Industrial Engineering Journal
ISSN: 0970-2555
Volume : 52, Issue 11, No. 2, November : 2023

SATELLITE PICTURE HANDLING AND HEADS-UP DIGITIZATION TECHNIQUE FOR THE APPRAISAL OF WATERBODY INFRINGEMENT UTILIZING GEOSPATIAL INNOVATION

Mr. S. Raja, Research Scholar, Department of Computer and Information Technology, Annamalai University, Tamilnadu -628 002.
Dr. C. Ashok Kumar , Associate Professor , Department of Computer and Information Technology , Annamalai University ,Tamilnadu -628 002.

ABSTRACT

Water bodies like lakes or tanks or lakes assume a huge part in safeguarding and reestablishing the ecological dependability. They are in presence for quite a long time, serving the water needs of communities. Encroachment of water bodies for improvement human settlements and cultivating has been expanded because of populace development and public demeanor. This exploration zeroed in on the water bodies infringement in Manapparai Taluk, which covers an area of 1090 sq.km that envelops 108 income towns and found inthe focal piece of Tamil Nadu, India. The remote detecting procedures were utilized to evaluate the land-use landcover (LULC) changes, The visual understanding methods were utilized to set up the LULC map and examined the washes between geographical bed covers of 1976 and Fast Bird satellite symbolism of 2019. The vector layers of LULC were made by involving heads-up digitization strategy in open-source geospatial programming climate for example QGIS and GRASS. The LULC changes were evaluated by income towns, likewise anticipated the complete number of water bodies infringed by the general population. The aftereffects of LULC layers between 1976and 2019 affirm that the degree of human settlement expanded from 3.52% to 5.98% of the complete region, while vegetation cover additionally increments from 1.38% to 2.12%. Also, the lakes and lakes diminished from 4.11%(44.94 sq.km) to 3.82 % (39.14 sq.km). The examination enjoys exhibited the benefits of Fast Bird satellite symbolism to give a definite, financially savvy commitment to set up a guide and explore LULC changes over a stretch.

KEYWORDS: Land-use land cover change, Image processing, visual interpretation, google earth, water bodies encroachment, QGIS

INTRODUCTION

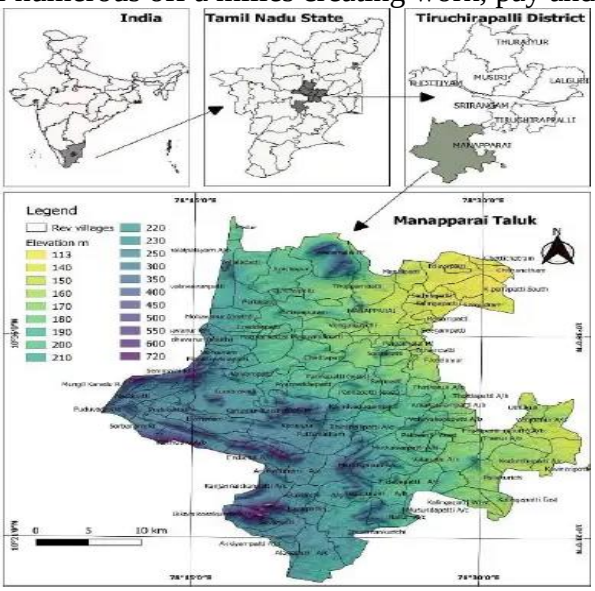
The lakes and lakes assume an essential part in parched and semi-bone-dry districts. Antiquated realms created it, which were all around kept up with by buyers. Over 100 years back, surface water bodies like lakes and ponds were the essential wellspring of water. Additionally, lakes and lakes increment the groundwater level ascent. Tanks and ponds are supplies ordinarily developed by earthen soil to catch stormy season overflow in the bone-dry zones by the ancient kingdom of Tamil Nadu (Chola and Pallava realm). There are numerous old bits of proof to show that rulers had fabricated supplies and lakes and lakes in their separate realms (i.e., Lord Karikalachola was developed the Great Anaicut across Waterway Cauvery, Maravarman Arikesari was constructed a check damacross Vaigai Stream, Parakrama Pandiyan was constructed an actually take a look at dam Sitranai, and so on). They are found in all dirt types except sand, situated in all socio-biological, agro-climatic and precipitation areas of Tamil Nadu. The rulers gathered a corpus asset to desilt the lake, selected watchmen to prevent individuals from debasing. As of late, different studies show that a significant number of the water bodies were infringed to change over human settlement or horticultural or industrial region. In this exploration center around the infringement of water bodies through examination of LULC changes in Manapparai Taluk of India. The infringement of water bodies was evaluated exceptionally enormous scope, as per sub taluk level for example revenue villages. The capacity to screen the infringement of water bodies is important by the local government also as the leader of the income towns . The LULC requires to deal with the normal asset the executives untamed life natural surroundings insurance metropolitan development model and civil region improvement . Transportation network arranging and steering of force transmission lines. The LULC was utilized to assess the various disaster like

avalanches, twisters, flood immersing, and volcanic ejection and timberland fire. The LULC change assumes a fundamental part, for example, benchmark planning for much logical examination like site choice for a breeze ranch, solar farm, strong garbage removal and groundwater re-energize .The human settlement improvement represents a tremendous gamble to the public authority properties like woodland, river, tanks and lakes, they decline casualty to the interaction . Countless LULC changes have been broke down to various part of Tamil Nadu, India. Continuous stretch, exact, and acquainted land-use arranging is required to screen the human exercises, risk appraisal, ecological assets the executives and sustainable advancement [6]. Nonetheless, Observing of LULC at public scales or local scales face several challenges, including sans cloud information procurement, the extremely excessive cost of making public items for developing countries like India. Past scientists have utilized different satellite symbolism, for example, LANDSAT and Sambath 2006; SPOT, IKONOS , KOMPSAT , Quick bird and Sentinel ethereal photograph [14]. in any case, the accuracy of progress discovery of LULC utilizing geospatial strategies firmly depends on the goal of the symbolism for example spatial, unearthly, and radiometric goal of the sensors utilized .However, the cost of the satellite symbolism is straightforwardly proposition to its spatial goal, in this examination used the uninhibitedly accessible satellite symbolism of Google Earth Master programming (i.e., Quick Bird satellite symbolism), that has a high spatial goal of 2.62m of four multispectral groups and 65cm spatial goal of the panchromatic band. The evaluation of LULC is the method of characterizing satellite symbolism in each sort of features through a vector or raster examination at many time spans. Prior scientists embraced different picture handling procedures including pixel-based land cover arrangement, picture characterization. The precision of satellite picture handling methods (i.e., administered grouping, unsupervised classification, Standardized contrast in vegetation file, the balanced distinction of vector examination) was delivered range between 57% to 73% . The past specialist was utilized ideal mixes of pixel-based and object-based land cover order strategy to get a higher grouping and post-characterization change identification exactnesses. Visual understanding methods can be utilized to set up the preparation locales of regulated characterization to accomplish 96% precision. The visual translation and head-up digitization is an accurate strategy for changes ID in LULC. We speculated that adjustments of the degree of populace development, as well as blasts in agribusiness exercises, significantly affect the biology, climate, water bodies, and woods from 1976 to 2019 on Manapparai Taluk in Tamil Nadu State, India. In this exploration, two unique information were utilized, like geographical guides (1:50000) and Quick Bird satellite symbolism, to evaluate the water body infringement and land-use land cover changes in a geospatially express way.

STUDY AREA

Manapparai Taluk in Tamil Nadu State, India has a little metropolitan degree, covering a general region of1090 sq.km and is limited by scopes 10° 17′ 28″N to 10° 44′ 56″N also, longitudes 78° 9′ 46″E to 78° 34′ 07″E as shown in Figure 1. As indicated by the evaluation, 2011 information, the exploration region incorporates both a urban and provincial region populace was 52355 and 318127 separately. The all out populace of the review region was 370482,total families in were 12,620. The populace in Manapparai Taluk was, expanded from 331255 of every 2001 to370482 in 2011 (https://www.censusindia.co.in). The review region has molten rocks (stones), which is containing early stage radio nuclides movement (Sankaran Pillai et al. 2016). Likewise, a reedy layer of red sandy soils covers on top of the western and southern pieces of the review region [40].The normal temperature in Manapparai is 28.5°C. In a year, the typical precipitation is 816mm. the annual rainfall is around 816mm, most extreme in October to finishing off with December because of winds of the upper east stormy season, and from December to February, the environment is a breeze and sticky. The Time of blistering summer wins till June when Southwest storm sets which bring sparse downpours (MINING 2019). Essential exercises of country region are agricultural and peaceful movement. The money related base of Manapparai is widely cultivating, including the cultivation of maize, Paddy, Millets, Heartbeats, Banana, Sugarcane and Cotton are the significant harvests

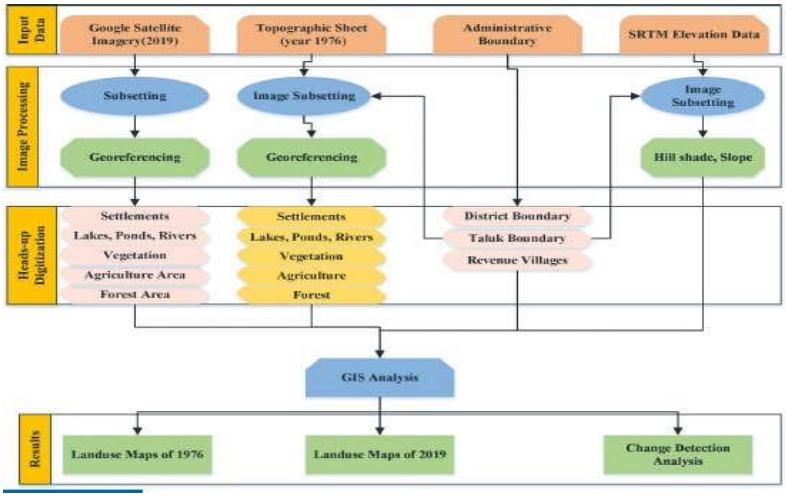
developed in the study regions well as poultry and pig [35]. Ovine raising and agribusiness are conventional occupations of numerous off a milies creating work, pay and resource [5].



Tank water system in Manapparai Taluk is a aid frequently joined by wells sunk on flooded land under the tanks. Unfortunate upkeep of the lakes and the lakes have been confronting the a large portion of the issue by the local administration and town panchayats.

The visual translation is very simple to recognize in the Speedy bird satellite pictures, as the subtleties of the singular lakes, lakes and different elements should be visible. The region of the water body was determined by utilizing the field number cruncher apparatus of property table in the QGIS programming climate.

METHODOLOGY



DATASETS USED IN RESEARCH:

The review portrays four general strides in LULC change examination, for example picture geo-referring to, Picture sub-setting, visual heads-up digitization, spatial geo processing and evaluation as outlined in Figure 2.

The geospatial method is an expected device in evaluating the impacts of LULC on various environmental factors including catastrophic events and even environmental change. Flying photos and satellite pictures are skilled of covering enormous locales and a separate assortment of land features, which gives change evaluation to various land covers like metropolitan region and water bodies. Geological sheets were gathered from the Review of India. The satellite symbolism of Google Earth Master has worldly irregularity, doesn't cover the whole review region (say 1000sq.km) by single

picture because of mists, shadows. The high-goal Speedy Bird satellite symbolism was downloaded through Google earth expert, procured on dated 09-09-2019, was initially taken from the QB and have red, green and blue groups with a spatial goal of 2.6m.

SOFTWARE ADOPTION

Quantum Geographic Data Framework (QGIS) is a GNU Overall population Permit programming, which was delivered as Open source programming in May of 2002. The elements of QGIS can work as generally costly exclusive GIS programming. QGIS upholds a few raster and vector information designs.

IMAGE PROCESSING

Remote detecting and geospatial innovation together can complete a jump in land-use and land cover planning. Picture preprocessing related works like sub-setting, Geo-referring to, spatial examination and planning was performed by utilizing QGIS 3.10 and GRASS 7.8 programming. The geographical sheets were geo referenced by Everest ellipsoid and afterward projected into WGS84 UTM zone 44N. The review region was delimit

ated utilizing open-source programming (QGIS and GRASS programming), utilizing a computerized height model from the satellite of Transport Radar Geology Mission sent off by the NASA (effectively downloadable from earth traveler) The rise information of Manapparai Taluk was displayed in Figure 1. The SRTM computerized rise model can assist with understanding the territory state of the review region. The filtered duplicate of Geological sheets of the Review of India was made. The Geo-referring to and heads-up digitizing of vector information was completed, then all topical layers were put away in ESRI shape file design [23]. Picture to-picture enlistment and geo-referring to were executed on the other satellite pictures utilizing the QGIS programming climate.

HEADS-UP DIGITIZATION

The geological sheets were given more itemized data in regards to changes in water bodies and different layers. For LULC planning of the review region from visual translation of satellite symbolism and the heads-up digitization of geographical sheets as displayed as Figure 3. The spatial information base was built by embracing the QGIS programming climate. The layers that require identifying changes, for example, water bodies, settlements, vegetation, woods, and farming were digitized utilizing from the checked duplicate of geological guides with a size of 1:50000. The computerized geological information utilized basically for mathematical rectification of the satellite symbolism. The sans cloud Speedy bird (high spatial goal of Google earth) satellite symbolism was chosen to digitization cycle of the review region. The whole picture handling was performed utilizing open-source programming i.e. GRASS GIS (rendition 7.1) and Adventure GIS (variant 8.5). In this exploration, the visual understanding methodology was utilized to get the ordered Land use maps. The LULC highlights were sorted into five wide types(as represented in Table 1): water bodies, farming terrains, human settlements, timberland, and vegetation. These five classes of LULC were deciphered in view of the visual understanding keys. Additionally, LULC classes of the google satellite symbolism were confirmed by ground truth confirmation

The LULC maps were arranged at large scale (1:5000) by visual translation with the utilization of picture understanding keys like tone, surface, size, shape, related highlights. Visual translation procedure was utilized for precise extraction of lakes and ponds from high-goal satellite symbolism in QGIS programming.

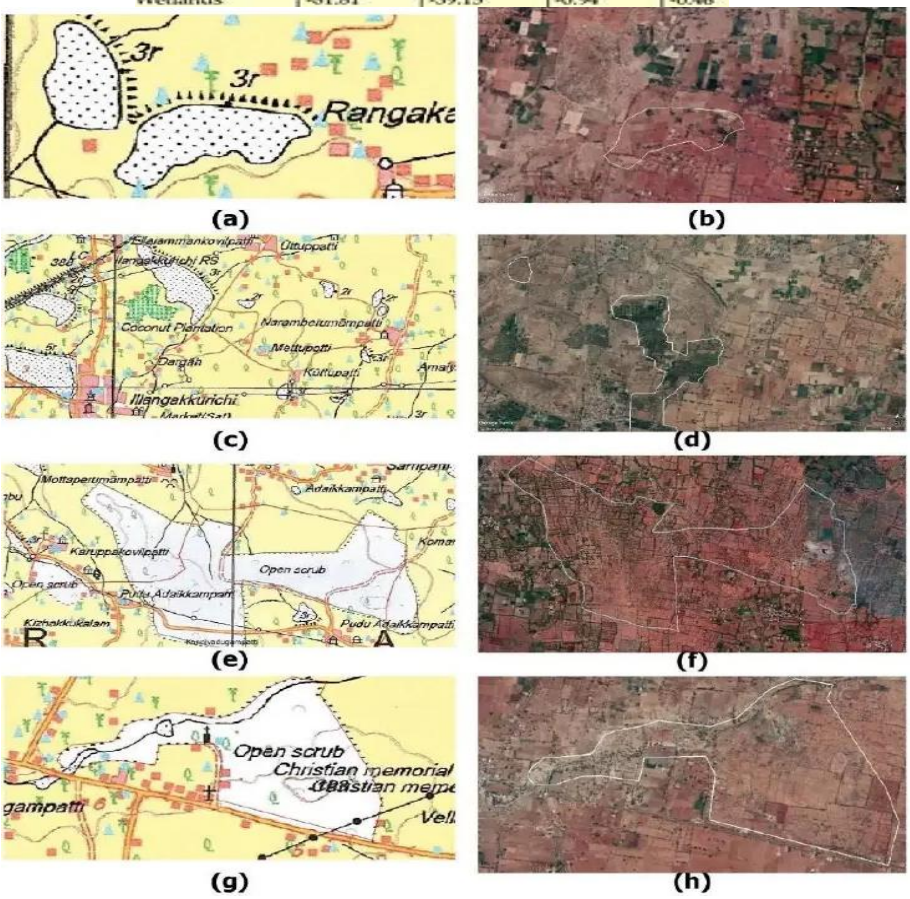
RESULT DISCUSSION:

The study area had 959 tanks (according to LULC map of 1976), which were helpful to recharge groundwater, regulate rainwater inundations, support ecology and environment, and provide livelihood opportunities to an enormous population. There are a small number of tanks constructed in

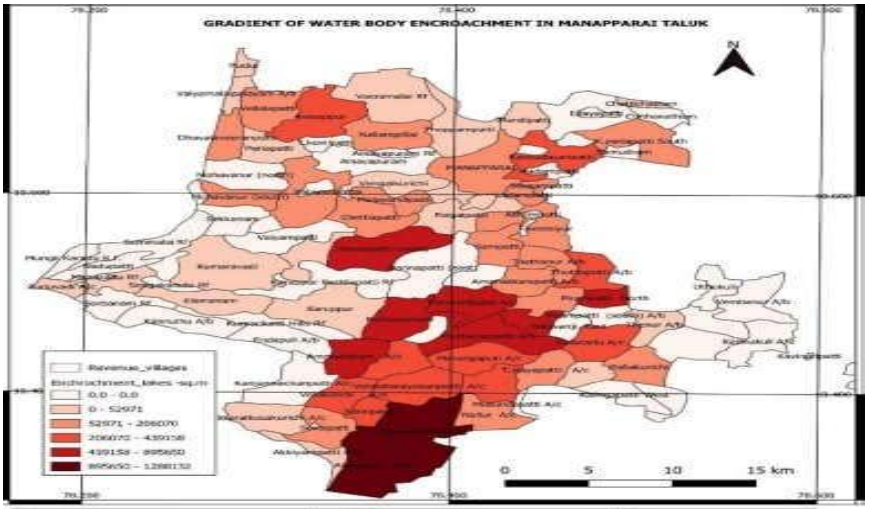
Industrial Engineering Journal
ISSN: 0970-2555
Volume : 52, Issue 11, No. 2, November : 2023

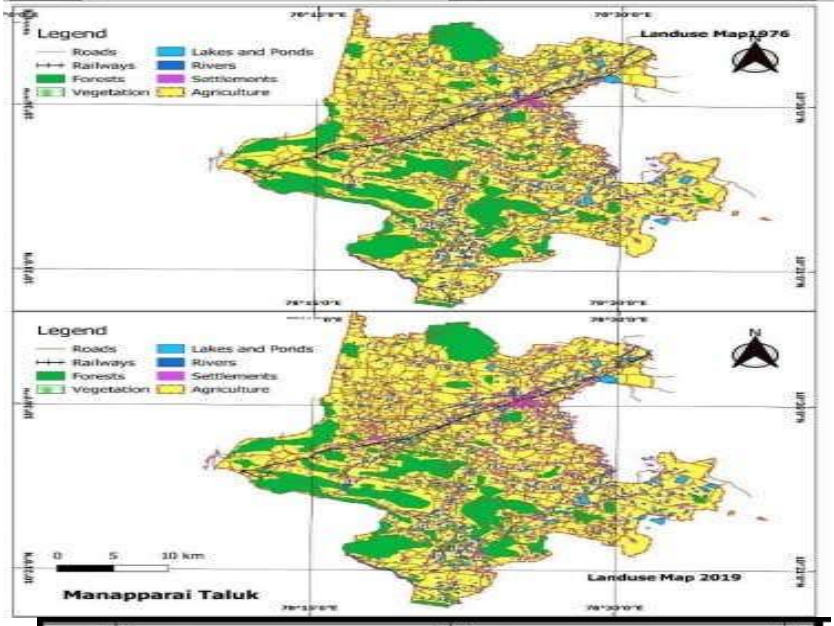
the recent past two hundred years. The interlinked water bodies were developed for the conjunctive use of wells with ponds, lakes and tanks. The main problems in tank irrigation are the accumulation of silt and poor maintenance of tank bunds that lead from the tank into another type of land-use. According to LULC map of the year 1976, nearly four decades ago, estimated that Manapparai Taluk had 959 lakes or tanks and more than half of them were located south of the Manapparai urban area. The maps showed that between 1976 and 2019 the surface area of water bodies or lakes and ponds decreased from 4.11% (44.94 sq.km) to 3.82 % (39.14 sq.km) of the total area as shown in Table 2. In 1976compared to 2019 the 43 years, among 959 water bodies, only 871 (according to LULC 2019) of them exist and remaining 88 (112.6 ha area) water bodies have fully encroached. Besides, 232 water bodies (463.4 ha area) had partially encroached which has reduced the size of the lakes as shown in Figure 3. All these menaces had happened because of encroachments on lakes and ponds and major land-use/cover conversions from 1976 to2019.Also, the list of water bodies encroached partially or fully according to revenue villages was created in QGIS software environment for 1976 as well as 2019 (Table 3). The gradient map of water body encroachment was shown in Figure 5 and Figure 6. The area and number of water body encroachment according to revenue villages was illustrated in Table 4.

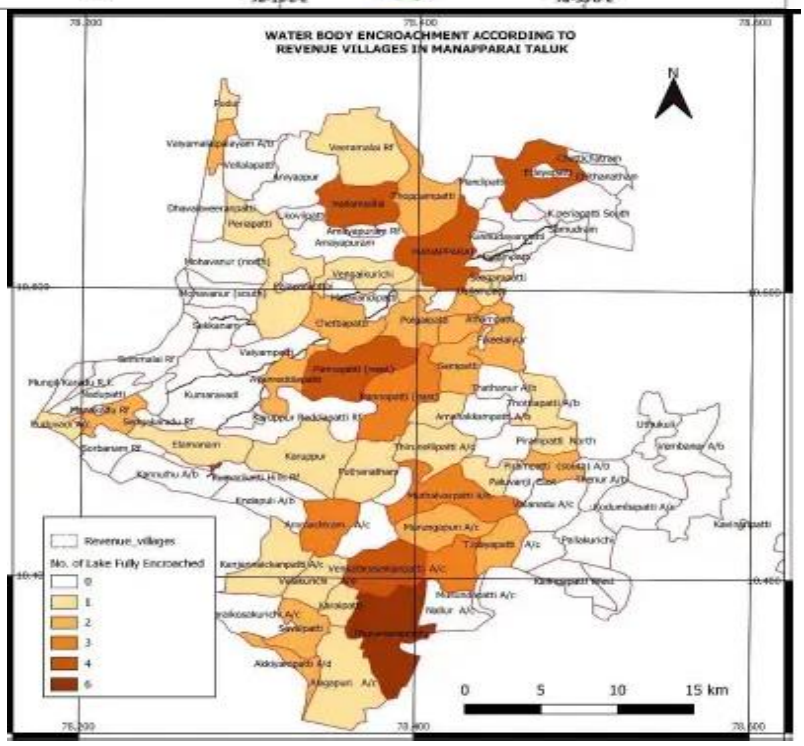
	Change (ha)		% Change	
LULC	1986-2002	2002-2007	1986-2002	2002-2
Bare Soil/ Sand	-109.98	197.64	-1.27	2.29
Built-Up	2255.13	970.02	26.05	11.2
Croplands	110.07	191.43	1.27	2.21
Grassland	36.00	-112.59	0.41	-1.29
High Density Forest	-1957.95	-1025.37	-22.61	-11.85
Sparse Forest	-178.65	-206.19	-2.07	-2.38
Water	-72.81	24.21	-0.84	0.28
Wetlands	-81.81	-39.15	-0.94	-0.46



Industrial Engineering Journal
ISSN: 0970-2555
Volume : 52, Issue 11, No. 2, November : 2023







The benefits of geospatial data innovation in LULC change examination was completely appreciated. The LULC maps were created for 1976 and 2019 (Figure 4) and the singular class region and change measurements for the four years are summed up in Table 2. The evaluation results work out the LULC changes in the Manapparai Taluk and furthermore show the capable of Google Satellite symbolism to convey an exact, reasonable to map and look at changes in LULC during 1976 to 2019. LULC change can be utilized as data sources to ecology the board and decision making to safeguard the climate. Figure 4 shows a guide of the significant water bodies has infringed somewhat or completely in 61 income villages. The surface area of water body diminished from vegetation and backwoods, addressing 19.51%of the examination region, are the three most significant LULC classes in the Manapparai Taluk, while vegetation cover sorts of manors expanded from 1.38% to 2.12%. The increment of human settlement lands in the review region was 3.52 to 5.98% comparative with the entire scene. Nonetheless, the term of 43years (LULC period 1976-2019), 21.856 sq.km region was changed to human settlements from developed land, distressingly, 10.083 sq.km (18.13% in 1976 and 17.21% in 2019) woodland cover diminished. Table 4. List of revenue towns in Manapparai Taluk and its area of water body in fragment.

CONCLUSION

The current review gives proof of water body infringement in Manapparai Taluk of India through LULC change examination utilizing geospatial data advances. This study was utilized Google satellite images and in situ information inside open-source GIS to plan populace development and its subsequent impacts ashore use changes in the Manapparai Taluk, Tamil Nadu throughout the course of recent years. LULC is a peculiarity, which is of serious caution and needs brief consideration in every one of the developing country as well as metropolitan regions. The 43 years time frame shows numerous outrageous changes in water bodies. Especially these water bodies were switched over completely to agribusiness and developed lands. The rising populace and expanding financial exercises are the principal justification for LULC change. The water bodies, stream, agribusiness, and woods have been diminished in the whole review region. The developed land and vegetation have expanded. The review uncovers that geospatial data innovation has a special capacity to evaluate the progressions that have happened in LULC over a period. There is a need to foster fitting picture handling or logical strategies to survey LULC change. It is normal that the income town organization would endeavor to meet the necessity for fostering the tanks and its ability. The field examination is expected to check that the water bodies infringed by the general population.

REFERENCES

[1] Abd El-Kawy, O. R., Rød, J. K., Ismail, H. A., & Suliman, A. S. (2011). Land use and land cover changedetection in the western Nile delta of Egypt using remote sensing data.
Applied Geography *31*(2), 483
[2] Aguirre-Gutiérrez, J., Seijmonsbergen, A. C., & Duivenvoorden, J. F. (2012). Optimizing land based approachin a mountainous area in. *Applied Geography* ,*34* (May), 29
[3] Agyemang, F. S. K., & Silva, E. (2019). Simulating the urban growth of a predominantly informal Ghanaiancity-region with a cellular automata model: Implications for urban planning and policy.
[4] Álvarez Alonso, M., & Martínez Izquierdo, E. (2009). Decision management making byAHP (Analytical Hierarchy Process) trought GIS data. *IEEE Latin America Transactions*
[5] Ayakumar, P., & Sahayaraj, M. (2017). An Economic Analysis of Ovine Population At Manapparai Block InTiruchirappalli District.
[6] Balukkarasu, A., & Kumar, B. S. (2004). Geological, Geomorphological And Lineament Mapping UsingRemote Sensing And Gis - A Tool For Land Use Planning In Tiruchchirappalli Districts Of Tamil Nadu.

[7] Blackburn, J. K., McNyset, K. M., Curtis, A., & Hugh-Jones, M. E. (2007). Modeling the geographicdistribution of Bacillus anthracis, the causative agent of anthrax disease, for the contiguous United States using predictive ecologic niche modeling
[8] Carstens, D., & Amer, R. (2019). Spatio-temporal analysis of urban changes and surface water quality.
[9] Chi, K. H., Park, N., & Lee, K. (2002). Identification of Landslide Area Using Remote Sensing Data andQuantitative Assessment of Landslide Hazard
[10] Choudhary, K., Boori, M. S., & Voz, V. (2015). Land use / cover disturbance due to tourism in Jesenı kyMountain, Czech Republic : A remote sensing and GIS based approach.
[11] Dewan, A. M., & Yamaguchi, Y. (2009). Land use and land cover change in Greater Dhaka,Bangladesh : Using remote sensing to promote sustainable urbanization.
[12] Estoque, R. C., & Murayama, Y. (2015). Classification and change detection of built-up lands from Landsat-7ETM + and Landsat-8 OLI / TIRS imageries : A comparative assessment of various spectral indices.
[13] Feyisa, G. L., Meilby, H., Fensholt, R., & Proud, S. R. (2014). Remote Sensing of Environment AutomatedWater Extraction Index : A new technique for surface water mapping using Landsat imagery.
[14] Hu, Q., Wu, W., Xia, T., Yu, Q., Yang, P., Li, Z., & Song, Q. (2013). Exploring the use of google earthimagery and object-based methods in land use/cover mapping.
[15] Iyappan, L., & Kasinatha Pandian, P. (2012). Fuzzy Logic based Selection of Potential Wind Farm Locationsin Mettupalayam Taluk , Tamil Nadu , India.
[16] Iyappan, L., & Pandian, P. K. (2012a). Identification of Potential Wind Farm Locations in TirumangalamTaluk using Geospatial Information Technology.