

SPATIAL DISTRIBUTION OF WETLANDS IN THE DISTRICT OF SIVASAGAR, ASSAM

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ABSTRACT:

The present study was undertaken to understand the spatial distribution pattern of wetland in the study area. The spatial pattern of *beels* and other wetlands are studied in respect of their latitudinal distribution which is carried out with the help of topographical sheets(1974) of Sivasagar . Abstract of spatial mapping of wetlands done by ARSAC, Guwahati was taken as an offset to detect the declining of wetlands in the district. A Correlation and Regression study was carried out between the numbers of wetland and distance from the rivers. It is seen that $27^{\circ}00'$ - $27^{\circ}10'$ north latitudinal extension contributes maximum numbers of wetlands in the district.

Key words: Beels, Spatial pattern, Correlation and Regression.

1.0 INTRODUCTION:

“Wetlands are considered as liquid treasures of a region”(A.Rahmani et al. after 2002).The global extent of wetland is estimated to be from 7 to 8 million km², compared to other ecosystems, wetlands are extremely productive part of the landscape with average annual production above 1000g.cm⁻² years⁻¹ in terms of nutrient recycling and storage, plant and animal harvest and species conservation (Dugan 1993 Mitsch et al 1994). *Wetlands are defined as lands transitional between terrestrial and aquatic eco-systems where the water table is usually at or near the surface or the land is covered by shallow water (Mitsch and Gosselink, 1986).*

India is blessed with a multitude of rivers and natural wetlands scattered all over the country, except perhaps in very dry parts of Rajasthan. By definition wetlands are transitional areas between aquatic and terrestrial ecosystems where water table is usually at or near the surface or land is covered with shallow water. The river Brahmaputra is one of the world's largest rivers with a drainage area of 580,000 sq.km. (Goswami, 1985). The valley of the river Brahmaputra with its innumerable fresh water lakes locally called *Beel* or Or-bow lakes, marshy tracts and seasonally flooded plains and hundreds of riverine sandbars and islands was till recently an ideal wetland ecosystem which contains number of flora and fauna. The low lying areas of flood plain are naturally waterlogged and marshy areas are serving as regulators of hydrologic regimes, maintaining environmental quality and home of treasure of diverse aquatic ecosystem. These areas are of different size and shapes and generally connected to adjacent river systems. The wetlands are originated as a consequence of many naturally interrelated processes and factors. However the development of *Beels* in this region is strongly related to the geomorphological development of the river basin, related to neo-tectonic activity, and other human related factors.

Wetlands are hugely diverse, but whether they are ponds, marshes, coral reefs, peat lands, lakes or mangroves, they all share one fundamental feature, i.e. the complex interaction of their basic components such as soil, water animals and plants.

2.0 STUDY AREA:

The district is situated in the north-eastern part of Assam between 26°42' and 27°15' north latitudes and 94°24' and 95°23' east longitudes. The district occupies an area of 64250 hectares. The Geological History of Sivasagar District, and for that matter, of the Upper Assam Valley as a whole, is related to two long narrow subsiding trough (geosyncline) lying on either side of an old rigid continental shield (foreland). The foreland is geologically a north eastern continuation of the shillong and Mikir Hills Plateau and is concealed in the valley by a great thickness of alluvium and tertiary rocks. The geology of almost the entire district is, thus concealed by alluvial deposits. The soils of the district are divided into three main categories viz.- New alluvial soil in an area of few kilometers on the south of Brahmaputra, old alluvial soil on the central part of the district and old mountain valley alluvial soils located along the foot hills of Nagaland. The normal annual rainfall in the district is 2244.5 mm. The minimum and maximum temperatures are 6.9°C and 37.2°C during winter and mid summer respectively. As per Census Report, 2001, the district has a total population of 10, 51,736. The main rivers of the district are the Brahmaputra and its tributaries viz. Disang, Dikhow, Jhanzi and Burhidihing, which are perennial in nature. Total wetland area in the district is 12582 ha that includes 530 small wetlands (<2.25 ha). River/stream occupies 69.13% of wetlands. The other major wetland types are Waterlogged-natural (10.57%), Lake/pond (8.28%). The area comprises of alluvial flood plain of the Brahmaputra River and is predominated by grassland and wetlands. The terrain is gently sloped from east to west. The area falls under temperate climate zone and the climate can be divided into four seasons- viz. winter season, pre-monsoon season, monsoon, post monsoon season. The rain fall occurs during the monsoon season. The mean annual temperature during winter is 9⁰c to 23⁰c and during summer 21⁰c to 33⁰c. The relative humidity varies from 60% to 90%. Total wetland area in the district is 12582 ha that includes 530 small wetlands (<2.25 ha). River/stream occupies 69.13% of wetlands. The other major wetland types are Waterlogged-natural (10.57%), Lake/pond (8.28%), Ox-bow lakes (4.2%). There are 25 Tank/pond with 310 ha area (2.46%). Details of wetland statistics is given in Table.21. Aquatic vegetation is mainly observed in Lake/pond, waterlogged wetland types. The area under aquatic vegetation is more or less same in both the seasons. Seasonal fluctuation of open water spread of wetlands does not vary during both the seasons. The turbidity of water is moderate in both the seasons.

3.0 OBJECTIVES:

The presentation is based on the objective of studying the spatial distributional pattern of wetlands in the district of Sivasagar.

4.0 METHODOLOGY:

The methodology set for the presentation is as follows:

- I. Topographical sheets (1974) of Sivasagar and its adjacent areas were collected to count the total numbers of wetlands of all categories and to show the spatial distribution of the same.
- II. Abstract of spatial mapping of wetlands done by Assam Remote Sensing Application Centre (ARSAC), Guwahati was taken as an offset to detect the declining of wetlands in the district. The mapping was done on LISS-III satellite image (Pre-Monsoon & Post-Monsoon, 2004-2007).
- III. A Correlation and Regression study was carried out between the numbers of wetland and distance from the rivers.

5.0 ANALYSIS:

5.1 Latitudinal Distribution of Wetlands:

The spatial pattern of *beels* and other wetlands are studied in respect of their latitudinal distribution in terms different types of wetlands.

Table-1 Latitudinal Distribution of Wetlands.

Latitudinal Extension	Number of wetlands	Types of wetlands				
		Oxbow lakes	Waterlogged	Swamps	Tanks/ponds	
					Artificial	Natural
26°45'-26°50'	15	6	2	3	1	3
26°50'-26°55'	16	1	2	6	5	2
26°55'-27°00'	57	18	8	13	12	6
27°00'-27°05'	80	41	9	23	5	8
27°05'-27°10'	60	20	11	24	1	7
27°10'-27°15'	26	8	2	11	1	4
Total	275	94	42	84	25	30

Source: Data collected from toposheets (1974) by author.

From the table it has been evident that 27°00'-27°10' north latitudinal extension contributes maximum numbers (140 numbers) of wetlands in the district. This extension is a part of one of the major fluvial regimes of the district, i.e. the Disang river basin. It is because of the fact that out of the two fluvial regimes namely, the Disang and the Dikhow, the Disang has the highest numbers of tributaries (5 Numbers) than that of the Dikhow (2 numbers) within the district. Another important feature of the table is that the artificial tanks listed above in the district of Sivasagar have become natural water bodies which retain the characteristics of wetlands. It is worth mentioning to note that the historical tanks and ponds which are being degraded due to the extreme human interferences are not included here.

The river basin wise distribution of wetlands is given here under:-

Table-2 River basin and type-wise distribution of wetlands.

Master Stream	Tributary stream	Sub-Tributary Stream	Types of wetlands					
			Ox-bow lakes	Waterlogged	Swamps	Tanks/ponds		
						Artificial	Natural	
Brahmaputra			-	-	6	-	-	
	Disang		29	7	18	2	7	
		Dimau	5	17	12	-	-	
		Diroi	6	-	6	-	-	
		Safrai	3	2	-	-	-	
		Tiyak	4	-	-	-	-	
		Taoka	4	2	2	-	-	
	Dikhow			19	6	13	10	-
		Namdang		9	-	6	1	-
		Dorika		12	-	-	-	-
	Jhanji (A part)		3	2	2	-	-	
	Balama		-	4	4	-	-	
	Buridihing (A part)		-	2	-	-	-	
Total	4	7	94	42	69	13	7	

5.2 Decline of Wetlands:

The comparative study between the topographical sheets and the ARSAC's LISS-III (2004-2007) study reveals the fact that there has been a gradual decline of wetlands in the district of Sivasagar.

Table-3 Comparison of topographical sheets and ARSAC (LISS-III, 2004-2007)

Categories	SOI Toposheet (1974)	ARSAC's LISS-III Image Study (2004-07)	Decline of wetland
Ox-bow lake	94	75	19
Water logged	42	34	8
Swamps/Riverine wetland	84	16	68
Lakes/Ponds(Natural)	30	30	0
Tanks/Ponds (Artificial)	25	25	0
Total	275	180	95

5.3 Relation between the Distance from the River and Number of Wetlands:

A data table has been prepared to show the distribution of the wetlands in terms of their distances from the nearby rivers:-

Table-4 Distribution of wetlands with reference to the rivers of the district.

Rivers	Distance wise numbers of wetlands (in kilometer)							
	0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	Total
Disang	44	10	4	2	2	1	-	63
Dikhow	20	9	6	1	1	3	1	41
Dimau	16	6	2	2	1			27
Darika	15	4	3	3	2		1	28
Namdang	12	3	1	1	-	-	-	17
Diroi	9	2	-	1				12
Tiyak	5	-	1	-	1	-	-	7
Taokak	5	-	-	1				6
Safrai	4	1	-	-	-	-	-	5
Balama	1	4	1	1	1	-	-	8
Jhanji	2	2	-	1	-	-	-	5
Brahmaputra	1	4	1	-	-	1	-	7
Buridihing	2	2	-	-	-	-	-	4
Total	136	47	19	13	8	5	2	230

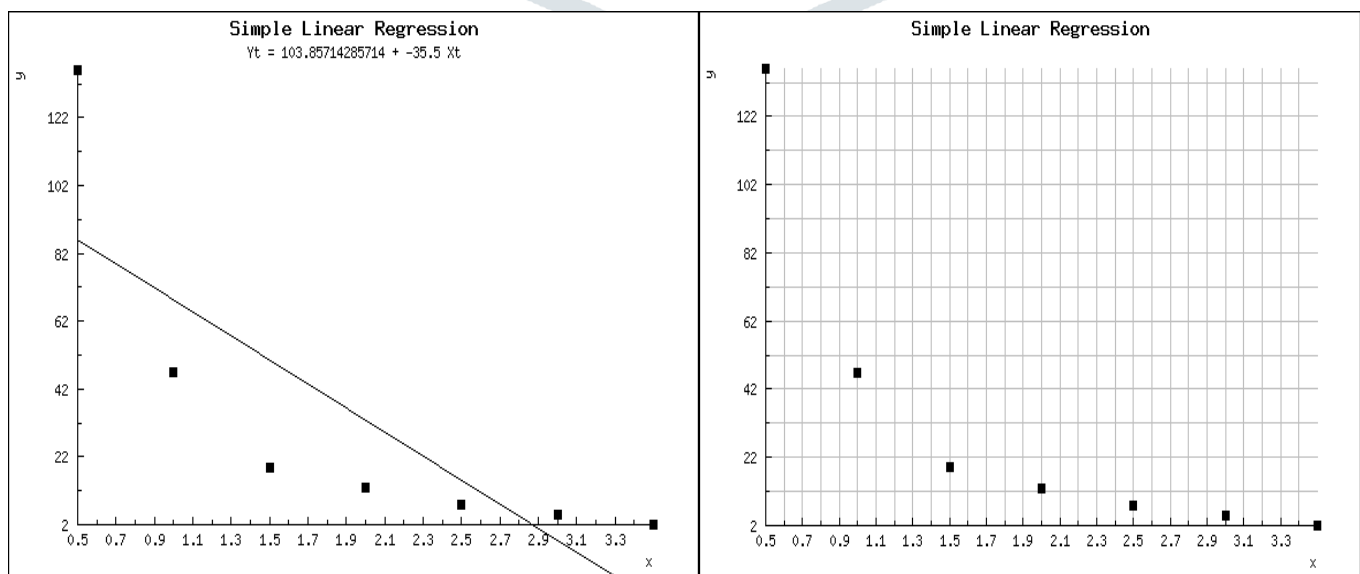
Note: Excluding Tanks and Ponds (artificial & Natural)

Pursuant to the spatial distribution of the wetlands in the district of Sivasagar, a correlation and regression analysis was conducted based on the following table:-

Table-5 (x and y variable table)

Distance from the Rivers (in kilometers) (X)	0.5	1.0	1.5	2.0	2.5	3.0	3.5
Numbers of Wetlands(Y)	136	47	19	13	8	5	2

The table shows the correlation coefficient (r) = -0.85, which shows the high negative correlation between the X and Y variables. Further, the Co-efficient of Determination (R²) value (72.25%) shows that the 72% negative correlation between X and Y can only be interpreted while determining the influence of distance from the river on the numbers of wetlands. Again, a regression



line was drawn to show the distance wise influence of rivers(X) on the numbers of wetlands(Y).The regression equation derived from the table is $Y=103.86+(-35.5)X$, which shows that increase one unit

in the distance from the river decreases the 35.5 unit in numbers of wetlands. It can be mentioned that statistically there will be the presence of 103 wetlands at zero distance from the river (if $X=0$, $Y=103.85$). In ground reality it is noticed that there are 136 wetlands between 0-.5 kilometers, which implies a considerable significant level.

6.0 CONCLUSION AND PERSPECTIVE:

Raw data so far collected and observations made till the writing of this paper are the main data base. This study reports preliminary investigative information on the distribution of wetland as well as the types of wetland in the district. The entire investigation on this issue will involve primary data collection with sophisticated modern tools and techniques, viz. high resolution satellite imagery (LISS-III). The classification and distribution of wetland enable the wetland manager to pay selectively more attention to those types of wetland that are functionally the most valuable to a given region.

7.0 REFERENCES AND SELECTED BIBLIOGRAPHY:

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