AIRO JOURNALS

Free / Unpaid
Peer Reviewed
Multidisciplinary
International

ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.2
Subject:Geography

Title:

Geomorphological Changes In Bangalore
A Study in the perspective of Bangalore

Sreenivas A V
babu2812@gmail.com
9538999326
Post-Graduation in Political Science and Geography From Bangalore University
Rashmi B. S.
rashmisharma8182@gmail.com
7338519897
Rashmi holds Post-Graduation Degree in Geography from Bangalore University

Abstract

Land and water resources are finite in countries like India, where population pressure is always increasing, and universal use is essential. Drainage basins, catchments, and sub-catchments are the major administrative entities for protecting natural resources. Watershed management is dependant on uplands, lowlands, land use, geomorphology, slope, and soil. Geomorphology is the scientific study of landforms on the earth's surface, including topography, drainage patterns, and geomorphic units, among other things. Bangalore has grown dramatically in the recent decade as a result of both globalisation and urbanisation. The need for services and, as a result, a higher quality of life in the city is not limited to the central core, the erstwhile Bangalore City Corporation jurisdiction alone, but also extends to the peri-urban areas, the metropolitan area, and beyond, into the Bangalore Metropolitan Region. At 12.59o north latitude and 77.57o east longitude, it is about equidistant from both the eastern and western coasts of the South Indian peninsula. Over the last ten years, the average yearly total rainfall has been around 880 mm, with about 60 rainy days. Summer temperatures range between 18 to 38 degrees Celsius, while winter temperatures range between 12 and 25 degrees Celsius. As a result, Bangalore has a comfortable environment throughout the year. Hebbal, Koramangala, Challaghatta, and Vrishabhavathi are the four watersheds that run through Bangalore. The study area, like the Udupi coast and other parts of Karnataka state on India's west coast. Coastal areas are active land-sea transition zones. Because of human interference with natural processes, their susceptibility is increasing. We focused on assessing coastal vulnerability along the Bangalore coast in this study. Our research included a fact study and prediction analysis of key records and data connected to our research purpose, which assisted us in reaching a conclusion on Bangalore's Geomorphological Changes.

Keywords- Yelahanka watershed Bangalore rural district Karnataka India - geomorphological study, The river flows of the Netravati and Gurpur in Karnataka India, Shoreline Dynamics and

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.2
Subject:Geography

Vulnerability Along the Karnataka Coast, India: A Geo-Statistical Approach, Dakshina Pinakini River Basin Chikkaballapura and Banglore Districts Karnataka- Geomorphical Analysis and Associated Landuse Study, Bangalore Urban Hydrological Study Karnataka India, The Impact of Landscape Metrics on Bangalore's Different Spatial Extents.

1. Hypothesis

Bangalore is located at 920 metres above sea level and is nearly equidistant from both the eastern and western shores of the South Indian peninsula, at 12.59o north latitude and 77.57o east longitude. The average yearly total rainfall has been roughly 880 mm during the last ten years, with about 60 rainy days. The temperature in the summer is from 18 to 38 degrees Celsius, while the temperature in the winter is 12 to 25 degrees Celsius. Bangalore experiences wet and dry seasons. Bangalore's climate is more pleasant all year due to its high elevation. Summer can, however, be unpleasant due to heat waves. In this paper Geomorphological Changes in Bangalore, we conducted a zone based study on landscape and other natural features that are presents in various regions of Bangalore.

2. Introduction-

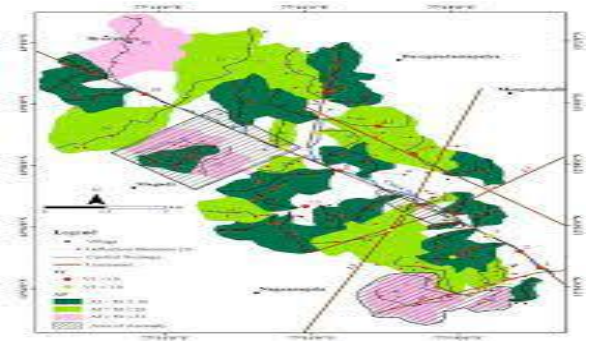
Bangalore has grown dramatically in the recent decade as a result of both globalisation and urbanization. The need for services and, as a result, a higher quality of life in the city is not limited to the central core, the erstwhile Bangalore City Corporation jurisdiction alone, but also extends to the peri-urban areas, the metropolitan area, and beyond, into the Bangalore Metropolitan Region. The State Government established Greater Bangalore City Corporation in January 2007 in response to urban sprawl, which resulted in the agglomeration of previous City Corporation with nearby 8 municipal councils and 110 villages. With other large-scale infrastructure development initiatives like the Bangalore-Mysore Infrastructure Corridor, the Bangalore International Airport, and the ring motorways, the urban outgrowth is no longer confined to the city corporation lines, but has now expanded beyond them.

Bangalore is India's fifth-largest city and the country's most rapidly rising metropolis. The city is vulnerable to even moderate earthquakes since its structures are composed of mud. Reinforced cement concrete was used to construct the construction. Buildings are being built without regard for building rules, and the population is growing. The presence of destructive earthquakes in numerous places of the world with similar intraplate tectonic settings, on the other hand, suggests that formerly active structural weaknesses/faults have reactivated. The most significant administrative entities for preserving natural resources are drainage basins, catchments, and sub-catchments. Uplands, lowlands, land use, geomorphology, slope, and soil are all part of the watershed management concept. When it comes to maintaining reservoir catchments, soil and water conservation are the most important elements to consider. Shoreline movements and coastal floods endanger the majority of the world's coasts, destroying homes and infrastructure. All of these aspects must be described in advance for our Research

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.2
Subject:Geography

Objective to obtain a comprehensive image of the Geomorphological Changes in Bangalore in the various places where we performed our research.

1.1. Tectonic Geomorphology of West Bangalore Using ASTER DEM Analysis of the Chick Tore River Basin, Karnataka, India:

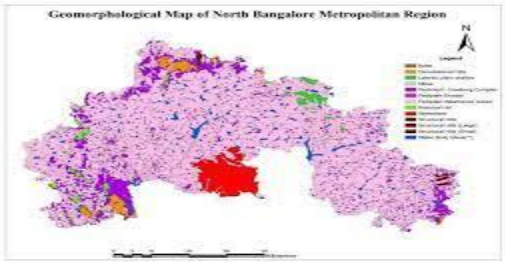


In active tectonic research, tectonic geomorphology and morphometry are regarded valuable tools.

The geomorphology of this location where a past earthquake has been reported. The research region is a tiny

river basin (Chick Tore) with fourth order tributaries and a dendritic pattern. It covers an area of 116 km2 and has a dendritic structure as the figure shows. The area is divided into 43 sub basins for morphometric investigation. Southwest of the river's main trunk, two areas of unusual basin asymmetry may be seen.

1.2 Time Series Analysis of Rainfall in the North Bangalore Metropolitan Region: Using Remote Sensing and Geographic Information System Techniques:



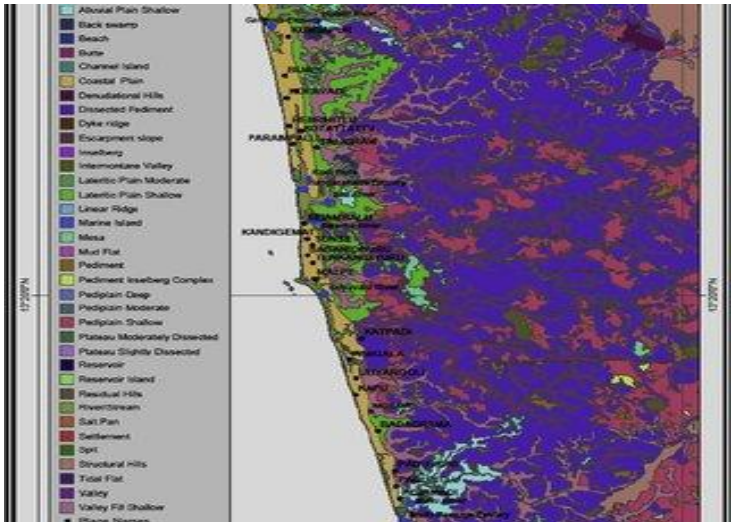
A major climate challenge confronting civilization today is changing precipitation patterns and their influence on surface water resources. Rainfall changes are already occurring on both the global and regional level as a result of global warming.

Geomorphology is the study of landforms and structural characteristics. Many of these characteristics are conducive to the occurrence of groundwater and are categorised according to groundwater potentiality. The remote sensing data generated by ArcGIS software is used to decode these units.

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.2
Subject:Geography

1.2.Future sea level rise coastal vulnerability assessment in the Karnataka state of India's Udupi coastal zone:

The study region, the Udupi coast in Karnataka state on India's west coast, is notable for sandy beaches, aquaculture ponds, lush flora, temples, and big and minor enterprises. It is located between 13000 0000–13450 0000 north latitudes and 74470 3000–74300 0000 east longitudes, has a 95-kilometer coastline, and is orientated NNW–SSE. Due to its low topography and high ecological and touristic significance, it is vulnerable to accelerated sea level rise (SLR). The purpose of this study was to calculate the coastal vulnerability index (CVI) in order to determine the high and low vulnerable zones, as well as the area of inundation owing to projected SLR and land loss. The research region is the Udupi coast, which runs from Surathkal in the south to Navunda in the north along the Karnataka coast on India's west coast.



Geomorphology map of the study area

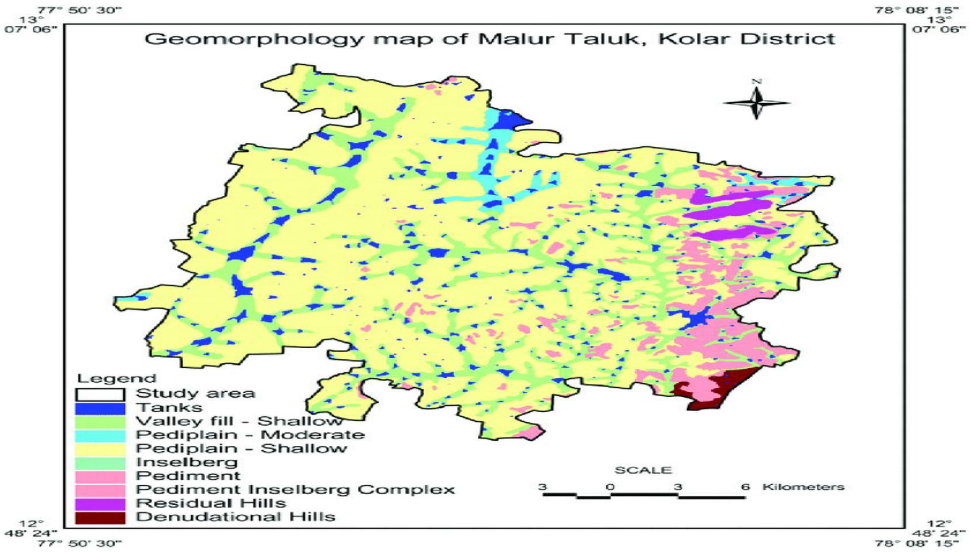
1.3.. A Case Study in Malur Taluk, Kolar District, Karnataka, India, Using Geomorphological Mapping to Identify Ground Water Potential Zones in Hard Rock Areas Using Geo-spatial Information-

Because there is a scarcity of excellent quality water and an increasing need for it for home, agricultural, and industrial applications, groundwater is getting more attention. Not only is it now required to identify groundwater potential zones, but it is also necessary to monitor and protect this valuable resource (CGWB 1985). Groundwater prospecting, particularly in hard rock terrains, necessitates a thorough understanding of the geology, geomorphology, and lineaments of the area, all of which are influenced, directly or indirectly, by terrain characteristics such as weathering grade, fracture extent, permeability, slope, drainage pattern, landforms, land use/land cover, and climate.

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.2
Subject:Geography

Geospatial technology provides a quick and low-cost way to generate valuable data on geology, geomorphology, lineaments, slope, and other factors that aid in determining the potential for groundwater. Groundwater resource identification, mapping, and planning have all benefited from the use of integrated remote sensing and GIS approaches.

Geomorphological mapping was carried out in Malur taluk of Kolar district, Karnataka, to designate potential groundwater areas using a methodological integrated approach based on remote sensing and GIS. Hydrogeomorphological research include the delineation and mapping of various landforms, drainage characteristics, and structural factors that may have a direct impact on groundwater occurrence and movement.



3. Study Objective

The report on Geomorphological Changes In Bangalore examines and analysis the different regions of Bangalore. Since, Bangalore, the capital of the state of Karnataka, is a landlocked metropolis in peninsular India. The research area is the Bangalore Region like the naturally undulating landscape of Bangalore City, with its hills and valleys, has given itself well to the formation of lakes that can absorb and retain rainwater, earning it the nickname "city of lakes and tanks." Wet and dry seasons exist in Bangalore. Bangalore has a more temperate climate throughout the year due to its high elevation, yet occasional heat waves can make summer unpleasant. The northeast and southwest monsoons both provide rain to Bangalore, with September, October, and August being the wettest months in that order. Thunderstorms are common in the summer, and they can bring power outages and local floods.

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International

ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.2
Subject:Geography

4. Related Work

4.1. Yelahanka watershed, Bangalore rural district, Karnataka India - geomorphological study-

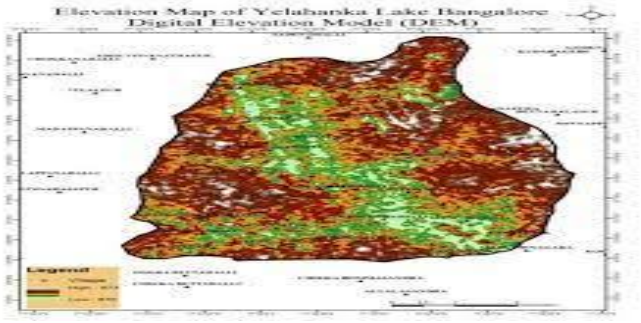
Within the Arkavathi River Basin, the current research area is located. To better understand the geo-hydrological characteristics of the Yelahanka watershed, a geomorphological study was conducted out. The linear, aerial, and relief characteristics of the research region were studied using remote sensing and geographic information systems. The Arkavathi River basin includes the Yelahanka watershed. The study region is encompassed by latitude 13o 06' to 13o 40'N and longitude 77o 35' to 77o 44'E at a height of 915 metres above sea level. The Yelahanka Lake lies 14 kilometres north of Bangalore's city centre, next to the NH-7 highway.

This is a 300-acre catchment basin for a man-made lake. The principal source of water is rainwater gathered in the lake from the surrounding area, which includes villages. Yelahanka Doddakere is the name of the lake, which provides drinking water and irrigation to a big section of Bangalore. The watershed has a semi-arid, tropical environment with warm to hot temperatures. Each year, 914mm of rain falls on average. The watershed is undulated, reaching a maximum elevation of 950 metres and a minimum elevation of 903 metres.

Results of Geo-morphological of the Yelahanka watershed:-

Stream order	**No. of streams (NU)**	**Bifurcation ratio**	**Total length of streams (LU in km)**
I	90	2.90	54.800
II	31	4.40	23.367
III	7	7.00	15.269
IV	1	-	8.544

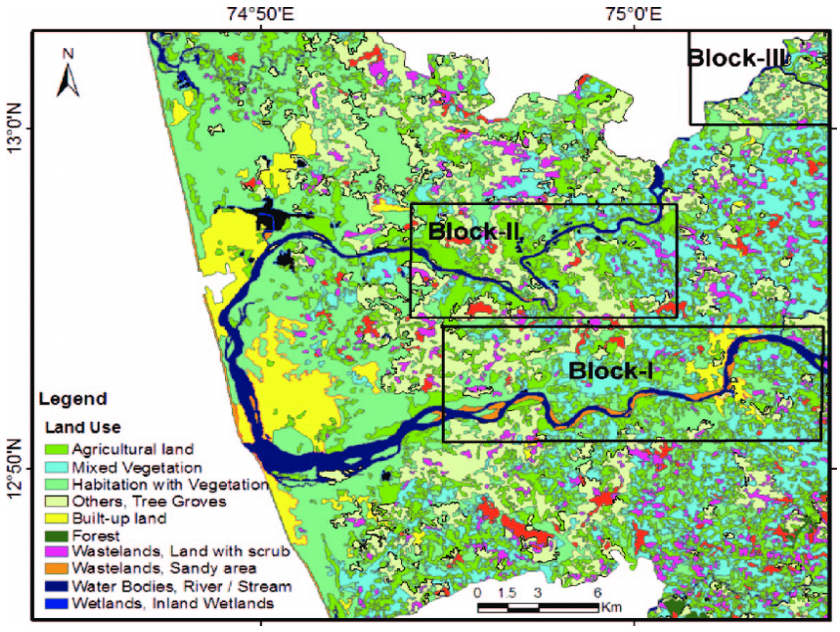
AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.2
Subject::Geography



4.2. The river flows of the Netravati and Gurpur in Karnataka-

The Netravati and Gurpur (N–G) rivers rise 900–1800 metres above sea level on the steep slopes of the Sahyadri hill ranges (Western Ghats). The Netravati river flows into the Arabian Sea at a right angle to the south of the New Mangalore Port , whilst the Gurpur river travels parallel to the coast for about 8 kilometres before meeting the Netravati river. They traverse across an undulating lateritic environment and over the low-lying coastal plains on their way west.

River bank erosion, meander migration, and lateral channel modifications are some of the words that have been used to characterise the erosion of the channel boundary in river systems. Bank erosion is the consequence of complicated natural processes that are influenced by in-channel hydraulic conditions as well as the physical characteristics of the banks, both of which are extremely varied both within and between rivers. The goal of this research is to discover how the N–G rivers have changed across time and space. Significant alterations were found in three blocks along the Netravati (Block-I) and Gurpur rivers' courses (Blocks II and III



AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International

ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.2
Subject:Geography

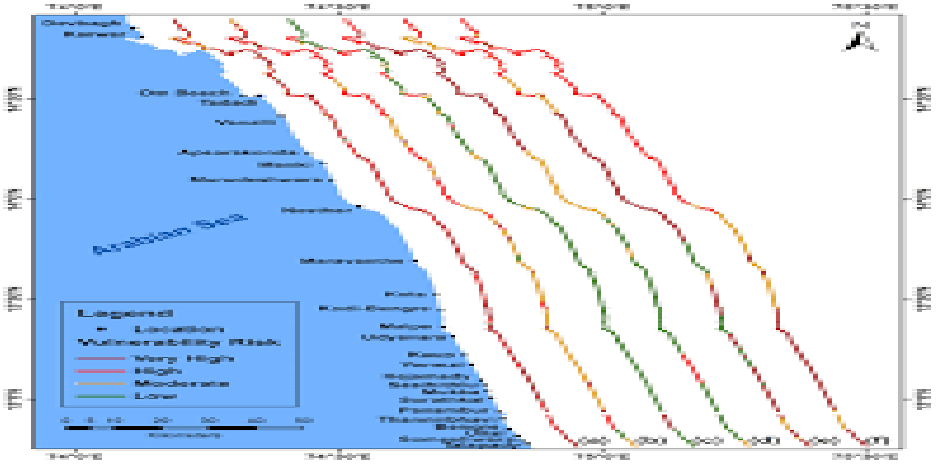
4.3. Shoreline Dynamics and Vulnerability Along the Karnataka Coast, India: A Geo-Statistical Approach-

Over the last few decades, urbanisation and rapid growth of coastal cities have been the norm, resulting in a plethora of megacities around the world facing a variety of coastal risks. Coastal erosion, which results in the irreversible loss of valuable land, property, and natural resources along the coast, is one of the most serious risks caused by these anthropogenic factors. Shorelines are dynamic because they fluctuate in space and time as a result of natural and manmade changes in coastal processes. Coastal scientists, engineers, and land planners utilise shoreline change rate as one of the most common indicators of the coast's dynamics and risks. Coastal erosion is a big threat all around the world.

The Indian seashore on both sides of its peninsula is prone to varying degrees of erosion. The coastal zone management authority must first assess the vulnerability of a shore owing to erosion before recommending additional coastal protective measures. Vulnerability is defined as the likelihood of a system being harmed as a result of external stress. Vulnerability assessment is the process of determining the risk and developing measures to lower the risk of coastal erosion via adequate planning and management. It is a prediction of the extent of harm that could be caused by a dangerous event. When natural processes wreak havoc on human activities or infrastructure, the latter is referred to as a natural hazard.

St. Mary's in Malpe and Netrani near Murudeshwara are the two largest islands off the coast. With an average annual rainfall of 3900 mm and temperatures ranging from 17 to 34 C, the coastal belt faces hot humid conditions and monsoons from the south-west and northeast.Agriculture, fishing, estuary water salt production, small to large-scale enterprises, and tourism are the mainstays of the local economy. Because of the industrial foundation, such as oil refineries, thermal power plants, and ports, this coastline is attracting more attention. Agriculture and fishing resources are dwindling as a result of widespread urbanisation and overexploitation of the coastal environment.

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.2
Subject:Geography



4.4. Dakshina Pinakini River Basin Chikkaballapura and Banglore Districts Karnataka- Geomorphical Analysis and Associated Landuse Study-

The research region is located in the Chikkaballapura and Bangalore districts of Karnataka, and is part of the Dakshina Pinakini river basin. The hydrological conditions of the subject basin were investigated using morphometric analysis.

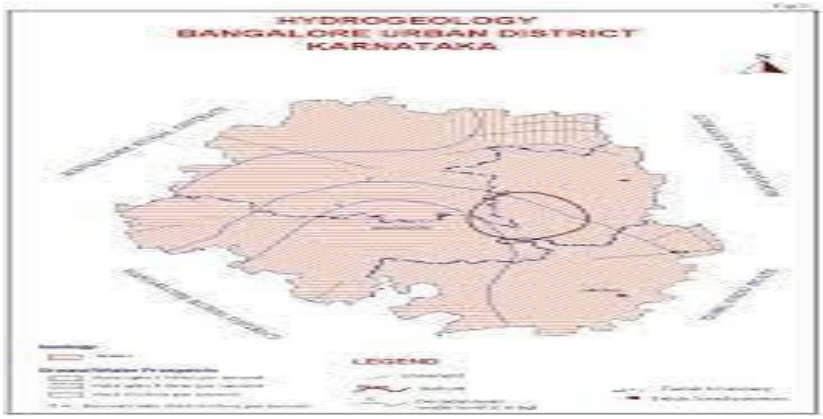
The Dakshina Pinakini river basin is a sub-basin of the Kaveri river, which begins in the Nandi hills of Chikkaballapura district and flows for 68.75 kilometres, spanning an area of 2185 square kilometres across sections of Karnataka's Chikkaballapura and Bangalore rural and urban districts (Fig.1). A peninsular gneissic terrain bounded by latitude 120 15' to 130 32' N and longitude 770 34' 30' to 780 00' E makes up the majority of the research region.

4.5. Bangalore Urban Hydrological Study Karnataka India-

Bangalore Urban is a municipality in India's Karnataka state. It is bordered on the east and north by the Bangalore Rural district, the west by Ramanagara district, and the south by the Krishnagiri district in Tamil Nadu. Bangalore was separated into two districts in 1986, one for the city and one for the countryside. Yelahanka, Bangalore North, Bangalore East, Bangalore South, and Anekal are the five taluks that make up Bangalore city.

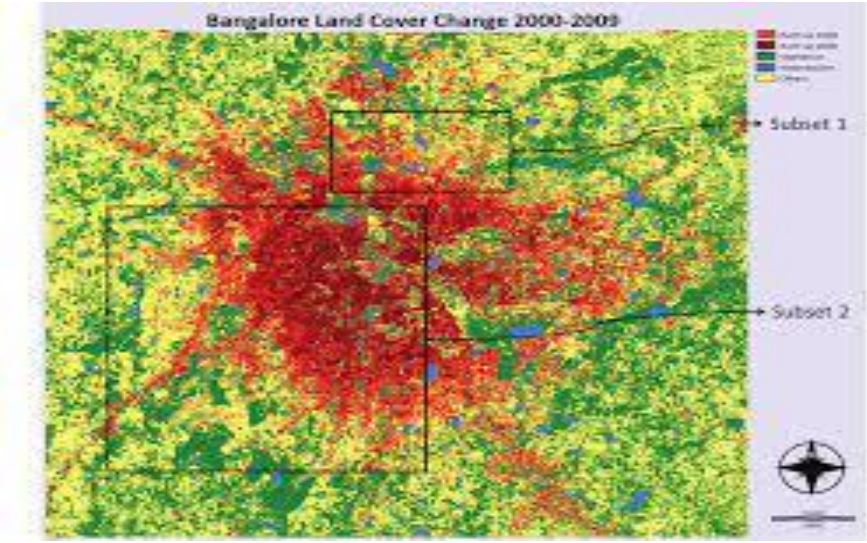
Rainy and dry seasons exist in Bangalore. Because to its high elevation, Bangalore has a temperate climate throughout the year, however summers can be hot and humid. The lowest average low temperature in January is 15.1°C, while the highest average high temperature is 35°C.

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.2
Subject:Geography



4.6. The Impact of Landscape Metrics on Bangalore's Different Spatial Extents-

Two subsets are cropped in this study, one in the north-east region and the other in the south-west region. The suburbs of Kengeri, Rajarajeshwari Nagar, Malathalli, Sunkadakatte, Papareddipalya, Nagarbhavi, and Govindraja Nagar are mostly part of the city's core areas of residential layouts and commercial areas. Kengeri tank, Hosakere, Komghatta tank, Ullal tank, Dubasipalya tank, Malathalli tank, and Herohalli tank are some of the water bodies that can be found in this area.



5. Design Methodology-

This analytical study based on Geomorphological changes in Banglore There has been several literature reviews and fact studies published for public consumption all throughout the world. We gathered related relevant material that supports or contradicts

ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.2
Subject:Geography

the elements listed in the Introduction Section of this research and then conducted our analysis based on the background study. Our research includes the following study areas:

- Geomorphological changes in different regions of Bangalore i.e their climatic changes.
- Different features of Geomorphological changes in Bangalore

Our results are based on these analytical observations in the aforementioned domains, which allow for future extensions/predictions based on the implications or requirements related to our study's subject.

6. Study Area and Data Collection

We gathered essential information from Government and Authorized Agency portals as made available for public use for the purpose of observation and analysis in this research on Geomorphological Changes In Bangalore. We spoke with researchers, journalists, and institutes working on important studies/activities on climate changes, landscapes, drainage, soil, waterfalls, prospects, and problems to learn more about the topics. We also recommended many online academic, research-based libraries to help enrich/evaluate the quality of the knowledge.

As a result, data, statistics, and information are gathered from verified official portals, research/survey/journal references in this field, opinion polls, and review reports formally released by the related agencies/institutions/functioning bodies/research organisations.

Data/Information is collected till the period of 2021, with the goal of observing trade and political transitions or developments in the world's major nations.

The credibility of this data/information is verified using the credentials and methodology stated in those information sources, and they are thoroughly checked to ensure that they do not contain any conflicting or deceptive facts that could undermine social, political, economic, or other platforms.

7. Finding and Conclusion-

Several satellite pictures and topomaps from different dates were used to explore the previous and future shoreline positions, as well as the morphological changes of spits on the Karnataka coast (Banglore) in western India. Multi-dated satellite pictures, topography, geology, gravity, and seismotectonic maps are used to analyse the migrations of the N–G river channels. The purpose of this study was to identify susceptible locations along the Udupi coast owing to future sea level rise (SLR) through the analysis of conventional and remotely sensed data, with the goal of identifying areas where physical changes are most likely to occur as sea level rises.Due to environmental processes and manmade factors, the morphology of surface drainage or streams varies over time.

ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.2
Subject:Geography

Future research should focus on the growth pattern and landscape fragmentation at various spatial scales.s The effect of various geographical extents on the estimate of landscape metrics was investigated in this study, which assessed land cover change in Bangalore from 2000 to 2009. The geomorphological characteristics of these places make it easy to identify groundwater potential zones and contribute to decision-making.

Groundwater potential zones have been classified as I very good to good, (ii) good to moderate, (iii) moderate to poor, and (iv) poor to very poor, based on different geomorphic units.

Coastal vulnerability is a method of calculating vulnerability along the coast that uses an index. The number of variables and their risk levels used to determine regional coastal vulnerability vary. Shoreline dynamics, land use/landcover, geomorphology, geology, elevation, and bathymetry all have a role in the vulnerability of the Karnataka coast (Banglore).

8. Recommendation and Suggestions

1. Geomorphologists are confronting challenges that were only a few decades ago unthinkable, thanks to a slew of new high-resolution topographic tools and vastly improved numerical dating. Completely different approaches for examining the landscape that are based on numerical data with a high resolution.

2. The use of dates and high-resolution topography in a sequential fashion is transforming the industry. Surface processes are studied.

3. Banglore geomorphology changes apply concepts and methodologies to a variety of geomorphology and earth science challenges. Another approach to consider such applications is that the problems being investigated are typically of societal significance.
4. Climate change and natural disaster mitigation are among them, with the goal of better understanding how people perceive and react to natural disasters like flash flooding and debris flows.
5. The importance of social concerns in social scientists' studies to link hazardous occurrences to what communities know about hazards, what they believe the proper emergency management response should be, and what their personal response to loss and damage should be is especially important. As much social science as physical science is required for disaster response and mitigation.

ISSN: 2320-3714
Volume:4 Issue:2
November 2021
Impact Factor:5.2
Subject:Geography

9. Acknowledgement

To give our research the framework it needed, we had to look for both qualitative and quantitative data from reputable sources. We were lucky in that we were able to secure the necessary information/resources for the official and research websites under a creative commons licence that allowed for free access and reuse. We appreciate the free access materials provided on the Geomorphological changes in Banglore official website for statistical data and facts.

10. References

- Sitharam, T.G. and Anbazhagan, P. (2006), 'Seismic Hazard Analyasis for the Bangalore Region'. Natural Hazards (2007) 40:261-278.
- Abbas MH, Vishwanadham KD, Krishna Rao SVG (1991) Resource map of Udupi and Dakshina Kannada districts, Karnataka. Geological Survey of India, Hyderabad
- Bird Eric CF. Coasts: an introduction to coastal geomorphology. UK: Basil Blackwell Publisher Limited; 1984.
- Burrough, P.A., McDonnell, R.A., 1998. "Principles of Geographic Information Systems". Oxford UniversityPress, New York,
- Forman, R. T. T. & Godron, M. (1986). Landscape ecology. John Wiley & Sons, New York, USA
- Babar, M. 2005. Hydrogeomorphology: Fundamentals, Applications and Techniques. New India Publishing Agency, New Delhi.
- Chow, V.T., 1964. Handbook of Applied Hydrology (Ed.), McGraw Hill, New York, 29 p
- Abbas, M. H., Vishwanadham, K. D., & Krishna Rao, S. V. G. (1991). Resource map of Udupi and Dakshina Kannada Districts, Karnataka, India. Hyderabad: Geological Survey of India
- Geological Survey of India. (2005). District resource map of Uttara Kannada, Udupi and Dakshina Kannada, India. Compiled by A. V. Jayprakash & M. H. Abbas
- Chorley R.J. (1969): Drainage basin as the Fundamental Geomorphic Unit., Water, Earth and Man Ed. Metheun and Co.
- C.R. Bannur,. Studies on coastal environs using remote sensing techniques and morphology of the beaches of Uttara Kannada District, Karnataka District, Ka (1994)rnataka. Ph.D., Thesis, Karnataka University, Dharwad, pp 136