*IOSR Journal Of Humanities and Social Science (IOSR-JHSS)*
*Volume 30, Issue 9, Series 1 (September, 2025) 11-24*
*e-ISSN: 2279-0837, p-ISSN: 2279-0845.*
*www.iosrjournals.org*

# Land Utilization And Land Use Land Cover Of Shillong Urban Agglomeration: A Study Analysis Of 2000 To 2020, Shillong, Meghalaya, India.

Dr. Banbhalang Swer,
*Assistant Professor, Department Of Architecture, School Of Technology, North-Eastern Hill University, Shillong, India*

***Abstract:***
*Hill stations were developed by the British in colonised lands as settlements to make themselves comfortable. These hill stations were typically developed in areas that the British identified as similar to landscapes back home. Garrisons were established along with health sanatoriums, which helped in forming a retreat from the summer heat. The urbanscape of these hill stations reflected quaint British towns with anglicised names, wide avenues lined with trees similar to those found in Europe, meandering walks and trails, low population density, and large estates. Several hill stations also developed as educational towns where Catholic boarding schools were established. These areas were exclusive and often developed into being summer capitals with entire offices being moved there to avoid harsh Indian summers.*
*Such planning and architecture led to the development of a unique typology of settlements which had several points in common, such as high altitude locations (similarity to European landscapes), isolated and spacious estates with a large bungalow or manor, and a church with a Mall Road (promenade) with access allowed only for Europeans. Another distinguishing factor of these areas were that the settlements in the plains, commonly known as cantonments, were often rigidly planned in a grid pattern, while the hill stations were planned along the slope of the land and integrated into natural land-forms.*
*Shillong is the capital city of Meghalaya and is located at 25.57° N and 91.88° E. It lies in the Khasi hills in Meghalaya and is also the headquarters of the East Khasi Hills district. To the north of the state of Meghalaya lies the state of Assam and the plains of Bangladesh lie to the south.*

Date of Submission: 22-08-2025 Date of Acceptance: 02-09-2025

## I. Introduction

Shillong being a rapidly growing urban area, has experienced a rapid increase of in built up area and decrease in agricultural land, forest, recreation and vacant land. There has been vast changes in land use and land cover of Shillong in the years from 2006 to 2011(Khardewsaw, 2013). A brief account of the changes in land use/ land cover of Shillong from 2006 to 2011 is given below has been given below: Built up areas: Rapid expansion of Shillong into commercial center has led to rapid changes of land cover in Shillong. According to the land use map 2011, about 86.05 per cent of the total geographical area is under built up areas which increased from 76.95 per cent in 2006 and 39.19 per cent in 1966. This is due to construction of buildings for residence or for trade related purposes in the suburb of the city. As the city is growing, the commercial area of the city with its core in Barabazar and Policebazar has been found extending along the major roads due to lack of space. Forest lands: with the increase in population, urban expansions of Shillong has taken a heavy toll on the forest cover. Mining and other human activities have been 38 responsible for fragmentation, destruction and degradation of forest cover in the city. Localities like Kenches trace, Bishnupur, Lumparing, Nongthymmai, Madanryting, Laitkor and Rynjah have come up in clearing up of forest lands. Beside construction work is still going on, on the hill slopes of Lumapring, Upper Nongthymmai and Laitkor. In 1966, forest cover in Shillong was 32.71 per cent which decreased to 14.40 per cent in 2006 and 9.61 per cent in 2011.

Agricultural land: Shillong has also experienced gradual contraction of of cultivable land. Destruction of agricultural land for human habitation, construction of roads and offices has been dwindling fast. Many housing have come in the recent decades on agricultural land. The Urban area expansion leading to change of agricultural land into urban land and hence less agricultural activities available. Agricultural land in Shillong has decreased from 2.30 per cent in 1966 to 1.08 per cent in 2006 and 0.81 per cent in 2011. The decrease in agricultural land clearly shows a shift in the occupational structure of the city. The loss of agricultural land in the suburb has increased the cost of vegetation due to shortage of supply and extra transportation charges for carrying it from a longer distances to the city centre. The rapid depletion of agricultural land in Shillong is an issue to worried about. Thereby development needs to clearly monitored and controlled in order to ensure sustainability of urban

development. Recreation: Recreational land in Shillong is seen only in small patches in Golf link located in the eastern part of the city. Land use under recreation decreased from 1.51 per cent in 1966 to 1.01 per cent in 2006 and 0.76 per cent in 2011. Recreational land is seen to change very slightly compared to other land use categories.

Shillong has an average elevation of 1400-1900 m above mean sea level. The present site of Shillong is divided into five physiographic units, such as the northern slope of Shillong range (1900 M.S.L), the Umshirpi Valley, the Laitumkhrah – Mawkhar upland, the Umkhrah village and Umkhrah & Umshing river divide. The northern slope ofShillong range is now occupied by Nongthymmai, Motinagar, Malki, Lumparing & Laban. The Umshirpi is a narrow valley commonly known as Happy valley and is occupied by the cantonment area. The Laitumkhrah – Mawkhar upland is located between the Umkhrah & Umshirpi valleys. The Umkhrah valley is the lowest hieght (1400-1500m). This valley is wide and flat near the race course. Larger part of the city area falls with 50-100 slope. Happy valley, Pynthorumkhrah, Polo ground lies on the low relief hillocks. Northern & western peripheral development is on steep slope where the range is more than 150 which is unfavorable & uneconomical. Measurement and classification of Sediment

The study and analysis of the distribution of bedload in the selected river channel have been carried out by measuring each sample. An amount of 250 g of the collected samples was weighed with a precision balance, and their sizes were determined with the help of sieve mesh in the laboratory. With the help of Gradistat, the measured values were classified into different fractions based on their sizes using Wentworth's Scale. Given the objectives of the study or investigation, the grain size below 38μm was not considered. The samples collected were processed and analyzed using the methods mentioned in the methodology, and the results are discussed in the following paragraphs:

**Vacant land:**

The barren lands are the lands which remained unused throughout the year. These vacant lands are mainly found in the areas adjacent to the rivers. Those stretches of land which were earlier used for shifting cultivation are also included under vacant or fallow land. River banks which are seasonally submerged by overflow of water and cannot be used for any purposes is also kept under this category. It can be seen that vacant lands in Shillong decreased from 24.29 per cent in 1966 to 6.56 per cent in 2006 and 2.77 per cent in 2011. This is indicative of the situation that vacant lands have experienced a decline due to pressure of built up areas. Land values have gone very high in the middle of the town. Population tends to settle in those areas which are not suitable for residents which have led to the threat of human hazards in the city.

**Land Utilisation**

The land utilisation of Shillong Urban Agglomeration is classified as per Delhi NCR plan - builtup area, agriculture, forest, wate bodies and waste Land. So the tables in the following describes the Land Utilisation of Shillong and its agglomeration for the period from 1971, 1981,1991,2000,2003,2010,2016,2020.

**Land Use**

Land use classification as per Shillong master plan 1991-2011 is residential, commercial, industrial, institutional, administration, security, recreational, transportation, cultivation, forest, and open space but as per the Delhi master plan standards the classification changed to residential, commercial, industrial, Public & Semipublic, recreational, transportation, Forest.

Land use of Shillong Municipal Area.

**Table 1. 1: Landuse -1971 for Shillong Municipal Area.**

| 1971 | | |
|---|---|---|
| LAND USE | Area in Hectare | Percentage of total |
| Residential | 568 | 37 |
| Commercial | 28 | 3 |
| Recreational | 117 | 11 |
| Industrial | 12 | 1 |
| Transportation | 26 | 3 |
| PSP | 211 | 20 |
| Forest | 74 | 7 |
| **Total** | **1036** | **100** |

*Source: Dondor Giri Nongkhlaw, 2003*

The table 1.1 describes the Land Use classification of shillong Municipal Board of 1971 and the result drawn indicates that land use under residential and public and semi public comprises largest area ie 37% and 20% while commercial, indusrtial and recreational comprises of marginal areas.

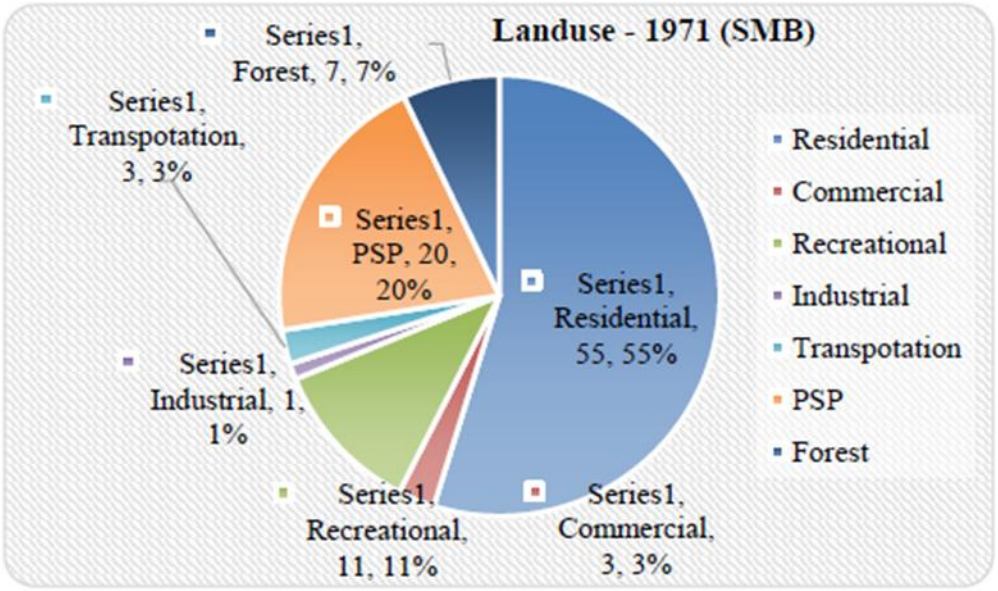



**Fig 1.1: Landuse -1971 for Shillong Municipal Area**

**Table 1. 2: Landuse -1981 for Shillong Municipal Area**

| Land uses | 1981 | |
|---|---|---|
| Area in Hectare | | Percentage of total |
| Residential | 470 | 38 |
| Commercial | 60 | 6 |
| Recreational | 55 | 5 |
| Industrial | 21 | 2 |
| Transportation | 59 | 6 |
| PSP | 310 | 30 |
| Forest | 61 | 6 |
| **Total** | **1036** | **100** |

*Source: Dondor Giri Nongkhlaw, 2003*

The table 1.2 describes the Land Use classification of shillong Municipal Board of 1981 and the result drawn indicates that land use under residential and public and semi public comprises largest area i.e 38% and 30% while commercial, indusrtial and recreational comprises of marginal areas. Areas for Recreational has slightly fell down from 11% in 1971 to 5% in 1981.

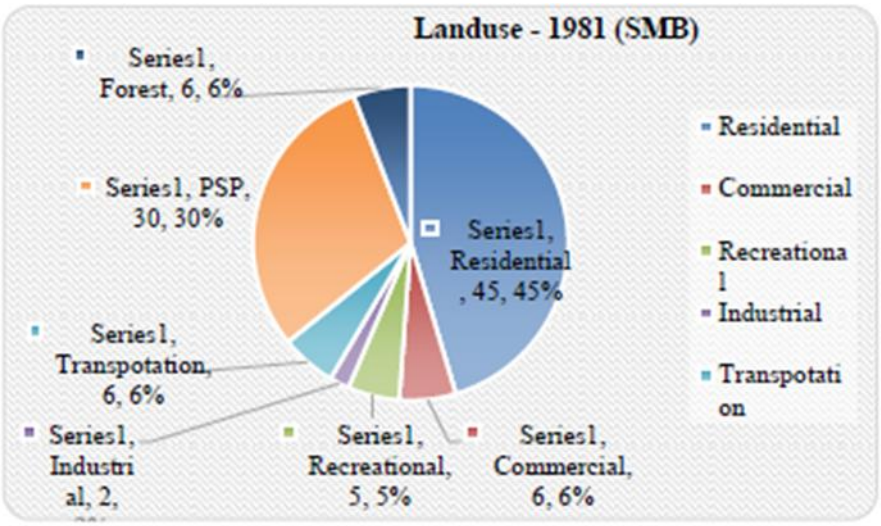



**Fig 1. 2: Landuse -1981 for Shillong Municipal Area**

**Table 1. 3: Landuse -1991 for Shillong Municipal Area**

| Land uses | 1991 | |
|---|---|---|
| Area in Hectare | Percentage of total | |
| Residential | 384 | 45 |
| Commercial | 79 | 8 |
| Recreational | 30 | 3 |
| Industrial | 38 | 4 |
| Transpotation | 73 | 7 |
| PSP | 387 | 36 |
| Forest | 45 | 4 |
| **Total** | **1036** | **100** |

*Source: Dondor Giri Nongkhlaw, 2003*

The table 1.3 describes the Land Use classification of shillong Municipal Board of 1991 and the result drawn indicates that land use under residential and public and semi public comprises largest area ie 45% and 36% while commercial, indusrtial and recreational comprises of marginal areas. Areas for Recreational has slightly fell down from 5% in 1981 to 3% in 1991.

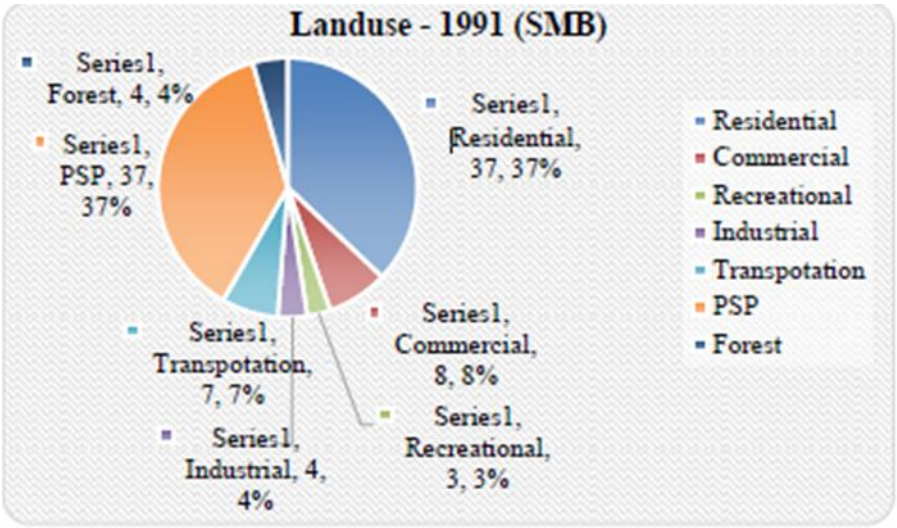



**Fig 1. 3: Landuse -1991 for Shillong Municipal Area**

**Table 1. 4: Landuse -2010 for Shillong Municipal Area**

| **Land uses** | **2010** | |
|---|---|---|
| **Area in Hectare** | **Percentage of total** | |
| Residential | 396 | 55 |
| Commercial | 95 | 9 |
| Recreational | 24 | 2 |
| Industrial | 40 | 4 |
| Transpotation | 91 | 9 |
| PSP | 372 | 37 |
| Forest | 17 | 2 |
| **Total** | **1035** | **100** |

*Source: Dondor Giri Nongkhlaw, 2003*

The table 1.4 describes the Land Use classification of shillong Municipal Board of 2010 and the result drawn indicates that land use under residential and public and semi public comprises largest area ie 55% and 37% while commercial, indusrtial and recreational comprises of marginal areas. Areas for Recreational has slightly fell down from 3% in 1991 to 2% in 2010 within the Shillong Municipal area.

Series1, Residential, 37, 37% Series1, Commercial, 8, 8% Series1, Recreational, 3, 3% Series1, Industrial, 4, 4% Series1, Transpotation, 7, 7% Series1, PSP, 37, 37% Series1, Forest, 4, 4% Landuse - 1991 (SMB) Residential Commercial Recreational Industrial Transpotation PSP Fores

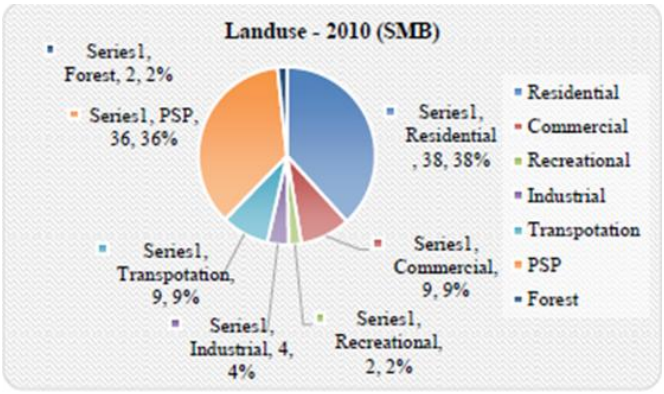



**Fig 1. 4: Landuse -2010 for Shillong Municipal Area**

**Table 1. 5: Comparison of Landuses from 1971 to 2010 (SMB)**

| Land uses as per Shillong master plan | Land uses | 1971 | | 1981 | | 1991 | | 2010 | | Change of land uses between 1971 and 2010 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Area in Hacter | Percentage of total | Area in Hacter | Percentage of total | Area in Hacter | Percentage of total | Area in Hacter | Percentage of total | |
| Residential | Residential | 568 | 37 | 470 | 38 | 384 | 45 | 397 | 55 | 10 |
| Commercial | Commercial | 28 | 3 | 60 | 6 | 79 | 8 | 95 | 9 | 1 |
| Recreational | Recreational | 117 | 11 | 55 | 5 | 30 | 3 | 24 | 2 | -1 |
| Industrial | Industrial | 12 | 1 | 21 | 2 | 38 | 4 | 40 | 4 | 0 |
| Transportation | Transportation | 26 | 3 | 59 | 6 | 73 | 7 | 91 | 9 | 2 |
| Institutional Administration | Public and Semi-Public | 211 | 20 | 310 | 30 | 387 | 37 | 372 | 36 | -1 |
| Forest | Forest | 74 | 7 | 61 | 6 | 45 | 4 | 17 | 2 | -2 |
| Total | | 1036 | 82 | 1036 | 93 | 1036 | 108 | 1036 | 117 | 9 |

*Source: Dondor Giri Nongkhlaw, 2003*

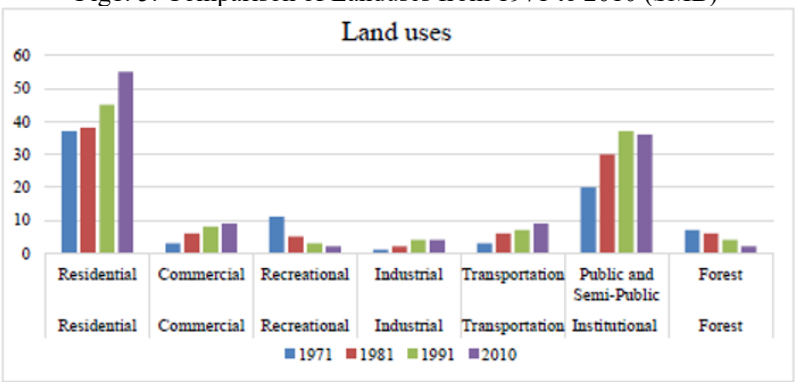
*Source: Dondor Giri Nongkhlaw, 2003*

The table 1.5 and Fig 1.5 which is a comparison table and figure from the year 1971 to 2010 of the Shillong Municipal areas describes the comparison of Land Use classification of shillong Municipal Board from 1971 to 2010 and the result drawn indicates that land use under residential and public and semi public has been increasing over the years, comprising the largest area ie 55% and 37% while commercial, indusrtial and recreational comprises of marginal areas. Areas for Recreational has slightly fell down from 3% in 1991 to 2% in 2010 within the Shillong Municipal area.

**Landuse/ Landcover classification of greater shillong planning area (GSPA)**

The Landuse /Landcover classification of the greater Shillong planning area(GSPA) have been develop through satellite imagery using Landsat 7 and Landsat 8 for the years 2000,2003,2016 and 2020. Table, figures and maps have been geo referenced , processed and the LU/LC have been generated and analysed. Following are the LU/LC Tables, figures and maps of the GSPA area. The classification has been generated upto 2 levels and the areas and percentage of the parameters been highlighted accordingly.

Fig1. 5: Comparison of Landuses from 1971 to 2010 (SMB)



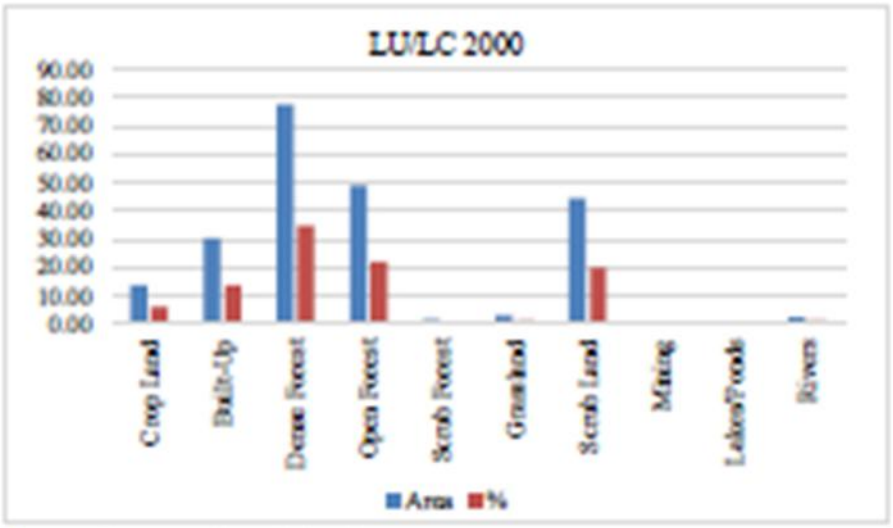

*Source: Dondor Giri Nongkhlaw, 2003*

**Table 1. 6: Landuse – 2000, Shillong Planning Area**
(Including Shillong municipal area)

| 2000 | | | |
|---|---|---|---|
| Level 1 | Level 2 | Area | % |
| Agricultural Land | Crop Land | 13.65 | 6.13 |
| Built Up | Built-Up | 30.39 | 13.65 |
| Forest Cover | Dense Forest | 77.64 | 34.87 |
| | Open Forest | 48.90 | 21.96 |
| | Scrub Forest | 1.54 | 0.69 |
| Others | Grassland | 2.98 | 1.34 |
| Waste Land | Scrub Land | 44.62 | 20.04 |
| | Mining | 0.39 | 0.17 |
| Water Bodies | Lakes/Ponds | 0.18 | 0.08 |
| | Rivers | 2.39 | 1.07 |
| | | 222.66 | 100.00 |

*Source:Primary data 2021-22*

Fig 1. 6: Landuse – 2000, Shillong Planning Area
(Including Shillong municipal area)




The table 1.6 describes the Land Use classification of Greater Shillong Planning Area(GSPA) of the year 2000 . The total Land coverage of the GSPA are is about 222.66 sq km and the result drawn indicates that land use under forest cover comprises the largest with 34.87% and 21.96% , waste land is next with 20.04%, then comes built up with 13.65% and agriculture with 6.13% . Land Use such as water bodies and others comprises of very marginal percentage which is 1.34% and 1.07% respectively.

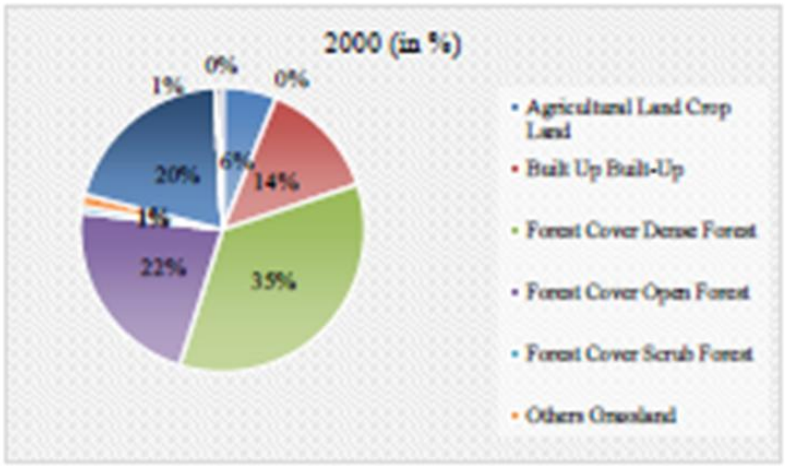



Fig 1. 7: Landuse – 2000, Shillong Planning Area
(Including Shillong municipal area)

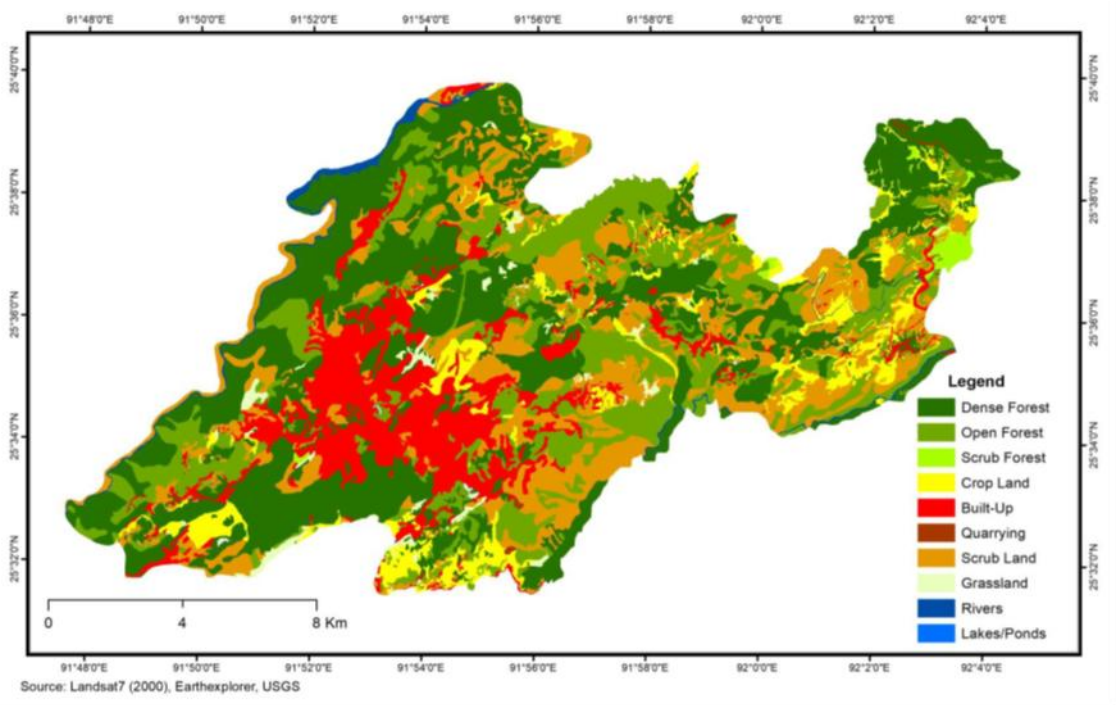



Fig: 1. 8 Land use /Land cover Map 2000 Researcher construct.

**Table 1. 7: Landuse – 2000 ,Shillong Planning Area**
(Including Shillong municipal area)

| 2003 | | | |
|---|---|---|---|
| **Level1** | **LULC** | **Area Km²** | **%** |
| Agricultural Land | Crop Land | 11.17 | 4.98 |
| Built Up | Built-Up | 43.58 | 19.43 |
| Forest Cover | Dense Forest | 80.38 | 35.84 |
| | Open Forest | 41.43 | 18.47 |
| | Scrub Forest | 17.54 | 7.82 |
| Others | Grassland | 3.65 | 1.63 |
| Waste Land | Scrub Land | 23.49 | 10.47 |
| | Mining | 0.62 | 0.28 |
| Water Bodies | Lakes/Ponds | 0.20 | 0.09 |
| | Rivers | 2.22 | 0.99 |
| | | 224.29 | 100.00 |

*Source:Primary data 2021-22*

Fig 1. 9: Landuse – 2003, Shillong Planning Area
(Including Shillong municipal area)

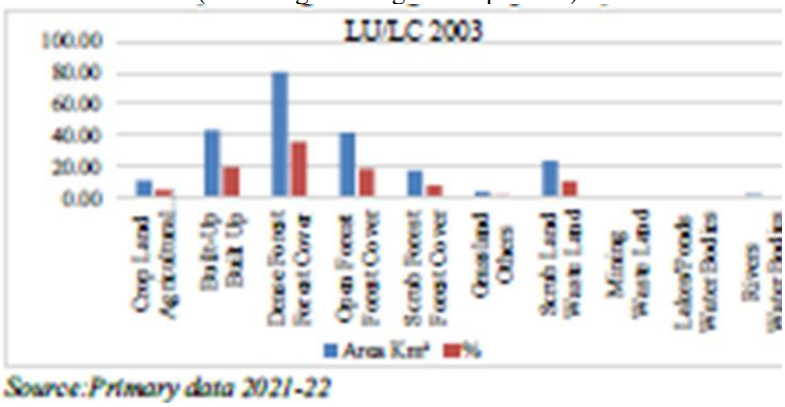
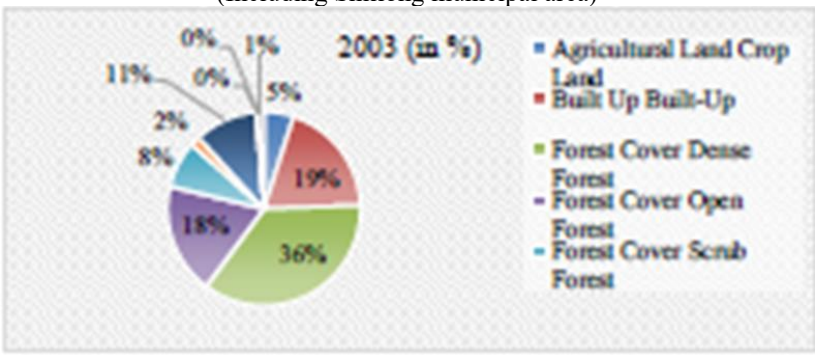



Fig 1. 10: Landuse – 2003, Shillong Planning Area
(Including Shillong municipal area)




The table 1.7 describes the Land Use classification of Greater Shillong Planning Area(GSPA) of the year 2003. The total Land coverage of the GSPA area is about 224.29 sq km and and the result drawn indicates that land use under forest cover still comprises the largest with 35.84% and areas under open forest have decreased from 21.96% in 2000 to 18.47 in 2003 , waste land has also reduced from 20.04% in 2000 to 10.47 in 2003 , Land under built up have increased from 13.65% in 2000 to 19.43 in 2003 and agricultural land with 6.13% in 2000 has decreased to 4.98% in 2003 . Land Use such as water bodies and others comprises of very marginal percentage which is 1.63% and 0.99 % respectively.these areas have also slightly increased and reduced at the same time compared to the data of the year 2000 which is 1.34% and 1.07% respectively.

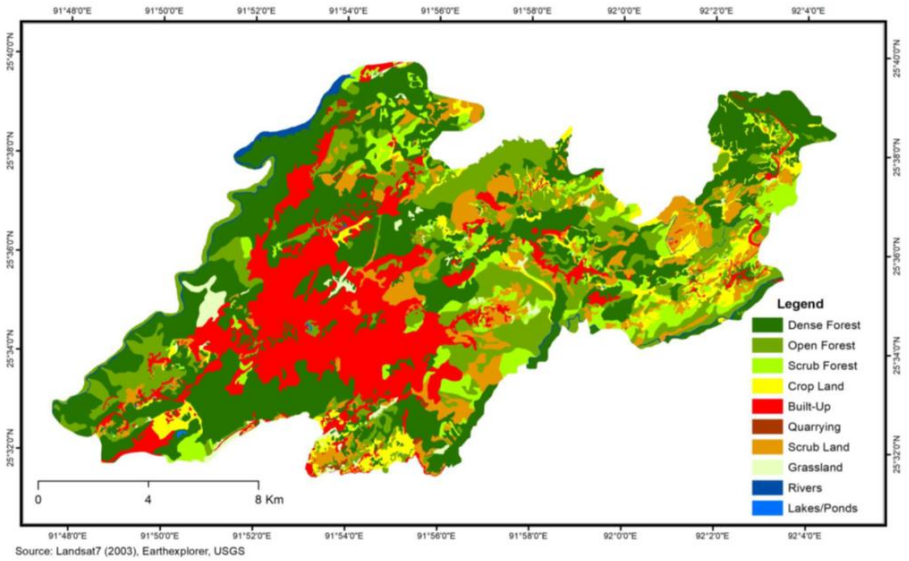
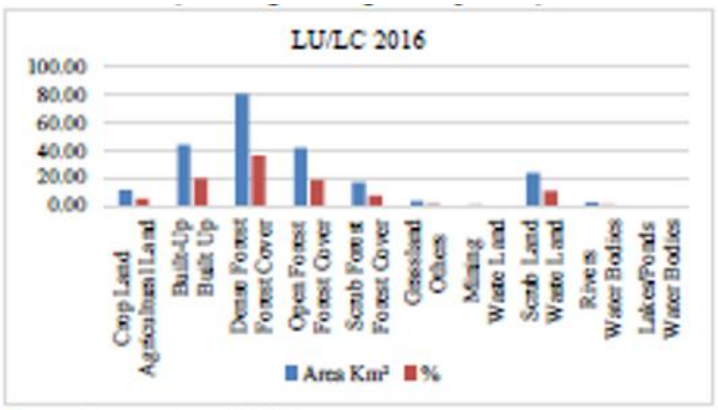



Fig: 1. 11 Land use /Land cover Map 2000 Researcher construct.

**Table 1. 8: Landuse – 2016, Shillong Planning Area**
(Including Shillong municipal area)

| 2016 | | | |
|---|---|---|---|
| **LULC Level1** | **LULC Level 2** | **Area Km²** | **%** |
| Agricultural Land | Crop Land | 11.20 | 5.00 |
| Built Up | Built-Up | 43.72 | 19.49 |
| Forest Cover | Dense Forest | 80.59 | 35.93 |
| | Open Forest | 41.96 | 18.71 |
| | Scrub Forest | 16.63 | 7.41 |
| Others | Grassland | 3.48 | 1.55 |
| Waste Land | Mining | 0.62 | 0.28 |
| | Scrub Land | 23.67 | 10.55 |
| Water Bodies | Rivers | 2.22 | 0.99 |
| | Lakes/Ponds | 0.20 | 0.09 |
| | | 224.29 | 100.00 |

*Source:Primary data 2021-22*




*Source:Primary data 2021-22*

Fig1.12: Landuse – 2016 ,Shillong Planning Area
(Including Shillong municipal area)

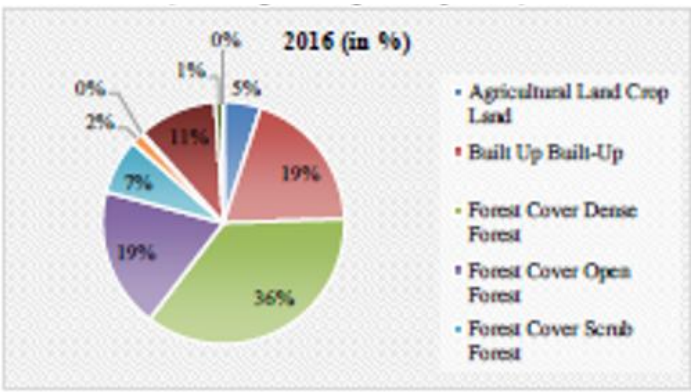



Fig1.13: Landuse – 2016 ,Shillong Planning Area
(Including Shillong municipal area)

The table 1.8 describes the Land Use classification of Greater Shillong Planning Area(GSPA) of the year 2016. The total Land coverage of the GSPA area is about 224.29 sq km and and the result drawn indicates that land use under forest cover still comprises the largest with 35.93% which has improved slightly compared to 35.84% in 2003, so also open forest has slightly improved from 18.47% in 2003 to 18.71% in 2016 , waste land has also slightly improved from 10.47% in 2003 to 10.55% in 2016 , Land under built up have further increased from 19.43% in 2003 to 19.49% in 2016 and agricultural land has also slightly improved from 4.98% in 2003 . to 5% in 2016 . Land Use such as water bodies and others comprises of very marginal percentage which is 1.55% and 0.99 % respectively.these areas have also slightly reduced compared to the data of the year 2000 which is 1.63% and 0.99% respectively .

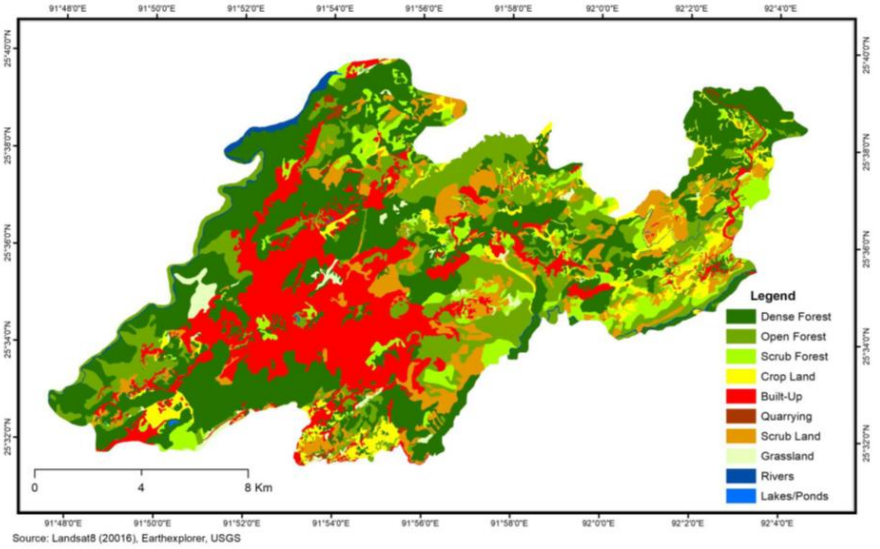


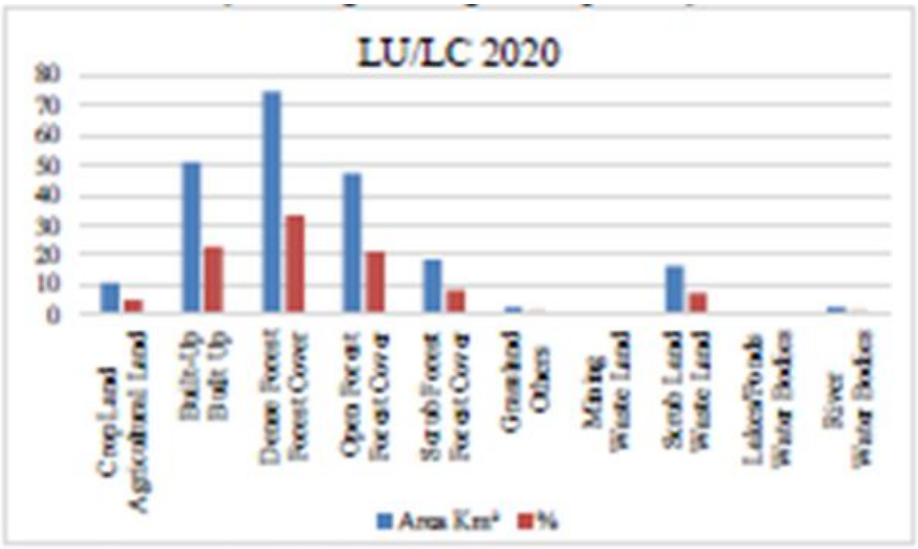

Fig: 1. 14 Land use /Land cover Map 2000 Researcher construct.

Table 1. 9: Landuse – 2020, Shillong Planning Area
(Including Shillong municipal area)

| 2020 | | | |
|---|---|---|---|
| **LULC Level1** | **LULC Level 2** | **Area Km²** | **%** |
| Agricultural Land | Crop Land | 10.53 | 4.69 |
| Built Up | Built-Up | 51.20 | 22.83 |
| Forest Cover | Dense Forest | 74.60 | 33.26 |
| | Open Forest | 47.34 | 21.11 |
| | Scrub Forest | 18.39 | 8.20 |
| Others | Grassland | 2.62 | 1.17 |
| Waste Land | Mining | 0.66 | 0.29 |
| | Scrub Land | 16.36 | 7.30 |
| Water Bodies | Lakes/Ponds | 0.18 | 0.08 |
| | River | 2.39 | 1.06 |
| | | 224.27 | 100.00 |

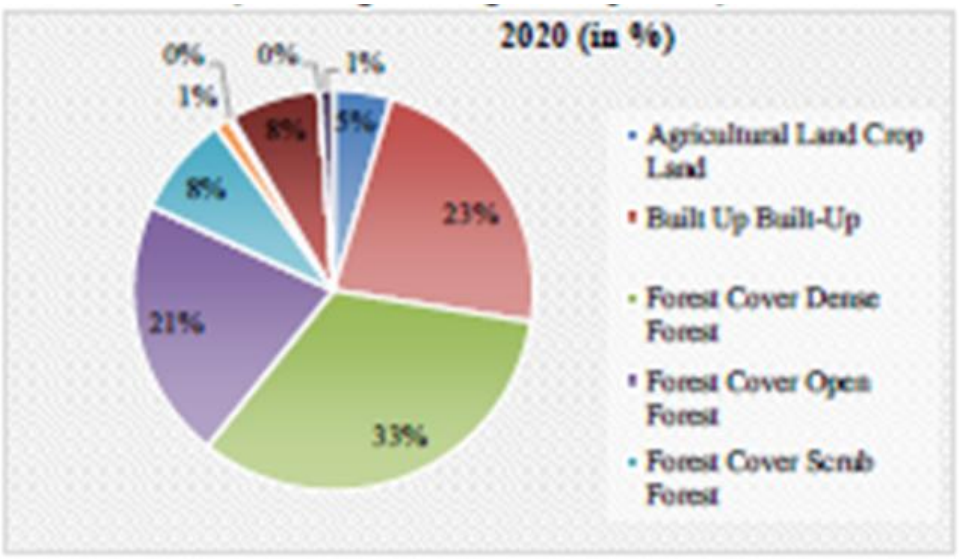
*Source:Primary data 2021-22*

The table 1.9 describes the Land Use classification of Greater Shillong Planning Area(GSPA) of the year 2020. The total Land coverage of the GSPA area is about 224.27 sq km and and the result drawn indicates that land use under forest cover still comprises the largest with 33.26% which has reduced compared to 35.93% in 2016, so also open forest has slightly improved from 18.71% in 2016 to 21.11% in 2020 , waste land has also reduced drastically from 10.55% in 2016 to 7.30% in 2020 , Land under built up have further increased from 19.49% in 2016 to 22.83% in 2020 mainly being the reason that the Expansion of the urban areas is noticable and people have started moving in this direction. Agricultural land has reduced from 5% in 2016 to 4.69% in 2020. Land Use such as water bodies and others comprises of very marginal percentage which is 1.17% and 1.06 % respectively.these areas have also slightly improved and reduced at the same time compared to the data of the year 2016 respectively.




*Source:Primary data 2021-22*

Fig1.15: Landuse – 2020, Shillong Planning Area
(Including Shillong municipal area)




*Source:Primary data 2021-22*

Fig1.16: Landuse – 2020, Shillong Planning Area
(Including Shillong municipal area)

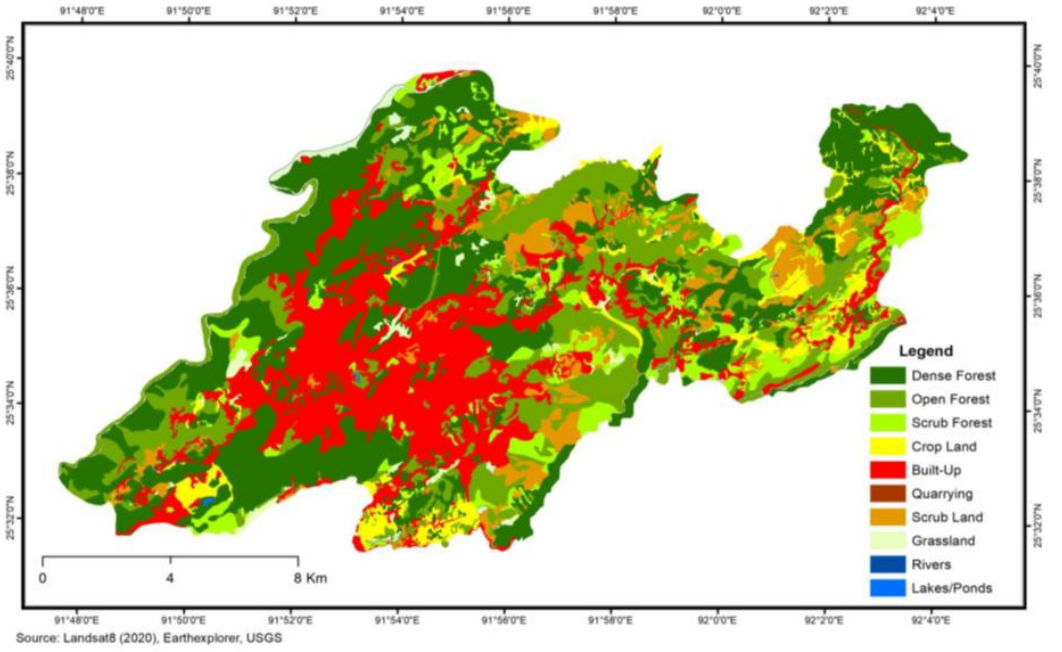



Fig: 1. 17 Land use / Land cover map 2020 Researcher construct

Table 1.10: comparison of Landuse : 2000 to 2020 for Greater Shillong Planning Area (Including Shillong municipal area)

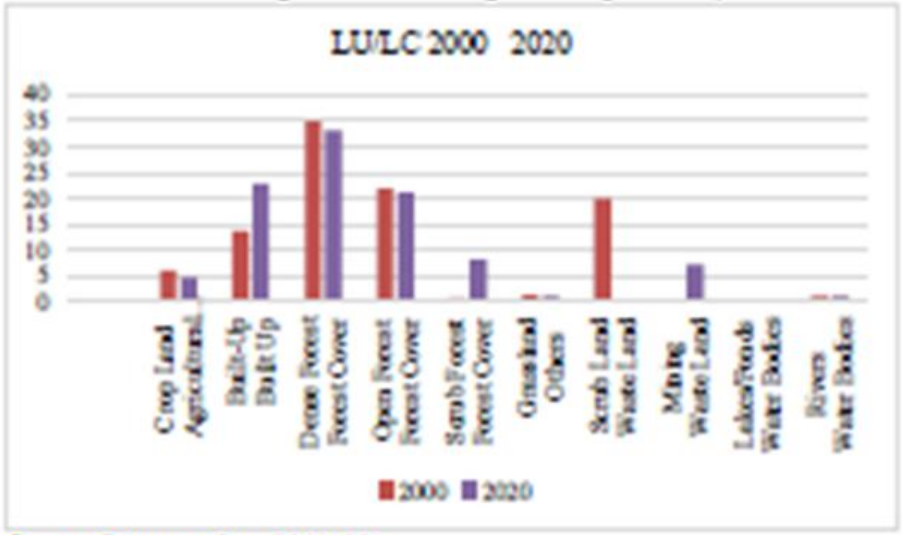
| 2000 - 2020 | | | | | | |
|---|---|---|---|---|---|---|
| **Level1** | **LULC** | **Sq Km** | **%** | **Sq Km** | **%** | **Change in land use from 2000-2020** |
| Agricultural Land | Crop Land | 13.65 | 6.13 | 10.53 | 4.69 | -1.44 |
| Built Up | Built-Up | 30.39 | 13.65 | 51.20 | 22.83 | 9.18 |
| Forest Cover | Dense Forest | 77.64 | 34.87 | 74.60 | 33.26 | -1.61 |
| | Open Forest | 48.90 | 21.96 | 47.34 | 21.11 | -0.85 |
| | Scrub Forest | 1.54 | 0.69 | 18.39 | 8.20 | 7.51 |
| Others | Grassland | 2.98 | 1.34 | 2.62 | 1.17 | -0.17 |
| Waste Land | Scrub Land | 44.62 | 20.04 | 0.66 | 0.29 | -19.74 |
| | Mining | 0.39 | 0.17 | 16.36 | 7.30 | 7.12 |
| Water Bodies | Lakes/Ponds | 0.18 | 0.08 | 0.18 | 0.08 | 0.00 |
| | Rivers | 2.39 | 1.07 | 2.39 | 1.06 | -0.01 |
| | | 222.66 | 100.00 | 224.27 | 100.00 | |

*Source: Primary data 2021-22*

The Table 1.10 clearly shows that between the period 2000 to 2020 we have witness a change in Land use where the Built Up area has increased by 2081 hectares other areas also has seen some change where in the year 2000 which was a Forest Cover has recently turn into a Scrub Forest, this may indicate that there has been certain areas where trees have been cut down and the area has been left open and also some development where certain land has drastically been converted into other uses as highlighted in the table where Waste Land has been

converted into Mining land and some rivers either converting into drains or nalas. Besides these changes there are also change in areas of same Land use wherein the area has been reduced for that particular use which is the same as per the year 2000 and 2020 such as the Agricultural Land, Forest , Grassland, Open Forest and scrub Land, the areas of these Land Use has been reduced as per the Table above indicating that the reduced area is either being use for other purpose.

Fig 1. 18 : comparison of Landuse : 2000 to 2020 for Greater Shillong Planning Area (Including Shillong municipal area)




*Source:Primary data 2021-22*

As per the Master Plan of Shillong 1991-2011, proposed land-use of Shillong has been evolved keeping in view the following objectives: integration of various area within the city and its region through linkage development, development of transport and communication network to discharge regional function efficiently and functional distribution of urban area in order to achieve efficient and proper utilization lands; harmonious relationship between various uses and activities; functional distribution of work centers, administrative and residential area for efficient functioning of activities; restoration and development of areas of natural beauty and historic importance etc.

Fig 1. 19 : Land Distribution : 2000 Shillong Agglomeration Area (Including Shillong municipal area)

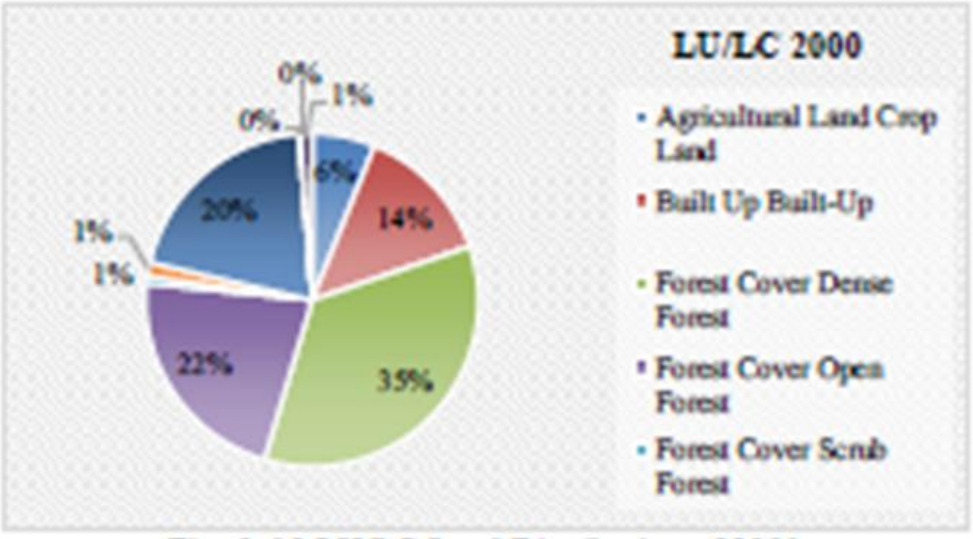
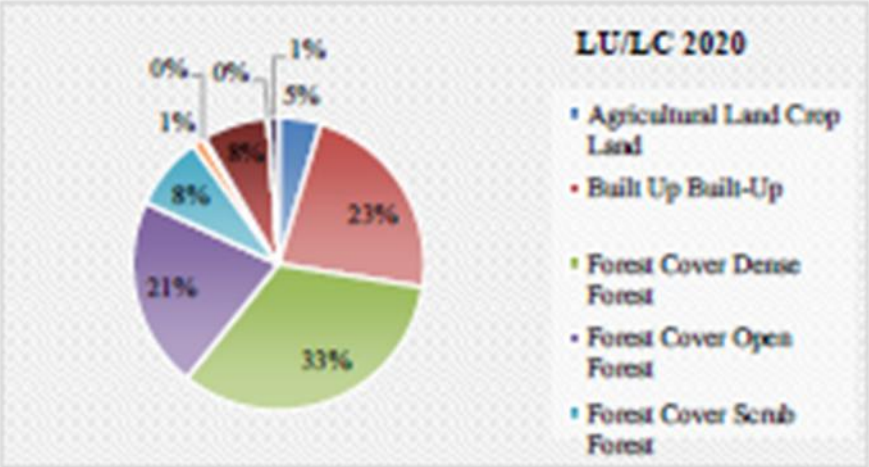


Fig 1. 20 : Land Distribution : 2020 Shillong Agglomeration Area
(Including Shillong municipal area)




The basic considerations that have been kept in view, while deciding the land-use pattern, relate to: development of regional/ wholesale market centers to relieve congestion; provide local shopping centers; development of administrative area to accommodate Central, State, District and local level offices; provision for proper circulation pattern; demarcation of land for industrial purposes: integrated provision of infrastructure; amenities and services and to ensure proper urban environment by improving slums; preserve the catchments area and the overall environment of the city.

## II. Conclusion:

This analyses of land utilization of Shillong planning area right from the year 1971 to 2020-21 shows the comparison of 1971 – 2010 and the comparison of the kind of land utilization of 2000-2020 to 21. In doing so we can understand the type of land use land cover and also be able to predict or recommend the kind of development in future as per the availability of land its suitability.

## References:

[1]. Urban Sprawl And Future Growth Projection Vis-À-Vis Groundwater Resource Availability In Hill Township In Shillong (Meghalaya), India By Arvind Chandra Pandey, Sudipta Hansda, Navneet Kumar

[2]. An Assessment Of The Geomorphodiversity And Land Use/Cover Change (LUCC) Effects Associated With Landslides In Meghalaya, India. Navdeep Agrawal, Jagabandhu Dixit First Published: 21 January 2024, Https://Doi.Org/10.1002/Esp.5769