"LAND USE CHARACTER IN URBAN PERIPHERY. . A CASE STUDY AT MIDNAPORE MUNICIPALITY"

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ABSTRACT

Urban periphery means the edge or outskirts of a city or urban area. There is a strong contrast of land use between the urban core and the periphery. There is some markable character in land use with some problems. If the land use of urban periphery will be sustainable it will consume a maximum part of problems in a city region.

KEYWORDS: Urban Periphery, Environmental degradation, Detour Index, C.R. Density.

INTRODUCTION :

Urban periphery means the edge or outskirts, as of a city or urban area. In the incensement of urban area periphery zones are increase rapidly. There is a strong contrast between the inner 'urban' core and the rural, in terms of housing conditions, accessibility and lifestyle. It is the outer flow of population which resulted in scattered settlement around the urban centers. The periphery zone could be regarded simply as a zone of transition, but the differences between urban centers and their immediate surroundings.

Urban periphery zone is played a vital role to consume the population pressure of a city. In our country Urban Periphery Zone develops quite unplanned. That is for why lot of problems is arrived. One of the most important problems is land use. But a proper land use can solve to full fill the basic needs of the population of a zone and also it can able to protect the environmental degradation. So we can say that a proper land use planning on an urban periphery region will be the Sustainable Development of a city region.

LITERATURE REVIEW

This Environmental Research Project is the review of various studies related to the Urban Periphery Region. There are a huge number of literatures on the selected topic. From the text book of K. Siddhartha & S. Mukurjee – Cities Urbanisation and Urban System, S.Ghosh – Introduction to Settlement Geography we can understand the basic concept of urban area, urban periphery region and the others component of an urban system. Changing Land Use On The Peripherya Case Study Of Urban Agriculture And Food Gardening In Orange Farm - Robin Richards Sue Taylor studied to know Urban periphery region. This region is a dynamic region, the land use characteristics is being changed within few years. As the change of the nature of land, consequences are growth as its way.

Studied various research journals as Land-Use Dynamics of Peri-Urban Areas of Metropolitan Cities with Special Focus on Delhi - Nanda Dulal Das**,** An application of Remote Sensing and GIS to Analyze Urban Expansion and Land use Land cover change of Midnapore Municipality, WB, India Dolui Gour, Das Soumen and Satpathy Sujan, Morphological Analysis of a Historical Urban Landscape: The Case of Midnapore, an Early Urban Centre of Eastern India - Koushik Mandal, Soumendu Chatterjee and Nilanjana Das Chatterjee etc to measure and impact of land use change in human and entire environment. Studied Remote Sensing

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and GIS –B. Bhat and Vidyasagar University Study Meterial(DDE-Geography and Environment Management – Module – 18) to know the changing dimension of land use by the use of RS & GIS techniques **.**

The Study Area

*M*idnapore is the district headquarters of Paschim Medinipur district of the Indian state of West Bengal. It is situated on the banks of the Kangsabati River (variously known as Kasai and Cossye). Latitudinal and Longitudinal Coordinates: 22.424°N 87.319°E (Fig-1).

Midnapore Municipality was constituted in the year 1865**.** The name of the town was recorded as an important port of Sarkar Jaleswar (Medinipur, Chakal, Bardhaman and Chetua) in Ain-e-Akbori and Medinipur was established and named after Medinikar (from 1200 to 1431 A.D.), the famous author of the lexicon 'Medinikosh'. The town Midnapore stretches over an area of 20.02 Sq. Km. It is bounded by Abhas in north, river Cossey in the south, pilgrim road (since converted to N.H.-60) in the east and Rangamati in the west. Midnapore urban area is mainly developed as an administrative, commercial, and educational centre along with agricultural activities, and different types of informal activities. In Midnapore municipality there is no such of larger industry. Some medium (Spean Mill) is developed at west side of this city region.

Collectorate More, LIC More, Rabindra Nagar, Razabazar, Battala, School Bazar, BoroBazar is the core area of the town, and its periphery region is developed around this CBD. Ward no 4, 24, 25 is the part of town's periphery zone.
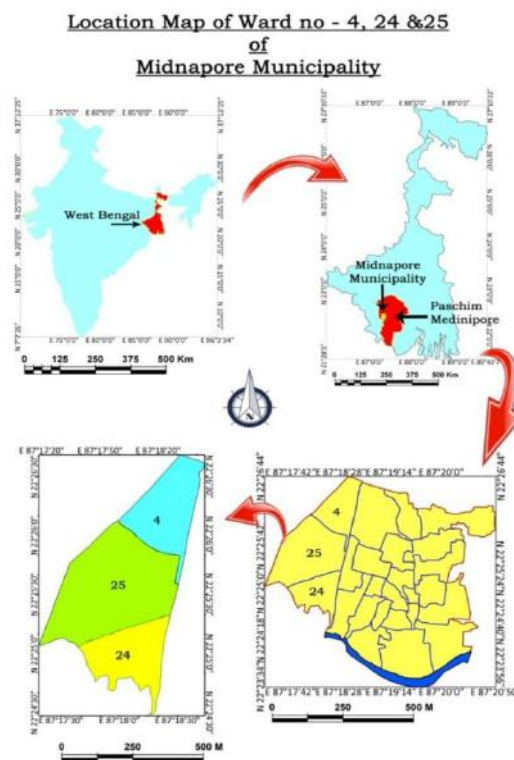

Location Map of Ward no - 4, 24 &25
of
Midnapore Municipality

Fig - 1

OBJECTIVES OF THE STUDY

*Th*e objectives of the study are –

- Find out the problems of urban periphery region.
- Understand the land use pattern of an urban periphery region.
- To develop a land use model.
- And finally to understand the way how to make ensure the sustainable development of an urban area.

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METHODOLOGY

*F*or this Environmental Research Project the following steps are used as methodology –
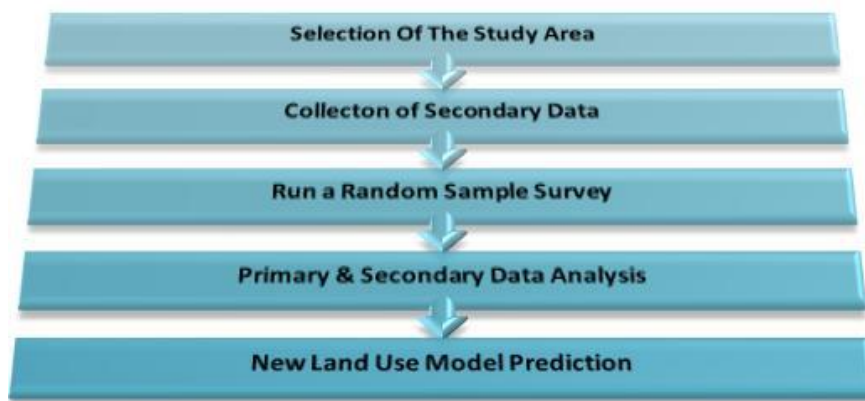
Fig – 2

The sources of secondary data are Medinipur Municipality, office of the Chef Medical Officer of Health (CMOH) – Paschim Medinipur Dist., Office of The S.P. For this project work I mainly collect recent land use data, Waste related data, drinking water supply volume, medical related data, transportation, no of accident etc. And LISS III satellite data.

I run a Random sample survey on selected ward to collect – the actual volume of water which is need per day of a family, inter houses distance, and arability of emergency services. The sample survey covers 7% population of each ward.

For the prediction of new land use model I conceder some parameter as Greenery coverage, inter house distance, transportation system, garbage disposal system, health services, availability of drinking water etc.

Demographic Character of Midnapore Municipality and Study Area

Population Growth of Midnapore Municipality

Year	Population
1931	32021
1941	43171
1951	45474
1961	59532
1971	71326
1981	94424
1991	125098
2001	149768
2011	169127

The graph shows: $y = 1770.x - 3E+06$, $R^2 = 0.947$
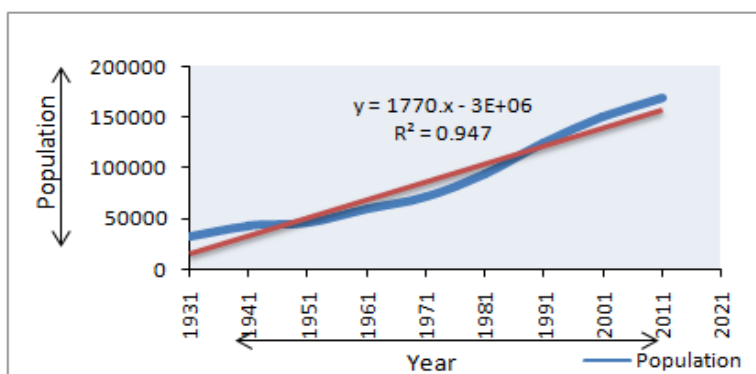
*Source –Midnapore Municipality   **Fig - 3**

Population Density of Midnapore Municipality & Study Area, Census – 2011

Ward No.	Area (Km2)	Total Population	Male	Female	S.C. Population	S.T Population	Density (Population/Km2)
4	1.12	7312	3688	3624	1118	1081	6528
24	0.989	8910	4597	4313	978	192	9009
25	2.413	7732	3968	3764	761	390	3204
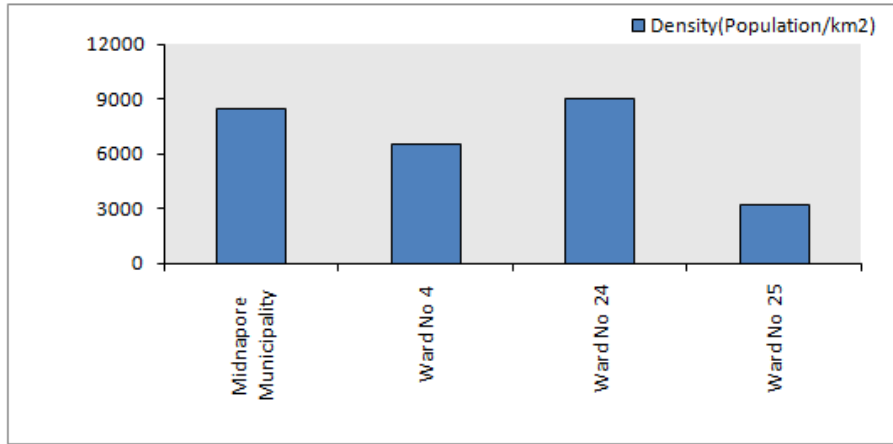
Fig - 4

Area	Density(Population/km2)
Midnapore Municipality	8447
Ward No 4	6528
Ward No 24	897
Ward No 25	344

*I*n the year 2014 the Midnapore Municipality ward boundary was reorganized. And now the total number of wards is 25.

The area of ward no 4, 24, 25 occupies 1.12, 9.93, 2.14 km2 correspondently, and the population density is 6528, 897, 344 persons per km2. Where the average population density of Midnapore municipality is 8447.

Midnapore Municipality population growth has more diversity. In the year 1931 and 1941 total number of population pick was over liner line of growth. It's reduced from the year of 1951 and it's continued still 1991. After 2001 it's again cross the linear line of population growth. Population of the city has increased by 13% in last 10 years. In 2001 census total population here were about 1.5 lakh. Female population growth rate of the city is 15% which is 3.9% higher than male population growth rate of 11.1%. General caste population has increased by 12.3%; Schedule caste population has increased by 18.6%; Schedule Tribe population has increased by 21.4% and child population has decreased by -2.2% in the city since last census.

In the case of town, among the total population about 85 thousand (50%) are male and about 84 thousand (50%) are female. Ward no – 4 has 3688 male, 3624 female, ward no – 24 has 4597 male 4313 female and ward no – 25 has 3968 male 3764 female.

Land Use Character of Midnapore Municipality and Study Area

Area Under Various Type of Land Use at Midnapore Municipality on 1991	
Land Use Type	Area (Hectares)
Water Body	38.59
Vegetation Coverage	595.34
Fellow Land	222.61
Settlement	610
Fellow Land	334.2

Fig - 5

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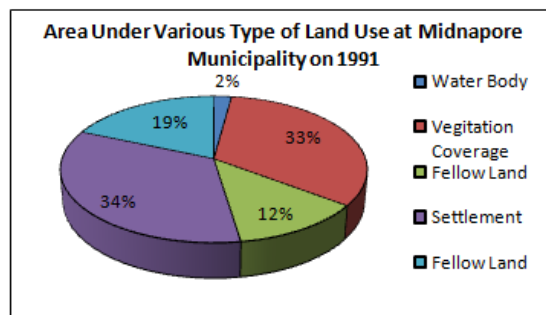
Area Under Various Type of Land Use at Midnapore Municipality on 2001	
Land Use Type	Area (Hectares)
Water Body	37.52
Vegetation Coverage	399.13
Fellow Land	288.78
Settlement	797
Fellow land	288.8
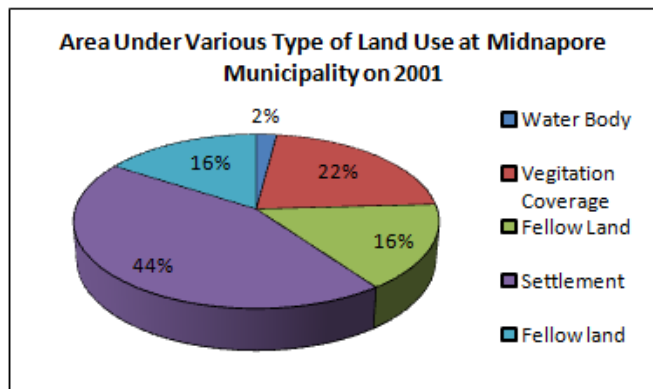
Fig - 6

Area Under Various Type of Land Use at Midnapore Municipality on 2011	
Land Use Type	Area (Hectares)
Water Body	30.97
Vegetation Coverage	307.26
Fellow Land	288.78
Settlement	1051
Fellow land	255.5
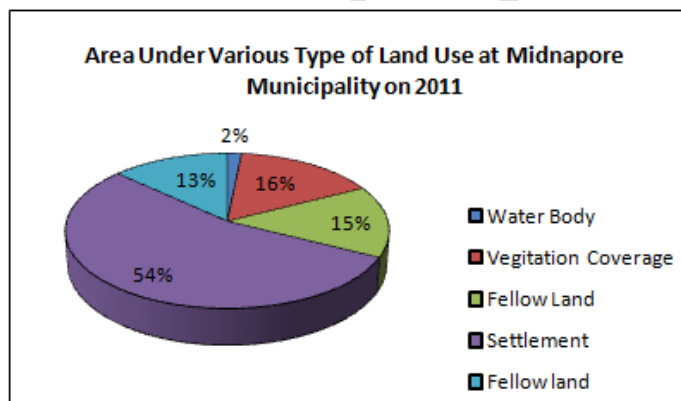
Fig - 7

Temporal Change Of Land Use Pattern At Midnapore Municipality			
Land Use Type	1991 (Area in Hectares)	2001 (Area in Hectares)	2011 (Area in Hectares)
Water Body	38.59	37.52	30.97
Vegetation Coverage	595.34	399.13	307.26
Fellow Land	222.61	288.78	288.78
Settlement	610	797	1051
Fellow Land	334.2	288.8	255.5

Fig – 8
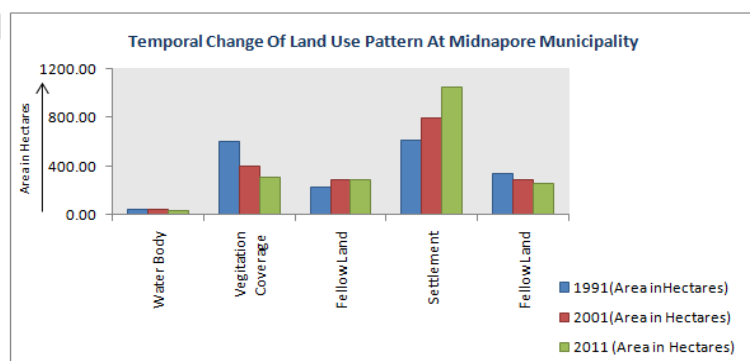
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Fig 5 to 8 Source - "An application of Remote Sensing and GIS to Analyze Urban Expansion and Land use Land cover change of Midnapore Municipality, WB, India - Dolui Gour, Das Soumen and Satpathy Sujan)
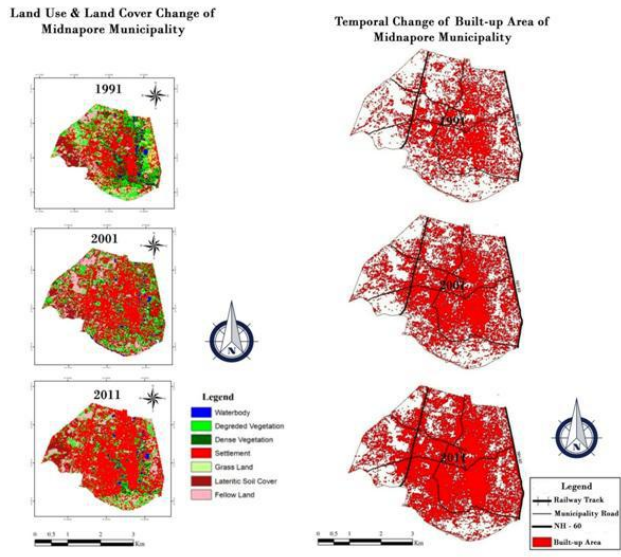

Fig – 9(Source - "An application of Remote Sensing and GIS to Analyze Urban Expansion and Land use Land cover change of Midnapore Municipality, WB, India - Dolui Gour, Das Soumen and Satpathy Sujan)
Fig - 10(Source - Source - "An application of Remote Sensing and GIS to Analyze Urban Expansion and Land use Land cover change of Midnapore Municipality, WB, India "-Dolui Gour, Das Soumen and Satpathy Sujan)

*T*he settlement area as well as vegetation cover area has been significant change from 1991 to 2011 (fig – 9) area has been increased by 72.35%, vegetation decreased by 48.39%. There are so many reasons behind the expansion of built-up area. Midnapore is one of the important centers for educational institutions and administrative services. That is for why a large number of people migrated in this area. Due to this migration some new 'para' or colony is developed at the peripheral region of Midnapore Municipality. As Golapi Chak, Tantigariya, etc. and extant its area. As another city Medinipur Municipality extending its area with some phases. The last three extending phases is like that - In 1991, the settlement area of Midnapore municipality area was 14. 76 square km with 125498 number of population. In the year 2001 population of the municipality increase 149769 (19.34%) and the area also widened along with the increase of the population, the total settlement area was 796.88 (30.64%) hectares. During 2001-2011 again the city showed a marginal growth of population as well as area. The settlement area is 1051.29 (31.92%) and the population is 169127 (12.92%). (Fig – 11)

Fig – 11

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In census year 2011 the western part was divided into two wards (20, 21), after the reorganization of ward boundary in 2013 that part become ward no 4, 24 and 25. The recent land use character like that –

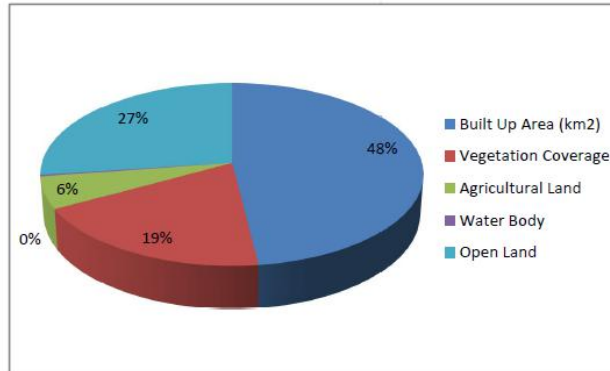|	
Built Up Area (km2)	2.29
Vegetation Coverage(km2)	0.901
Agricultural Land(km2)	0.27
Water Body(km2)	0.013
Open Land(km2)	1.291

Fig – 12

Land Use Map
Of
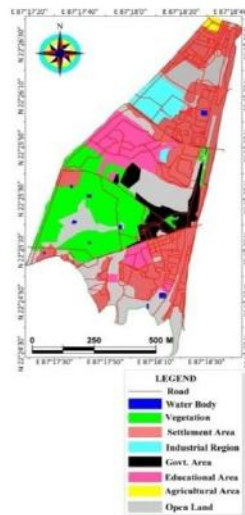Midnapore Municipality, Ward No. - 4, 24, 25

Fig – 13

From the above scenario (Fig -13), maximum land is used for infrastructural development as house, factory, and road. Although some outer part of ward no 25 has maximum coverage of greenery. Its occupy 19% area of this periphery zone. The most interesting factor is that the amount of open land, it's near about 27 %. And the outer part of ward no 4, there is some agricultural land, it's mainly developed for local vegetable demand. This area suffers for lack of surface water. Because in this region the amount of water bodies is too low.

In that study area (ward number – 4, 24, 25) there is some character, as an urban periphery. Those are -

Transport Scenario

In this periphery area main connecting roads are Vidyasagar University Road, Birla road, Dak Banglo Road, Station Road, and Dhaurua - Midnapore Road. Among those Dhaurua - Midnapore Road is state way,

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and the other roads are under Midnapore Municipality. Those connecting roads connected each ward with the city centre (CBD). (Fig – 15 and, 16)

Wards settlements area is connected with some sub roads. In this periphery area internal transport system is developed by Auto and Toto, in previous this transportation system mainly dependent on "Rickshaw". Connecting roads are Auto, Toto accessible, but the sub roads are not. In that case cycle and bike is the vehicles as transportation medium for the inhabitance.
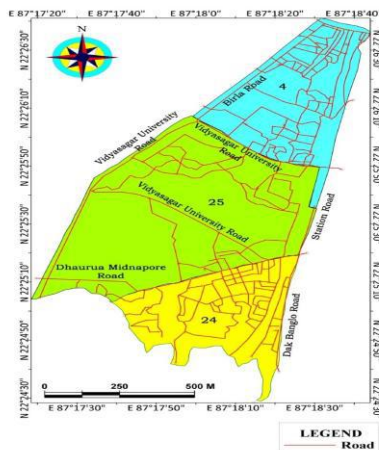
The average wide of roads is as bellow –

Table - Average Wide of Roads in Ward No 4, 24, 25
(Based on Sample Survey – 2018)

Road	Wide (in fit)
Linking Roads	15
Su-Roads	10
Foot accessible Roads	3.5
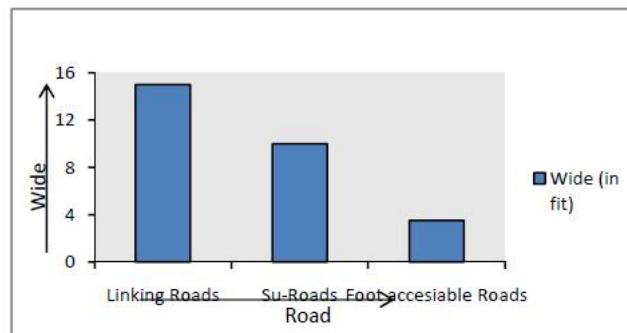
Fig – 14

Fig – 15
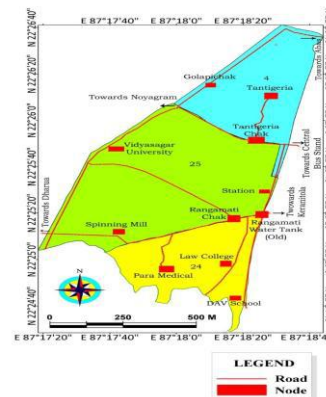
Fig – 16

Accessibility Measurement-

The straight routes between two places or direct routes (also known as 'desire line') are the routes, which travelers used to follow because of their shortest distance. But straight routes are, however, seldom to be found in reality; even the most direct route in practice deviates from straight line. This type of deflection is very common due to physical obstacles. Such deviations can be measured by the detour index where:

Detour index= actual route distance/ straight line distance × 100

In other words, the detour index is the actual journey distance calculated as a percentage of the desire line distance.

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Sl. No.	Node	Coordination		Linear Length (m)	Linear Length (km)	Actual Length (m)	Actual Length (km)	Detour Index (Actual Distance/Linear Distance *100)
		Latitude (N)	Longitude (E)					
1	Railway Station (Base Station)	22.424881	87.307672	0	0	0	0	0
2	Golapichak	22.441508	87.307265	1497.745	1.49	1818.59	1.81	121.42
3	Tantigeria	22.43532	87.309454	1260.385	1.26	1468.92	1.47	116.55
4	Tantigeria Chak	22.43051	87.308049	685.652	0.69	870.61	0.87	126.98
5	Vidyasagar University	22.431403	87.295324	1463.098	1.47	2189.24	2.19	149.63
6	Para Medical	22.41658	87.298869	1374.09	1.37	1596.32	1.60	116.17
7	Spinning Mill	22.419893	87.294771	1421.55	1.42	1740.69	1.74	122.45
8	Rangamati chak	22.42147	87.30507	485.04	0.49	579.7	0.58	119.52
9	Law College	22.416322	87.304877	1024.13	1.02	1096.99	1.10	107.11
10	DAV School	22.410927	87.305446	1442.63	1.44	1494.74	1.49	103.61
11	Rangamati Water Tank(Old)	22.42196	87.30715	289.53	0.29	290.41	0.29	100.30

Transport Accessibility of Midnapore Municipality, Ward No – 4, 24, 25
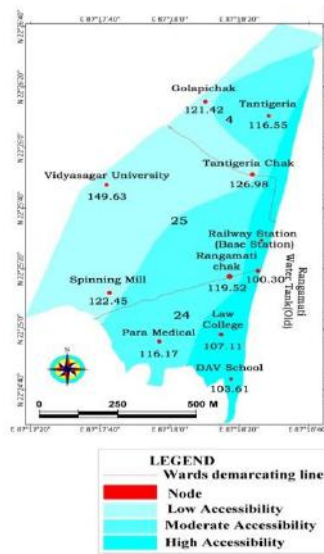
Fig - 17

From these accessibility measurement techniques it is shown that, the accessibility is gating loose with the increase of distance from Base Station (railway Station). Ward no 4 and 24 has much better accessibility than ward no 25; Maximum area of that ward has not so good accessibility.

Waste Management Scenario

*W*aste management or waste disposal is all the activities and actions required to manage waste from its inception to its final disposal. This includes amongst other things collection, transport, treatment and disposal of waste together with monitoring and regulation.

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Waste can take any form that is either solid, liquid, or gas and each have different methods of disposal and management. Waste management normally deals with all types of waste whether it was created in forms that are industrial, biological, household, and special cases where it may pose a threat to human health. So it is very much important for the inhabitance.

In the study area the waste management system is like that-

- *Liquid Waste Management :*

In this periphery area two types of liquid waste out flow drain are available. One is "Kancha Drain" and the one is "Pakka Drain". (Fig – 18)

Garbage Disposal System (Drain) Map of Midnapore Municipality Ward No - 4, 24, 25
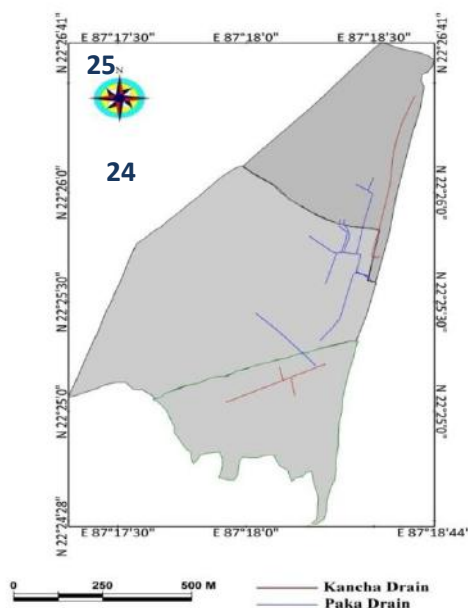
Fig – 18

Measurement:

Ward No	Length of The Drain (m)	Length of The Drain (Km)	Total Area(km2)	C.R Density (Length of the Drain/Total Area)
4	1754.47	1.75	1.12	1.57
25	2097.46	2.10	2.413	0.87
24	1291.16	1.29	0.989	1.31

For the case of liquid waste out flow system(C R Density) is very low at ward no 25. And the other two wards C.R Density is little good than ward no 25.

- *Solid Waste Management :*

In this periphery area the solid waste management system is too poor. From sample survey – 2018, inhabitance poled that there is no such of Solid Waste Management activity provided by Midnipore Municipality. People are thrown out their domestic solid waste in open area.

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In Medinipore Municipality there is only one Land fill site at Dharma, Lal Dighi. That landfill area occupies 6.38 acres, and expected capacity 70 MT. It is used science 1975. This landfill site already filled 70% of its capacity.

Vegetation Area Coverage

In an urban periphery one of the most significant characters is rapid lose of vegetation coverage area, due to unplanned and high growth of settlement and other infrastructure.

The total area of this periphery region is 4.25 km2, and the vegetation coverage land is only 0.901 km2. Maximum vegetation coverage area is located at ward no 25. Others wards has too poor vegetation coverage. Maximum vegetations are planted and scattered. (Fig – 19)
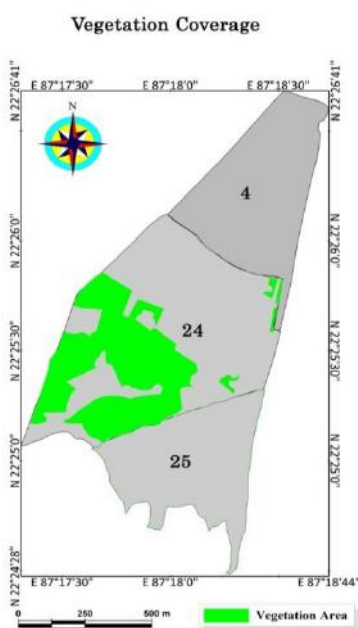

Fig – 19

Health Service Scenario

WHO's Observation –"Better housing and living conditions, access to safe water and good sanitation, efficient waste management systems, safer working environments and neighborhoods, food security, and access to services like education, health, welfare, public transportation and child care are examples of social determinants of health that can be addressed through good urban governance."

In Midnapore Municipality the UPHC (Urban Primary Health Center) Scheme is run by Central Government of India. On this scheme 3 health centers are developed at ward no – 16, 23, 2. (Fig – 20)

Health Center Name	Ward No	Employee				
		Medical Officer	Staff Nurse	Lab Technician	Lower Divisional Clark	Group D Stuff
Berballavpur Health Center	16	2	1(One post Vacant)	1	1	1
Sharathpalli Health Center	23	2	2	1	1	1
Kuikotha Health Center	2	2	2	1	1	1

- Source – CMOH, Paschim Medinipur Dist.

(Fig – 20)

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But there is no health centre at this periphery region. Peoples depend on local doctors. If they need to admit or better medical treatment they have to go Midnapore Medical College and Hospital, Christen Missionary Hospital located at Khayerrulyachak, or Rangamati Vidyasagar Institute of Health which is known as Para Medical.

Housing Scenario

*S*ize and spacing of buildings are important concern of urban periphery. A good space between inter house, can make sure the good environment and emergency services. Inter house spacing is well maintained in Indo – European housing culture. But this spacing is too poor in old Indian town, as they are developed by Old Indo housing Culture.

In Midnapore urban centre, the entire urban areas are not spacing plan fully. The average spacing between the buildings is less than 1m*.. Some residential place of Midnapore Municipality as Sarat Palli, Bidhannagar, Rabindranagar, Mitra compound, the spacing between the buildings are is greater than 1m, ti is the residential zone of high and moderate class people, and from the city centre outwards region towards Dharma the average spacing between and among the buildings increases rapidly. The amount is >1.5m..*

As Dharma periphery, ward no 4, 24, 25 inter house spacing is less than 1.5.(Fig – 21) At some "para" as Rangamati Goila Para, inner part of Tantigariya the spacing is less than 0.5 m. in that case those regions are in risk. Because of the some diseases as Cholera, viral flue will spread, beside that in those regions the hazard and disaster rescue operation will not be conduct properly.
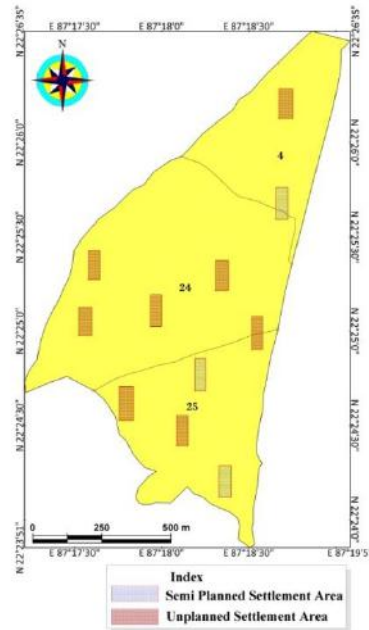

Fig – 21

* *Morphological Analysis of a Historical Urban Landscape: The Case of Midnapore, an Early Urban Centre of Eastern India - Koushik Mandal, Soumendu Chatterjee and Nilanjana Das Chatterjee.*

WATER BODIES

*W*ater bodies are the important component to consume some pollutant. The local atmosphere of an urban area is highly injurious to health, because the presence of some poisonous gases. Water bodies can able to consume the aerosol and carbon particles.

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In that urban periphery region, unorganized and unlawful human activities are responsible to reduced water bodies.

The area of water bodies is like that –

Ward No.	Total Area(km2)	Water Body Area (m2)	Water Body Area (km2)	Density(km2)
4	1.12	3314	0.0033	9.95775E-07
24	0.989	7264	0.0073	1.00496E-06
25	2.413	2552	0.0026	1.01881E-06

Fig – 22

Water Body Coverage

Fig – 23
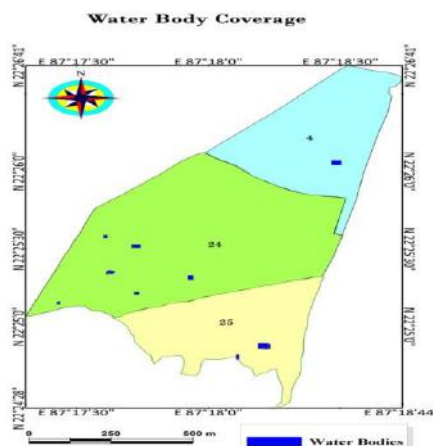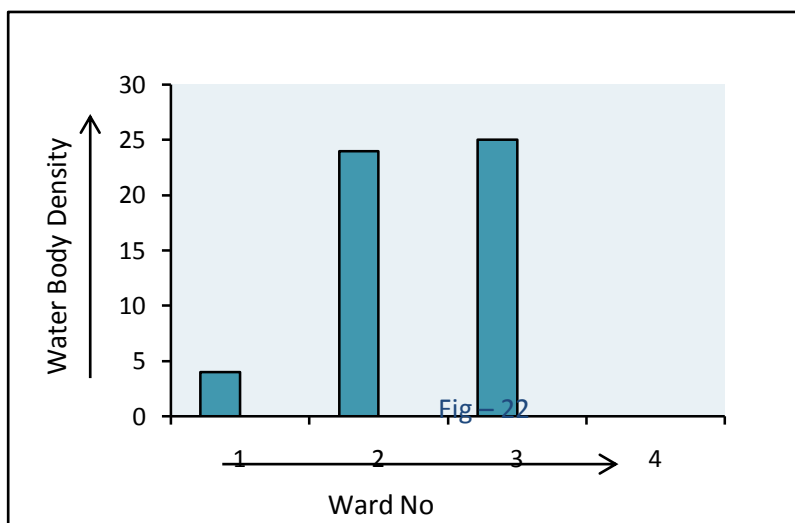
Some Others Factors
There is some special ward wise observation, as -

Ward no 4: the hug problem of that ward is high consistence of barren land.

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Fig – 24

Fig – 25

The barren land area about -196247.61 m2 or, 0.196 km2 with the perimeter of 2165.869 m or, 2.16 km.. (Fig – 24) Presently this area is going illegal occupancy and used for local garbage dispose. That is for why pollution is spreading from here.

Ward No – 24 and 25: In those regions the main problem is the presence of lateritic soil. That is for why the gully erosion getting dominance, and soil degradation process is stimulated (Fig – 25). And one of the most stimulating factors is the growth of built up activities. Parally the green area is getting reduced. As ward no 4 this region has the problem of illegal occupancy and unorganized garbage dispose. That is for why pollution is spreading from here.

RESULT AND DISCUSSION

*F*rom the analysis of the above chapter and data we reach a result. Actually our work tried to explain the changing nature of land use at urban periphery and its impact on the entire environment of midnapore Municipality. Midnapore municipality is the second largest town and a main commercial and administrative place of Paschim Midnapore district. Now a time the city attracts hues no of population through its services. The study has taken efforts to identify the change of such urban sprawl and land use land cover for 1991 – 2011 of the city. Over time the city region become much populated. So the peripheral zone of the city is going spared rapidly. Due to various causes this zone bears some significant characteristics. In the other ward this characters are the problem of an urban periphery region. Our study can able to identify the problems and quantify those.

In this peripheral zone there is the lack of transport accessibility, health services, garbage management, loss of forest land; growth of unplanned built up area etc. This character will be the barrier of sustainable development. But we have the scope to develop this zone as it is a new grown up area.

MAJOR FINDINGS

*F*rom the above study we collect some findings. As –
- This area is losing its land use character rapidly.
- High growth of unplanned infrastructures.
- Many urban amenities are unavailable in this zone.
- This zone is going polluted as the lack of proper garbage management.
- Heavy loss of greenery, gully erosion played the dominant role for soil degradation.

CONCLUSION

*F*rom the above discussion we are able to conclude that this zone of Midnapore Municipality needs a better land use management program. If we can able to apply a better land use management policy this zone can able to absorb the problem (as population pressure, lack of land at Midnapore Municipality, even

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pollution) of this urban area. As the part of better planning we have to focus on greenery coverage area (This greenery coverage area must be more than 30% of the total land of this zone), water bodies. In the other hand we have to conform the better urban amenities as needed the civilizers. To consume the scarcity of settlement, the vertical expending of building should be on focus. Because Midnapore Municipality situated on a stable geological structure, this city under IV Zone of earth quake. So the technology of building will chafe. And this type of expenditure can be solve the land (house) problem. The other important think that this zone needs a land fill area to dispose the garbage. Because of only one land fill area (Dharma, Lal Dighi) of Midnapore Municipality is nearly filled up and this land fill site situated at a long distance from this peripheral zone. We have to think a new land fill site to dispose the garbage of this periphery zone.

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