# SUITABLE SITE SELECTION FOR SOLID WASTE DISPOSAL POINTS IN TIRUCHIRAPPALLI DISTRICT USING REMOTE SENSING AND GIS

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*Abstract: In India the solid waste generation are 65 million tones in every year. In Tamil Nadu the solid waste generation are 13422 tonnes per day and Tiruchirappalli district the solid waste generation are 435 MT per day. All the solid wastes are dumped on the land surface which will causes air pollution, water and soil contamination. In this study on suitable site selection for waste disposal in Tiruchirappalli district. Application of Geospatial technology (Remote Sensing and GIS) for the selection of suitable site for waste disposal is based on the overlaying various thematic layers. The thematic layers include drainage, LU/LC (land use/land cover) geomorphology, geology, lineament, Digital Terrain Model (DTM) and road networks etc. The various thematic layers are created using ArcGIS software. New thematic map (new site selection) created based on the various thematic layaers overlayed in the ArcGIS software. ArcGIS software is an efficient tool for spatial relationship principles of connectivity, contiguity and overlay methods. The results from this study identified potential sites suitable for wastes disposal.*

**Keywords:** Solid Waste Management, Remote Sensing, GIS

## 1.INTRODUCTION

There are many sources of solid wastes such as : • Municipal solid waste – street sweeping, sewage treatment plant waste, waste from schools and other institution. Domestic waste – Garbage, rubbish, paints, paper, glasses, old toys, old clothes, spoiled food, etc. Solid waste is defined as the unwanted matter which is generated by the society that does not have any economic value from the point of view of first owner. Solid waste can create health problems for people in and around area of dumping site. If not correctly disposed of waste may provide breeding sites for insect vectors,pest and vermin that increase of disease transmission. It may also pollute water sources and groundwater also polluted. MSW is a term usually applied to a heterogeneous collection of wastes produced in urban areas, the nature of which varies from region to region. Municipal solid waste (MSW) is defined to include refuse from households, nonhazardous. The fimportant solid wastes are Rubbish consists of tin cans, newspaper, packaging materials, bottles, plastics, and yard trimmings i.e. it consists of both combustible and non-combustible matter excluding garbage. Garbage is a portion of waste that is biodegradable. The biodegradable waste that is generated from the kitchens, restaurants and markets. Trash : It is the combustible portion of the rubbish. Discarded materials are remains after the materials are removed for recycling, reuse and composting. Reusing a product for the same application for which it is originally intended. Recycling used to represent the processing of recovered material to make them as raw material for new applications. Remanufacturing is the restoration of the product which has the same characteristics as that of the new one. Recovery is Segregation and using the product for other purpose for reusing, recycling, and remanufacturing is called recovery of materials. The recovered materials will have some economic values. Refuse is the solid waste reject coming out of human practises. Litter is the collection of street sweepings at one point is called as litter. A major adverse impact is its attraction of rodents and vector insects for which it provides food and shelter. Impact on environmental quality takes the form of foul odours and unsightliness. These impacts are not confined merely to the disposal site. On the contrary, they pervade the area surrounding the site and wherever the wastes are generated, spread, or accumulated. Poor management of the collection and disposal of solid waste may lead to leachate pollution of surface water or groundwater. This may cause air pollution and human health problem.

## 2. OBJECTIVE OF THE PROJECT

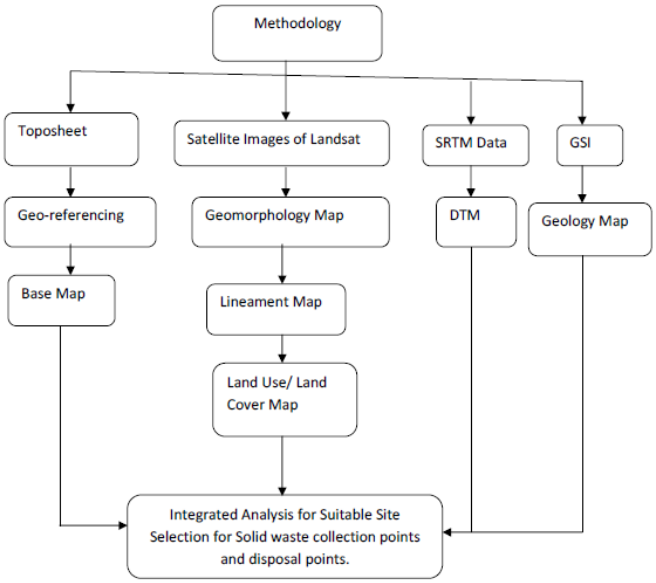
- To apply the Geospatial technology in Solid waste Management.
- To identify the suitable site for solid waste disposal using Remote sensing and GIS

## 3. STUDY AREA AND METHODOLOGY

Tiruchchirappalli district is located at the Central part of Tamil Nadu surrounded by Perambalur district in the north, Pudukottai district in the south, Karur and Dindigul districts in the west and Thanjavur district in the east. It lies between 10o10’ and 11o20’ of the Northern latitudes and 78o10’ and 79o 0' of Eastern latitudes in the centre part of the Tamil Nadu. The general slope of the district is towards east. It has a number of detached hills, among which Pachamalai Hill is an important one, which has a peak up to 1015m, located at Sengattupatti rain forest. There are reserve forests along the river Cauvery, located to the west/north-west of the city. Tiruchchirappalli district comprised of eight taluks viz. Thuraiyur, Lalgudi, Musri, Tiruchchirappalli, Thottiyam Manachanallur, Srirengam and Manapparai, which included 14 blocks, 408 Village Panchayats and 1590 Villages. This district consists of four municipalities namely Ponmalai, Srirangam, Thuraiyur and Manapparai. Tiruchchirappalli is the only Municipal Corporation which is also the Head Quarters of the District. As per 2001 census the population of city was 746,137 and it is classified as a medium sized city. Figure 1 shows the
location of the study area


**[Fig.3.1 Study Area]**

The methodology used was based on GIS approach. The toposheets, GSI map of geology were initially geo referenced using geometric transformations. Each Toposheet was corrected using a polynomial function with keyboard method and ground control points based on the topography map as geo-reference. From the Geological Survey of India map has been used for Geological map generations. The USGS satellite imagery of Landsat OLI (2017) and Geo eye was used for the geo morphological mapping. The Shuttle Radar Topography Mission (SRTM) has been used for lineament mapping. Figure 2 shows the methodology of the study




# 4. MATERIALS

- Existing Maps of the area.
- Image of the Area from Google.
- Global Positioning System (GPS)

Shuttle Radar Topographic Mission (SRTM).

# 5. SOLID WASTE MANAGEMENT

It's essential complex dimension was resulted, not only of the direct relationship with a number of factors that originate the living standard of a society, but also of our continuously rising consuming lifestyle which analogically enhances the existing perational difficulties (Modak et al., 1996). For present study various data been used such as remote sensing data, geologic data, surface hydrologic data, underground water and meteorological data. In the present investigation information from Quick Bird Imaginary and IRS P6 LISS IV and high–resolution PAN imagery were extracted for the identification of wasteland to be considered for solid wastedisposal.

# 6. RESULTS AND DISCUSSION

## 6.1 Existing Solid Waste Disposal Site

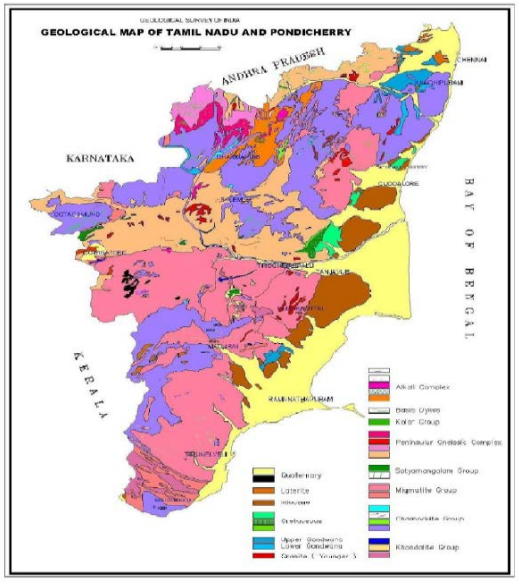
The existing solid waste disposal site is at Ariyamangalam, Tiruchirappalli district. Here huge biodegradable and non biodegradable wastes are dumbed on daily basis. Some time due to chemical reaction in the waste, the waste materials are fired and air was polluted. The soil waste contamination through direct waste contact, air pollution by burning of wastes, spreading of diseases by different such as birds, insects and uncontrolled release of methane by anaerobic decomposition of waste. Hence the new location for solid waste disposal need for this study area. The present location of the dumping site in Trichy district is shown in Figure 6.1

**[Figure 6.1 Present Location of dumping Site ( Google Earth View)]**

**[Fig. 6.2 Fire on the dumbing site]**

## 6.2 Geology Map

Geologically the entire district (Fig. 6.3) can be broadly classified into hard rock and sedimentary formations. In the total geographical area of 4403.83 Sq.Km. in Tiruchirappalli district, nearly 90% is occupied by hard rocks of Achaean age. They are mainly granitic gneiss and charnockite, which are intruded by pegmatite veins. Almost 90% of the district i.e. Tiruchi, Samayapuram, Manapparai, Musiri, Thottiyam, Thuraiyur and Manachanallur and part of Lalgudi taluks are covered by hard rocks of granite, genisses and charnockite.

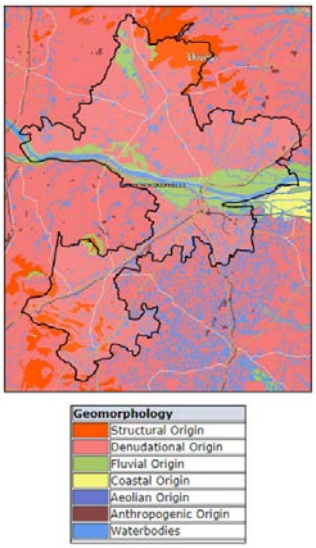



**[Fig.6.3 Geology Map]**

## 6.3 Geomorphology Map

The alluvial plain is formed by extensive deposition of alluvium consisting of gravels, sand, silt and clay by major river systems. This unit is normally flat to gently undulating and usually adjacent to a river that periodically overflows its banks..

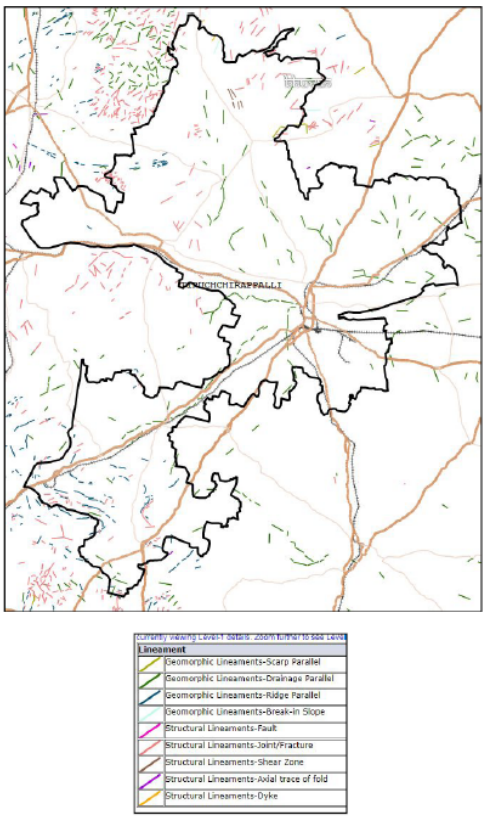
Denudational Hill is formed due to differential erosion and weathering or epiorogenic so that a more resistant function or intrusion has developed a character of hill/mountain. It has located in the southwestern part of the Tiruchchirappalli district. energy and materials from upstream areas. Inselbergs are isolated rises above a plain which consist of hard bedrock. If they have a soil cover, then this is very sparse. They vary in height depending on their development, and they take on different forms, as far as both ground plan and cross section are concerned, according to their genesis and lithology. Pediment are gently sloping erosional surfaces of low relief developed on bedrock, occur in a wide variety of lithologic, and climatic settings. It has present highly on the nearby river course. It shows medium grey tone and medium texture in the satellite FCC composite. Piedmont Zone Alluvium deposited along foot hill zone due to sudden loss of gradient by river/streams. Piedmont normally is a zone of coalescing fans, which occupies a long and narrow to moderately wide apron at the foot slopes of a high relief. It has identified by its pale greenish tone, texture and radial pattern of drainages. Structural Hills are the hills formed due to the regional tectonics showing structural trends of the region. The hill ranges in general have shown anticlinal hills, synclinal valleys and ring shaped hills, which are easily delineated using satellite data of huge view. The northern and southern parts of Tiruchchirappalli have shown complex folding and high degree o fracturing.




**[FIG.6.4 Geomorphology Map]**

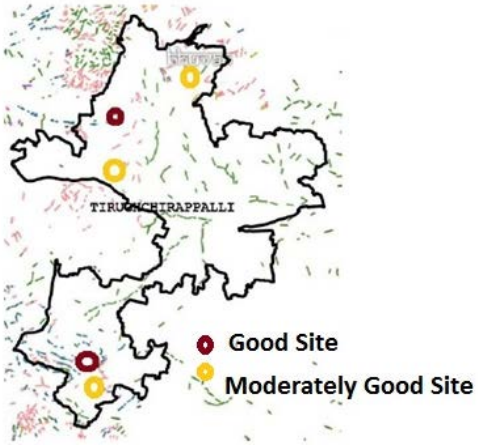
## 6.5 Lineament Map

Lineaments are weaker zones, which have been formed due to crustal movements of the earth. Lineaments may be in the form of fault or geological contact or shear or major joints. Lineaments are the proven secondary aquifers in hard rocks. Groundwater occurrence is confined to fractured aquifers and is stored in the relatively deeper zones. After exploiting the shallow aquifers for agricultural and domestic purposes, targeting of groundwater is concentrated in heterogenetic hydrofractures zones.




**[Fig.6.5 Lineament Map]**

## 6.7 Solid Waste Disposal points




## 6.8 CONCLUSION

In this study the new site are identified based on the various thematic layers such as Base map, geomorphology map, Land Use/Land Cover map, drainage map, Digital Terrain Model (DTM), geology map and Lineament map. The new sites are identified in the southern portion of the study area in the marungapuri block and in the northern portion of the study area in Tattayangarpettai block, Uppiliyapuram block and Thuraiyur block. The new site having the higher elevation, archaean rock terrain, hilly area, less lineament and build up area is less compare to central portion the study area. Hence, the geospatial technology is versatile technique and tools to determine the new solid waste site location.

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