

Figure .1 Kancheepuram Taluk Boundary

Palar is the main river of this district. Cheyyar and Vegavathy rivers are tributary and join the Palar river at Thirumukkudal.

The town is well connected by rail and road with the adjoining urban centers, viz Arakkonam, Chengalpattu, Arcot and Vandavasi. The ChengalpattuArakkonam broad gauge railway line passes through this town (work is under progress). Apart from this the great western trunk road from the Chennai to Bangalore also passes through the Local Planning Area. Vegavathi river traverses from west to east in the Planning area and it also divides the Planning area into two parts.

Predominant soil found in the area are Black, Redloom, Clay and Sand. The town has natural slope from West to East with a fall of 42ft. Soils have been classified into 1) clayey soil, 2) red sandy or red loamy soil 3) Red sandy brown clayey soil and 4) Alluvial soil.

Palar and Cheyyar are the important rivers. The drainage pattern in general is sub-dendritic and radial. All the rivers are seasonal and carry substantial flows during monsoon period. River Palar, a major river course, which drains this district originates from Western Ghats in Karnataka state, and discharges in Bay of Bengal near Pudupattinam. The Cheyyar, a tributary of Palar originates from the Jawadu Hills of Tiruvannamalai district. It has a northeasterly flow in Kancheepuram district and confluences with the Palar near Pazhaiyaseevaram. Other seasonal river like Korattalaiar and Tandiar drain this district partly on the northern and southern part respectively.

METHODOLOGY

Geographical Information Systems (GIS) are computer-based systems that enable users to collect, store, process, analyze and present spatial data. It provides an electronic representation of information, called spatial data, about the Earth's natural and man-made features. A GIS references these real-world spatial data elements to a coordinate system. These features can be separated into different layers. A GIS system stores each category of information in a separate "layer" for ease of maintenance, analysis, and visualization. For example, layers can represent terrain characteristics, census data, demographics information, environmental and ecological data, roads, land use, river drainage and flood plains, and rare wildlife habitats. Different applications create and use different layers.

A GIS can also store attribute data, which is descriptive information of the map features. This attribute information is placed in a database separate from the graphics data but is linked to them. A GIS allows the examination of both spatial and attribute data at the same time. Also, a GIS lets users search the attribute data and relate it to the spatial data. Therefore, a GIS can combine geographic and other types of data to generate maps and reports, enabling users to collect, manage, and interpret location-based information in a planned and systematic way. In short, a GIS can be defined as a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information.

GIS systems are dynamic and permit rapid updating, analysis, and display. They use data from many diverse sources such as satellite imagery, aerial photos, maps, ground surveys, and global positioning systems (GPS).

DATA COLLECTION

Data are the raw form of information, which are given to the computer for processing. Data is the name given to the facts such as name, age, address, telephone number, etc. Data are observations we make from monitoring the real world. They are collected as facts or evidence that may be processed to provide them meaning and turn them into information. Data collected from Survey of India, Gundy, Tamilnadu.

DIGITAL ELEVATION MODEL

A Digital Elevation Model(DEM) is generally described as a spatially geo-referenced data set is a popular way of encoding the topography for environmental modelling purposes. The representation of continuous elevation values over a topographic surfaces by a regular array of z-values, referenced to a common datum. DEMs are typically used to represent terrain relief. They have allowed us to better visualize and interrogate features.

SATELITE IMAGERY

The Global Navigation Satellite System(GNSS) is the standard generic term for satellite-based navigation systems that provide autonomous geospatial positioning with global coverage. The GNSS is a network of satellites that continuously transmits coded information, which makes it possible to precisely identify locations on earth by measuring distance from the satellites.

SLOPE MAP

Slope is the measure of steepness or the degree of a feature relative to the horizontal plane. It is the important parameter to parameter to evaluating the stability of land. Slope can be given in two different ways, a per cent gradient or an angle of the slope. The average slope of a terrain feature can conveniently be calculated from contour lines on a topo map. To find the slope of a feature, the horizontal distance (run) as well as the vertical distance (rise) between two points on a line parallel to the feature need to be determined.

CONTOUR MAP

Contour is an imaginary line constant elevation on the ground surface. The corresponding line on a map is called a ‘contour line’ ,a line on a map that joins places of the same elevation(height) above the sea level. Contour interval is the difference in elevation between two contour lines. The collection of contours is another feature. Contours can be collected by either of the two methods:

1)Stream digitizing.

2)Digital Terrain Model/ Digital elevation Model.

STREAM DIGITIZING

In the stream digitizing mode, the operators follows his or her interpretation of the physical elevation of the ground by digitizing points, thus creating an contour of coordinates that exist at the same elevation. This is not a task that can be done quickly, or without a great deal of care.

DIGITAL TERRAIN MODEL / DIGITAL ELEVATION MODEL

The second method for creating contours is by creating a DTM/DEM and employing a computer programme known as a contour interpolation program. Both DTM and DEM can be used to generate contour lines. A contour interpolation program is used to evaluate the DTM/DEM to create the contours with a desired interval via a computer.

HILL SHADE

Maps shading terrain as if illuminated by a point light source (i.e. hill-shading) are commonly used in cartographic displays. These hill-shaded maps are especially important for representing mountainous areas, due to the rapid variations in the orientation of terrain elements. Although these hill-shaded maps reveal the coarser landforms and the finer texture of the terrain, they can be enhanced to reveal additional detail with numerous methods.

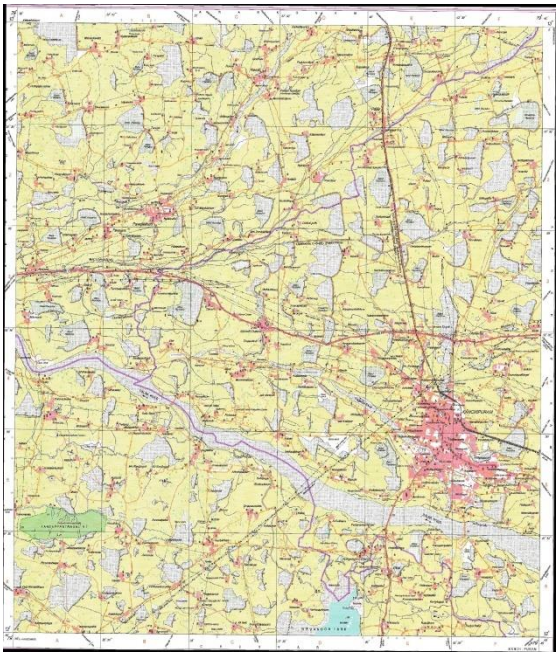

Figure.2 Satellite Imagery

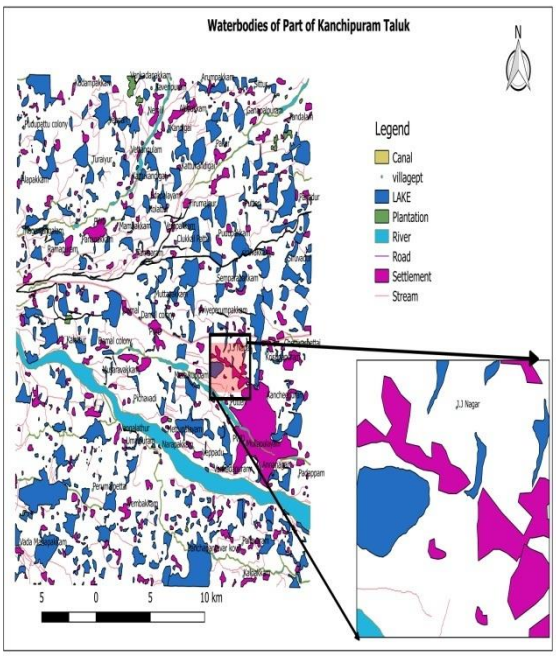

Figure.3 Water Bodies of Part of Kancheepuram Taluk

RESULTS AND DISCUSSION

Flood routing analysis is a useful method to estimate the response of dams(single or as a connected systems) to hydrological events, involving a wide range of flood return periods, as well as separation configurations of starting pool levels and spillways/outlets functionality. Flood routing analysis is a fundamental step in building a dam risk model. There is a good accuracy by using characteristics method of GIS and RS Technique and Q GIS software for simulating the propagation of flood in kancheepuram Taluk.

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