Suresh Devaraj

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Geomatics Analyst

Career Snapshot

To pursue a highly challenging and creative career, where I can apply my existing knowledge, creativity, acquire new skills and contribute effectively to the organization and its growth.

Geomatics Analyst
kCube Consultancy Services Pvt. Ltd.
09/2019 – Present ***Bangalore***

Academic Qualification

Doctor of Philosophy (Microwave Remote Sensing)
Vellore Institute of Technology
02/2017 – 09/2019 *Vellore*

M.Tech. (Remote Sensing)
Regional Centre of Anna University
09/2013 – 06/2015 *Tirunelveli*

B.E. (Civil Engineering)
Vel Tech
09/2009 – 04/2013 *Chennai*

Work Experience

Geomatics Consultant (Part Time)
Provided assistance to projects when required
kCube Consultancy Services Pvt. Ltd.
02/2017 – 09/2019 *Bangalore*

Geomatics Technician
kCube Consultancy Services Pvt. Ltd.
07/2015 – 02/2017 *Bangalore*

Nature of Work

As a domain specialist, active contribution in GIS analysis and database development, Drone survey, 3D visualization, imagery interpretation, change detection and training GIS technicians.

Publications

Suresh D and Kiran Yarrakula (2020), InSAR based Deformation Mapping of Earthquake using Sentinel 1A Imagery, Geocarto International, 35(5), pp 559-568. TR Impact Factor- 2.365.

Suresh D, Kiran Yarrakula, Venkateswarlu B, Biswajita Mohanty and Vijaya Kumar Manupati (2018), Risk Mapping Analysis with Geographic Information Systems for Landslides using Supply Chain, IGI Publications. pp 131-141, DOI: 10.4018/978-1-5225-5424-0.ch008. (Book Chapter)

Suresh D, Collins Johnny J, Jayaprasad B K, Kiran Yarrakula, Vaishnavi B and Ghosh Bobba (2018), Morphometric Analysis for Identification of Ground Water Recharge Zones: A case study of Neyyar River Basin, Indian Journal of Geo-Marine Sciences, 47(10), pp 1969-1979. TR Impact Factor- 0.301.

Suresh D and Kiran Yarrakula (2018), Subsidence Monitoring Techniques in Coal Mining: Indian Scenario, Indian Journal of Geo-Marine Sciences, 47(10), pp 1918-1933. TR Impact Factor- 0.301.

Suresh D and Kiran Yarrakula (2018), GIS Based Multi- Criteria Decision Making System for Assessment of Landslide Hazard Zones: Case Study in the Nilgiris, India. Indian Journal of Ecology, 45(2), pp 286-291. (Scopus)

Kunduru Rohin Reddy, **Suresh D**, Sandeep Biradar, Kiran Yarrakula and K. Srinivas Kumar (2019), Spatial Distribution of Land Use/ Land Cover Analysis in Hanamkonda Taluk, Telangana - A Case Study, Indian Journal of Geo-Marine Sciences, 48(11), pp 1761-1768. TR Impact Factor- 0.301.

Communicated Manuscripts

Suresh D and Kiran Yarrakula, Assessment of topographical and atmospheric errors in Sentinel 1 derived DInSAR, Geocarto International, TR Impact Factor – 2.365, Major Revision.

Suresh D and Kiran Yarrakula, Evaluation of Sentinel 1 derived and open access Digital Elevation Model products in mountainous areas of Western Ghats, India, Arabian Journal of Geosciences, TR Impact Factor- 1.141, Under Review.

Suresh D, Kiran Yarrakula, Tapas Martha, Geetha Priya, Divya Sekhar, Samvedya, Abhinav Wadhwa, Parthiban and Venkatesh, Analysis of Sentinel 1 Derived DInSAR for Landslides Identification in Mountainous areas of Western Ghats, India, Survey Review, TR Impact Factor – 1.442, Under Review.

Divya P, Ashna Mariam Philip, Radhika K and **Suresh D,** Comparison of Kaldness media and Luffa Aegyptiaca with varying proportions for the treatment of sewage wastewater, Environmental Science and Pollution Research, TR Impact Factor – 2.914, Under Review.

Conferences

Suresh D, Kiran Yarrakula, Colins Johnny and Abhinav Wadhwa (2019), Comparative analysis of INSAT-3D derived precipitation data with IMD data products over Indian Sub-continent, Sixth International Soil and Water Assessment Tool, South East and East Asia Conference to be held in Siem Reap, Cambodia on 21-26 October, 2019.

Arivumathi B, Colins Johnny and **Suresh D** (2019), Estimation and comparison of discharge using SWAT and HEC-HMS tools for a flood event – A case study for Thamirabarani river basin, India, Sixth International Soil and Water Assessment Tool, South East and East Asia Conference to be held in Siem Reap, Cambodia on 21-26 October, 2019.

Sandeep Biradar, **Suresh D**, Kunduru Rohin Reddy, Kiran Yarrakula (2018), Comparative Analysis of Land Surface Temperature and NDVI in Basavana Bagewadi Taluk, Bijapur District, Karnataka: A case study, ICONPO VIII –International Conference on Public Organization – Policy, Public Affairs, Disaster Governance: Building effective Collaborative Partnership, APSPA, 28th and 29th July, Chennai.

Communicated Book Chapter

Suresh D, Geetha Priya and Sivaranjini, Modeling and Simulation in Remote Sensing, Springer publishing book chapter – Under Review.

Workshops attended

Participated in a training program on **"Soil Moisture for Hydrological Risk Management"** from 13th - 16th November 2018 organized by Italian Air Force- Department for Meteorology in cooperation with EUMETSAT, held at Rome, Italy – Sponsored by EUMETSAT.

Participated in a training program on **"Satellite based Hydrology and Modelling"** from 08th - 11th August 2017 organized by Training and Research in Earth Eco-system(TREES), Space Applications Centre, ISRO, Ahmedabad.

Participated in a training program on **"Microwave Remote Sensing and Applications"** from 17th - 28th April 2017 organized by National Remote Sensing Centre, ISRO, Hyderabad.

Participated in the Joint International Workshop of ISPRS WG VIII/1 and WG IV/4 on **"Geospatial Data for Disaster and Risk Reduction"** during 21st and 22nd November 2013 at INCOIS, Hyderabad, India.

Training Experience

Being a part of training team in kCube Consultancy services Pvt. Ltd, I have been a part of the below listed training programs as a resource person.

- Annasaheb Dange College of Engineering and Technology, Ashta – Basics of Remote Sensing and GIS applications for Civil Engineers – Jan – 2016
- Sharad Institute of Technology, Ichalkaranji - Basics of Remote Sensing and GIS applications for Civil Engineers – Feb – 2016
- Loyola Institute of Technology, Chennai - Basics of Remote Sensing and GIS applications for Civil Engineers – Mar – 2016
- C.V.Raman College of Engineering, Bhubaneswar – Applications of Remote sensing and GIS for Civil Engineers – Jan – 2017
- International Participants - Introduction to Geonode and Applications - April 2017
- Sona College of Technology, Salem - Basics of Remote Sensing and GIS applications for Civil Engineers – Sept – 2019
- 3 Days Online Training Course on GIS and Remote Sensing – April 10 to 12, 2020 and April 25 to 27, 2020

Projects

Expertise with GIS data processing, analyzing, troubleshooting and resolving data related issues using various GIS Open source applications, I have worked on the below listed projects.

- As a part of Slum clearance board Pradhan Mantri Awas Yojana Project, I have surveyed and mapped the location of slums in Northern Part of Chennai (Wards 21 to 33)
- Drone Data Collection and Processing for identification of regions affected by Gaja cyclone during November, 2018 in Nagapattinam District.

- Mapping and database creation of land Parcels for NLC (Neyveli Lignite Corporation) India Ltd.
- Identified the volume of limestone excavated from a mining site in Ariyalur for Department of Mining and identified the locations where limestone is over excavated.
- Assisted and provided data to development team based on requirements.

Technical Skills

Softwares

- Remote Sensing and GIS - QGIS, GMTSAR, SNAP, ArcGIS, ERDAS and ENVI
- Designing and Database – AutoCAD, Revit Architecture, 3ds Max and PostgreSQL
- Operating System – Ubuntu and Windows

Languages

- English

  Professional Working Proficiency

- Tamil

  Professional Working Proficiency

Skills & Competences

- Ability to coordinate tasks/events independently
- Excellent analytical skills
- Problem solving

Interests

- Listening to music
- Playing and Watching Cricket
- Riding Bike & Car

Project Work

- Design of a Composite Structure - This aims at designing a workspace for IT companies.
- Design of Ennore Expressway – This aims at designing Roadway from Ennore Port to Kattupalli (4 Km) for easy flow of vehicle.
- Crop Yield Analysis for Tiruchendur Block using RS and GIS Techniques – This aims at analyzing the yield of crops and providing suggestion to improve the crop productivity.
- Morphometric Analysis for Identification of Artificial Recharge Sites for Neyyar Basin (NCESS, Trivandrum) – This aims at identification of artificial recharge zone for Neyyar river basin.

Industrial Visit and Implant Training

- Industrial visit to “Sathanur Dam, Sathanur”, “SERC, Tharamani”, and “Tamilnadu Slum Clearance Board, Chembarambakkam”.
- Underwent an industrial training at “National Academy of construction, Hyderabad” for a period of ten days.

- Underwent an industrial training at “SPL infrastructures, Minjur” for a period of ten days.
- Underwent an internship training at “kCube Consultancy Services Pvt. Ltd., Chennai” for a period of 28 days.

Extra – Curricular Activities

- Participated in NCC (1 [TN] Naval Unit) and passed the ‘B’ Certificate in the year 2011.
- Participated in Throw ball and won District Level Matches.

Personal Details

- Father’s name : Devaraj K
- Date of Birth : 24^{th} October 1991
- Nationality : Indian
- Marital Status : Married
- Blood Group : B +ve

Declaration

I hereby declare that all the above-mentioned details are true to my knowledge.

Date: 07-06-2020

Place: Chennai Suresh D

GEOCARTO INTERNATIONAL
https://doi.org/10.1080/10106049.2018.1544289

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ORIGINAL ARTICLE

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InSAR based deformation mapping of earthquake using Sentinel 1A imagery

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Centre for Disaster Mitigation and Management, Vellore Institute of Technology (VIT), Vellore, India

ABSTRACT
Development of synthetic aperture radar (SAR) based satellites provide remedies to major geohazards under critical situations around the world. Sentinel 1A mission with the revisit period of 12 days helps to serve the objective in an effective manner. With the availability of interferometric wide (IW) Swath mode, Sentinel 1A mission is capable of monitoring the surface deformation using interferometric synthetic aperture radar (InSAR) techniques. On 12 November 2017, an earthquake with a magnitude of 7.3 occurred in the Iran/Iraq border lead to the enormous disaster reaching over 500 victims. The study focuses on measuring the deformation caused due to earthquakes by using differential SAR interferometry (DInSAR). VV polarization of Sentinel Data and SRTM DEM are used as an input to GMTSAR for the development of interferogram. Based on the results obtained, it is found that a maximum of 85.1 cm deformation occurred and nearly 1500 km^2 of the area is severely affected.

ARTICLE HISTORY
Received 27 June 2018
Accepted 22 October 2018

KEYWORDS
SAR; earthquakes; InSAR; surface deformation; GMTSAR

Introduction

Among the existing natural disasters, Earthquakes of higher magnitude are considered as the most frightening and destructive catastrophe that leads to fatalities at a higher rate. Earthquakes generally last for an interval of 10 to 30 seconds but results in huge destruction of structures (Shedlock and Pakiser 1998). Casualties related to earthquakes are caused by the structural collapse and damage to construction practices. 'Earthquakes Don't Kill People, Buildings Do' a quote from Susan Hough and Lucile Jones on Earthquakes describes the disaster in an enhanced manner (Hough and Jones 2002). Earthquake is the release of potential energy due to the movement of tectonic plates in opposite direction. Earthquake under sea results in tsunami that swamps coastal regions. Landslides are also triggered by earthquake that result in damage of properties and loss of human life (The Final Report of the Earthquake study group 2000).

Historical evidence for earthquake events in China is available from 1177 B.C and for Europe records are available from 580 B.C. In early 17th century, description of earthquakes is published and records are maintained all around the world (Shedlock and Pakiser 1998). Even though earthquakes are one of the major disasters that lead to fatalities of larger count, prediction of earthquake is not possible. Derived earthquake

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Indian Journal of Geo Marine Sciences
Vol. 47 (10), October 2018, pp. 1918-1933

Subsidence monitoring techniques in coal mining: Indian scenario

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Received 25 April 2018; revised 24 July 2018

The article presents a critical review on the application of development of technology in the field of subsidence monitoring using various techniques. It consists the review of literature pertaining to causes of subsidence and their effects in coal mines with brief explanation on the various techniques to monitor the subsidence. The accuracy of various subsidence monitoring techniques is also discussed by evolving suitable technique for precise identification of slope failures in the coal mines.

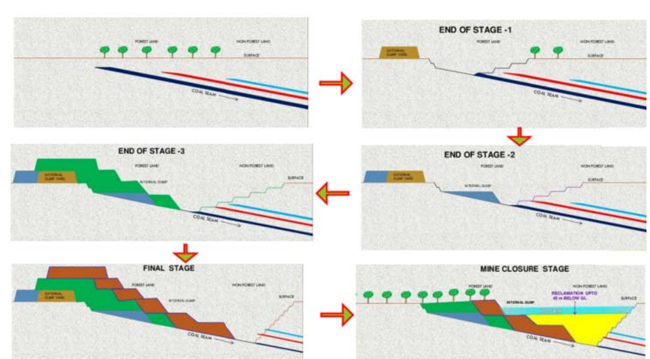
[Keywords: Land Subsidence, Subsidence monitoring, slope failure monitoring, Traditional methods, SAR Interferometry]

Introduction

India is the fourth largest producer of coal in the world next to China, United States of America and Australia with a total production of 488.06 MT [1]. Coal excavation in India started during the period of British Emperor Warren Hastings in the early seventies with initial excavation commenced from Rani gunj coal mine with poor quality by open and inclined works [Figure 1] [2]. Later on, various research works have been undertaken in the fifty sites coal mines in India by 1860. Towards the end of 19th Century, good quality coal was discovered in Jharia field which became the major producer of coal in India and consequently several coal mines were introduced in various parts of India, increasing the production of coal with various excavation techniques, especially Pillar and stall method of excavation3. The location of existing coal mines in India is shown in Figure 2[4] with the stages of excavation in Figure 1.

Subsidence is a universal deformation process that results in creation of voids due to the compaction of natural sediments, liquefaction, crustal deformation, ground water exploration, withdrawal of petroleum and geothermal fluids, melting of permafrost, mining of sulphur, limestone, coal, salt and metallic ores[5,6]. The importance of subsidence due to mining in India was realised in the beginning of the mining process and several measures are being undertaken by the Central Mining Research Station (CMRS), Dhanbad to reduce the impact of subsidence such as stowing, partial extraction, fly ash injection, etc. and are adopted in working and abandoned mines[7].

The importance of subsidence and the measures required to avoid loss of the available resources is described in Figure 3[8].Slope stability is the resistance of inclined surface to be failed by sliding or collapsing. Slope stability analysis is executed to ensure the safety of man-made or natural slopes such as road cuts, embankments, surface and subsurface mining, landfills, excavations, etc. and their stability conditions[9,10]. To avoid the loss of life and to reduce the property damage, monitoring of subsidence (or) slope failure monitoring techniques are required with more accuracy. The present paper explains the fatalities due to slope failure or subsidence and available techniques to monitor the subsidence. The present article also explains the best techniques to monitor subsidence. The applications of best techniques are also explained in the following sections.



Source: Coal India

Fig. 1 — Stages of excavation of coal from mines through open and inclined workings

Indian Journal of Geo Marine Sciences
Vol. 47 (10), October 2018, pp. 1969-1979

Morphometric analysis for identification of groundwater recharge zones: A case study of Neyyar river basin

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[3]Central Geomatics Lab, National Centre for Earth Science Studies (NCESS), Thiruvananthapuram, India 695 011

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Received 16 November 2017; revised 23 April 2018

In the presented study, Neyyar river basin is considered for identification of the artificial recharge location. Morphometric analysis results and integration of remote sensing and GIS are used to identify the suitable recharge zones. Weighted overlay analysis is performed with various thematic layers such as geology, soil, geomorphology, land use/land cover, slope, aspect, drainage density, lineament density, relative relief and infiltration number to determine the suitable recharge sites.

[**Keywords**: Morphometric Analysis, GIS, Remote Sensing, Artificial Recharge, Weighted Overlay Analysis]

Introduction

The main source of Groundwater is precipitation, rivers and lakes which percolated through soil and fractured/porous rocks[1]. India is estimated to use 230 km3 of Groundwater per year – over a quarter of the global availability. Over 60% of irrigated agriculture and 85% of drinking water supplies are dependent on Groundwater[2].

Even though India receives a significant amount of yearly rainfall, it is not very promising mainly due to the imbalance of recharge and Groundwater exploitation. The main reason for the imbalance is due to the run off of large amount of rain water and lack of rain water harvesting structures[3]. Over exploitation of Ground water from aquifers and other resources that are in practice takes decades to accumulate water in it where the current rainfall has no immediate effect[4]. To overcome the issue, certain analysis can be done to identify the zones and recharge techniques which can help in conserving Groundwater[5]. Artificial recharge is the process adopted to augment the subsurface water constructing artificial structures such as check dam, nala bunds, etc[4]. At current scenario, it is mandatory to take immediate action to augment the precipitation into the subsurface[6]. Artificial Groundwater recharge has been blooming in the past few decades, and the introduction of remote sensing and GIS techniques have received attention among the researchers[7]. Considering the geological and geo-morphological aspects scientists have identified the suitable location and also suggested the suitable structures that can be used to increase the subsurface water[8].

According to the latest report (November 2016) from the Central Groundwater Board (CGWB), India's ground water drops to a critical level in major parts of the country. Unregulated extraction of subsurface water resulted in putting the threshold of the country to critical. India is estimated to have over 30 million Groundwater points and in all states a majority of wells have registered declining water levels[9]. To overcome the issue, various Groundwater renewable methods are adopted around the country. The main objective of the present study is to accumulate in the saturated zone using RS, GIS and weighted overlay analysis. Morphometric parameters such as linear, aerial and relief parameters play a major role in management of flood and natural resources and watershed prioritization for water and soil conservation[10].

Materials and Methods

The Neyyar River flows through the south-western India along western ghats, lies between 8º 15′ - 8º 40′

Indian Journal of Ecology (2018) 45(2): 286-291

Manuscript Number: 2673
NAAS Rating: 4.96

GIS based Multi-Criteria Decision Making System for Assessment of Landslide Hazard Zones: Case Study in the Nilgiris, India

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Abstract: Landslides are considered as one of the most common natural hazards occurring in the Nilgiris since immemorial time that leads to the tremendous loss of human life, property and economy. In this study, landslide hazard zonation (LHZ) map for the Nilgiris district located in the state of Tamil Nadu, was prepared using various thematic layers such as Precipitation, Slope, Geology, Aspect, Land cover, Distance from road, Lineament Density, Distance from river, Elevation. The results obtained by adopting analytical hierarchy process (AHP) for updation of LHZ map found that nearly 52.5% of the total district area falls under risk zone in which 6% of the regions is fall under highly risk zone. Comparison the LHZ map with the inventory data, data it is found that nearly 90% of the landslides fall under hazardous zone.

Keywords: Analytical hierarchy process, Landslides, Remote Sensing, GIS, Landslide hazard zonation map

Nilgiris is a part of western ghats situated at the junction of Tamil Nadu, Karnataka and Kerala at an elevation of 900m to 2636m above mean sea level. Nilgiris hills plays a major role in tourism between the months of March and August every year as it experiences a relative temperature of 21°C during summer. Covering an area of 2551 km^2, the district receives heavy rainfall between June to August and October to December. Nilgiris has a long history of disastrous landslides events across decades and experience landslides since immemorial time, but the records are available since 19^{th}century. Due to heavy rain in 1824, a huge landslide in the Kundah hills was recorded . Since then, records are being maintained for the Nilgiris district for every landslides events.

It is noted that in the Nilgiris both the steep and gentle slopes have failed across years and the landslides are spread out in areas that are utilized for various purposes. The areas of crop cultivation and vegetation is found to experience large landslides than other areas. The regions of reserve forest are found to experience less landslides as the erosion of soil is less in Reserved Forests compared to that of cultivation areas. The major triggering factor for landslides in the Nilgiris is the rainfall and deforestation. In Nilgiris, generally landslides season is in between October and December .

The landslides in the Nilgiris doesn't have any standard guidelines which results in consideration of various parameters for identification of landslides hazard zones. Remote Sensing and GIS is the advanced technology that plays a major role in the identification of the hazardous zones. An attempt has been made in the present study for the identification of landslide hazard zonation map considering various parameters such as Precipitation, Slope, Geology, Aspect, Land cover, Distance from road, Lineament Density, Distance from river, Elevation. The LHZ map obtained can help the local authorities in case of disaster event for proper management and save human lives.

MATERIAL AND METHODS

Description of the study area: The Nilgiris is located between 76° 14´ E and 77° 02´ E longitude and 11° 10´ N and 11° 42´ N latitude of Tamil Nadu, India (Figure 1).Charnockite and pyroxene granulite type of rocks cover the major part of the district . Lateritic soil and small patches of sandy loam soil type covers major part of the district . According to the report from Geological Survey of India, Nilgiris district falls under judicious landslide hazard zone. Debris type of landslides is said to occur in major portion of Nilgiris and the major triggering factor is heavy rainfall. The district receives an average annual rainfall of 1700mm.

Thematic layers preparation: The spatial dataset was created in GIS platform with various remote sensing and collateral data. District boundary was obtained with the help of SOI Toposheets (58A/6,7,8,10,11,12,14,15) at an available scale of 1: 50,000. Geology layer was prepared with the help of Geological Quandrangle Map obtained from Geological Survey of India at 1: 2,50,000 scale (Figure 2

Indian Journal of Geo Marine Sciences
Vol. 48 (11), November 2019, pp. 1761-1768

Spatial Distribution of Land Use/ Land Cover Analysis in Hanamkonda Taluk, Telangana - A Case Study

Kunduru Rohin Reddy[1], Suresh Devaraj[2], Sandeep Biradar[1], Kiran Yarrakula[2]* & K. Srinivas Kumar[3]
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[2]Centre for Disaster Mitigation and Management, Vellore Institute of Technology, Vellore, India
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Received 25 April 2018; revised 04 September 2018

Lack of opportunities in villages and towns, significant changes has been noted in the urban cities across the world which provides opportunities for the people to earn money. Being the second largest city in Telangana State, Warangal is well known for the monuments such as fortresses, lakes, temples, and stone gateways. To identify the expansion of build-up regions in Hanamkonda Taluk, a comparison study was made for the years 1992, 2001, 2011 and 2017. In the present study, series of Landsat images are used to perform the spatio temporal analysis. The supervised classification with maximum likelihood estimation was performed and the area of urban settlement coverage was found to be increased from 2.25% to 11.22% (1992 – 2017). Prediction of spatial distribution of urban settlement in Hanamkonda Taluk was performed and it is expected to increase to 32.33% in the year 2023.

[**Keywords:** Landsat; LULC; Maximum likelihood; Remote Sensing; Supervised Classification; Urbanisation]

Introduction

Human activities on land are considered to be one of most epoch-making factor. It leads to various disasters such as deforestation, global warming, biodiversity loss, etc.[1]. The impact of human activities on ecosystems has a long history and now the evidence to support the hypothesis was obtained with the help of Remote Sensing and GIS[2]. In the 21st Century, as India marches towards the goal of economic development, Land use/ Land Cover (LULC) transformations are said to play a major role[3]. Urbanisation leads to the increase in population which affects the water supply and also affect the ground water quantity. It also changes the watershed characteristics by increasing runoff and transferring pollutants[4]. The periodical assessments of land use patterns are essential for proper management of available resources.

Land is becoming a scarce resource due to the increase in population and migration of people towards towns and cities[5]. The advanced technology such as Remote Sensing and GIS can be used to reduce the effect on natural resources. The Land Use/ Land Cover changes has a direct or indirect impact on the ecology of the area[6]. Temporal analysis is only possible with the help of Remote Sensing satellites. View of earth from space at regular intervals has become a vital tool in mapping land features[7].

The relation between the urbanisation and change in LULC pattern has a large impact on environment and proper investigation is required for the management of resources. Remote Sensing and GIS is a tool that can be utilized for temporal analysis with higher accuracy at very low cost[8]. The multi-temporal analysis can be carried out with the help of Landsat images obtained at 30 m spatial resolution to analyse the historical effects of Land Use/ Land Cover properties[4]. The main aim of the present study is to investigate the temporal changes using Landsat images in ArcGIS platform for Hanamkonda Taluk, Telangana, India and to predict the LULC distribution for the year 2023.

Study area

Hanamkonda taluk, a part of Warangal District covering an area of 2265 km^2 lies between 79.1925° E and 79.7818°" E Longitude and 17.6137° N and 18.1423° N Latitude. Being the capital city for Kakathiya dynasty in 12th Century, the taluk is well known for Warangal Fort, Thousand Pillar Temple and Ramappa Temple. Bhadrakali Lake, Waddepally Lake, Dharmasagar Lake, Bhadrakali Temple, Padmakshi Temple, Kazipet Dargah are the notable