Chapter – IV

MAPPING AND CLASSIFICATION OF WETLANDS

4.1. Introduction

The Lower Subansiri Basin has innumerable variety of wetlands which are connected or adjoined by the river Subansiri and its tributaries. The wetlands are stated to be deteriorating and shrinking due to siltation, encroachment, bad land use practices and construction of roads and embankments etc. Due to this, the rainwater that used to be accumulated in the wetlands now directly reaches the river leading to excessive water enhancing flood magnitude. Most of the natural wetlands of the basin have been converted to commercial fisheries in the recent years and predominantly granted lease for a period of six months every year. The fishermen use different types of fishing gears to capture fishes resulting in depletion of the fish fauna and deterioration of the habitat. These activities have also resulted in water quality deterioration, heavy weed infestation, continuous siltation and accumulation of petrified matters. The wetlands are reported to be shrinking due to these activities coupled with heavy encroachment for cultivation and settlements. Therefore, the necessity of scientific approach to assist for the enhancement of the wetlands and an appropriate geospatial database of the wetlands based on unambiguous scientific methods was felt. The first scientific mapping of wetlands of India was carried out in the year 1992-1993 by Space Application Centre (ISRO). This delineation had commenced that the total range of wetlands area coverage of the country is about 8.26 million hectare [93]. Hence an attempt has been made in this direction to delineate the wetlands of the Lower Subansiri Basin.

4.2. Database and Methodology

The mapping and delineating the wetlands consisted of Satellite Imageries IRS P4 LISS III data of the year 2006 and Survey of India (SOI) Toposheets. Digital classification was done applying both supervised and unsupervised classification and visual interpretation was accomplished using Google Earth images and performed in Arc GIS Desktop 9.3. Detail methodology has been discussed already in ***Chapter III, Section 3.3.1***.

4.3. Results and Discussions

The locations of the wetlands delineated out in the study area are shown in ***Fig. 4.1 and 4.2.*** It has been observed that most of the wetlands were located towards the confluence of the river, while wetlands were found to be sparse in the upper part of the basin. Very few wetlands were observed in the hilly part of the basin belonging to the state of Arunachal Pradesh. This indicates that most of the wetlands were formed due to fluvial activity of the river. As the fluvial activity is more prominent in the downstream, the occurrence of wetlands was also found to be more, especially in the flood plain areas of the river.

The Lower Subansiri basin covers an area of 10929.0549 sq. km, out of which 57.63 sq. km is the total area covered by wetlands, resulting into 0.8% of the total geographical area of the basin. It was found that 4227.64 sq. km (38%) of the total geographical area of the basin and 54.73 sq. km of the area covered by wetlands belong to Assam part of the basin. Thus, most of the area (97.6%) covered by wetlands are located in the Assam part. The percentage of wetland covered area in the Assam part is 1.3% of the total geographical area of the Assam part of the basin. In addition to this, many small wetlands also exists which was ignored and not recorded in this study. The

wetlands distribution of the basin in the states of Assam and Arunachal Pradesh and their total area coverage are presented in ***Table 4.1.***

Table 4.1: Wetlands of the Lower Subansiri Basin and their respective area coverage

Type	Total Number of Wetlands	Total Area Coverage (Sq. km)	Average size (Sq. km)	In % of total Wetland Area
Oxbow	282	28.19	0.099	49%
Waterlogged	51	20.20	0.396	35%
Lake/Pond	29	4.10	0.141	7%
Riverine	16	3.64	0.228	6%
High Altitude Wetlands	15	1.5	0.193	3%
Total	**393**	**57.63**	**0.146**	**100%**

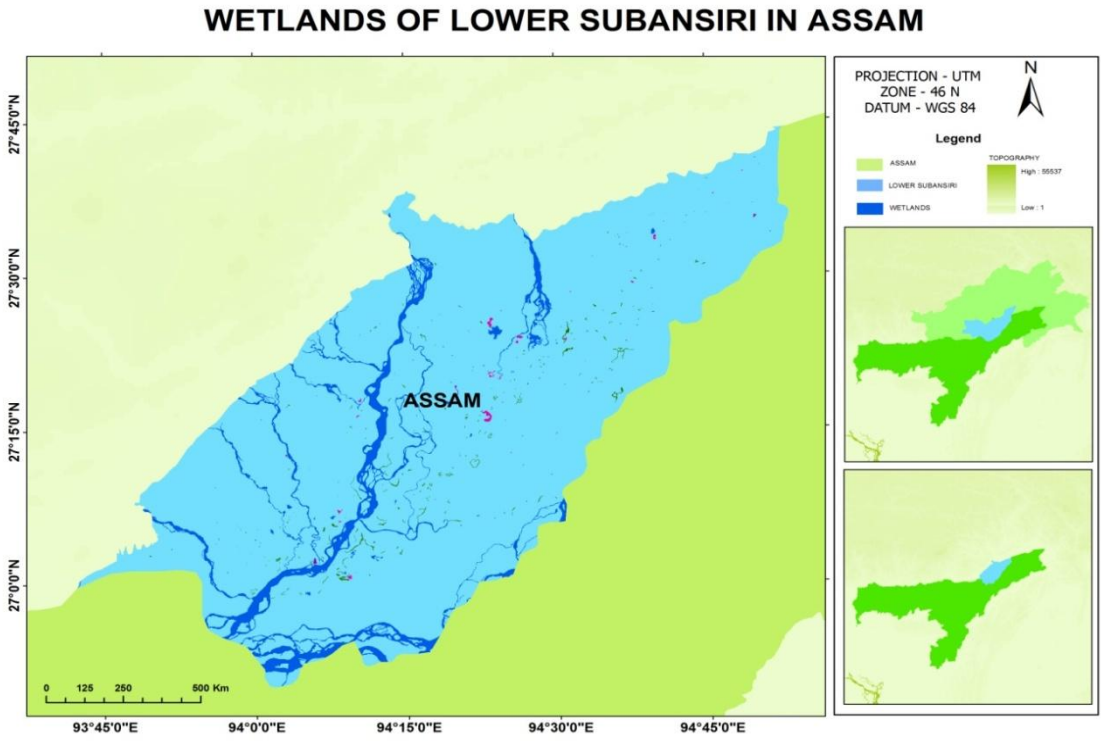

Fig 4.1: Map showing the wetlands showing the Assam part of the Basin

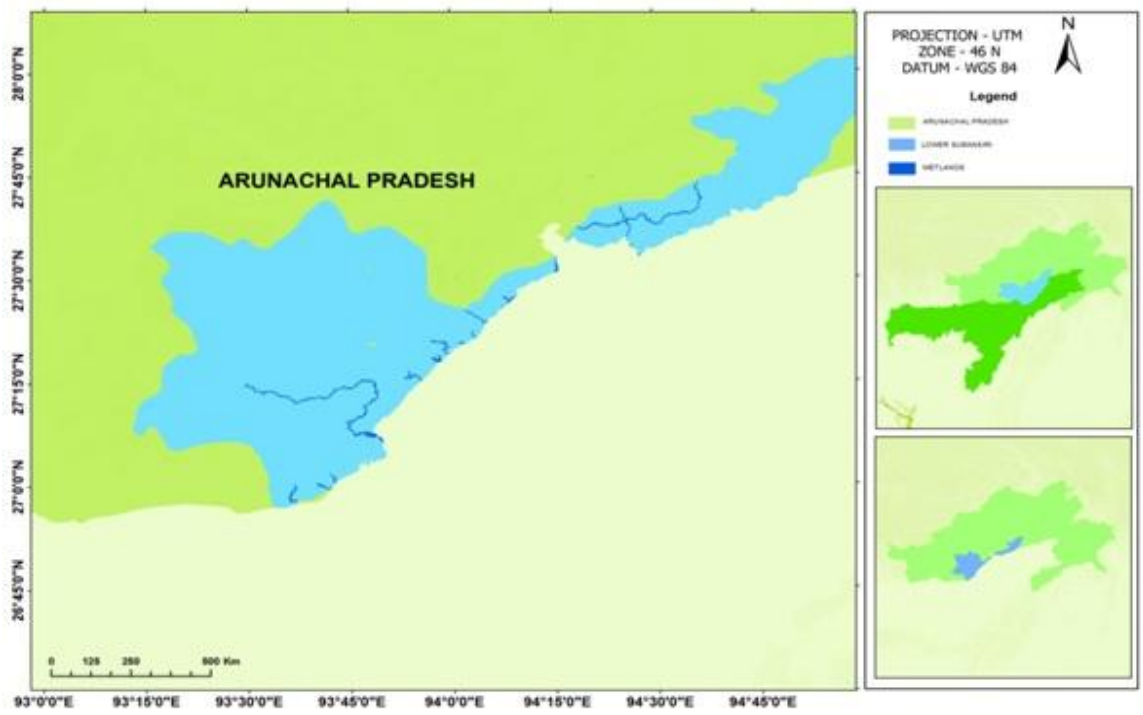

Fig 4.2: Map showing the wetlands showing the Arunachal Pradesh part of the Basin

More wetlands were observed mainly towards the confluence of the river due to channel migration and sedimentation. Way back in 1950, the great Assam earthquake caused depression in some land and also enhanced siltation and sedimentation leading to the formation of numerous lake/pond and oxbow wetlands. After a field survey, many of the origin of the wetlands formation were found to be due to the evacuation of land by the PWD department for building embankments and other activities. This kind of activities is the genesis for the formation of some of the waterlogged wetlands. Moreover, the annual floods occurring in the basin creates wetlands by deposition when it overflows the river banks originating waterlogged areas. The area has been facing erosion and deposition of sediment in the floodplains which are left by the flooding of the river and this is the origin for many riverine wetlands. This type of wetlands are contained within periodically or continuously flowing river and forms a connecting link between the two bodies of standing water. Further, based on their types, formation and

sizes, the wetlands were delineated and classified as per the techniques in National Wetlands Inventory and Assessment (NWIA) [3]. The basin was observed with five types of wetlands viz.– (a) Oxbow, (b) Lake/Pond (c) Waterlogged (d) Riverine and (e) High Altitude Wetlands. In terms of total area coverage, Oxbow wetland obtained the highest percentage accounting for 49% of the wetlands (57.63 sq. km) area coverage of the basin followed by waterlogged wetlands with 35%, Lake/Pond with 7%, whereas Riverine wetlands acquired 6% and lastly High Altitude Wetland obtained the minimum percentage with only 3%. The high altitude wetlands are located only in the Arunachal part of the basin and therefore not considered for further study.

As discussed, the oxbow category has been assigned with the maximum area coverage and hence the dominant category in the Assam part of the basin. Riverine wetlands were found only in the Assam part and none of them were observed in the upper part of the basin. The riverine wetlands have the origin to connect with rivers which are found within the river channels and also influenced by their flow. Since the fluvial activity was not observed to be active in this region, hence the advantage to form connection with stagnant water bodies might have perhaps failed. The High Altitude wetlands were observed only in the Arunachal part of the basin, because as the name signifies, high altitude wetlands are found 1600 m above the mean sea level. Therefore, none of the wetlands located in the Assam part of the basin belongs to this category. Most of the smaller wetlands on the basis of area coverage belong to Oxbow category. On the contrary, bigger wetlands comparatively on individual area coverage belong to Waterlogged followed by Riverine type. In addition to this, many small wetlands also exists which was ignored and not recorded in this study.

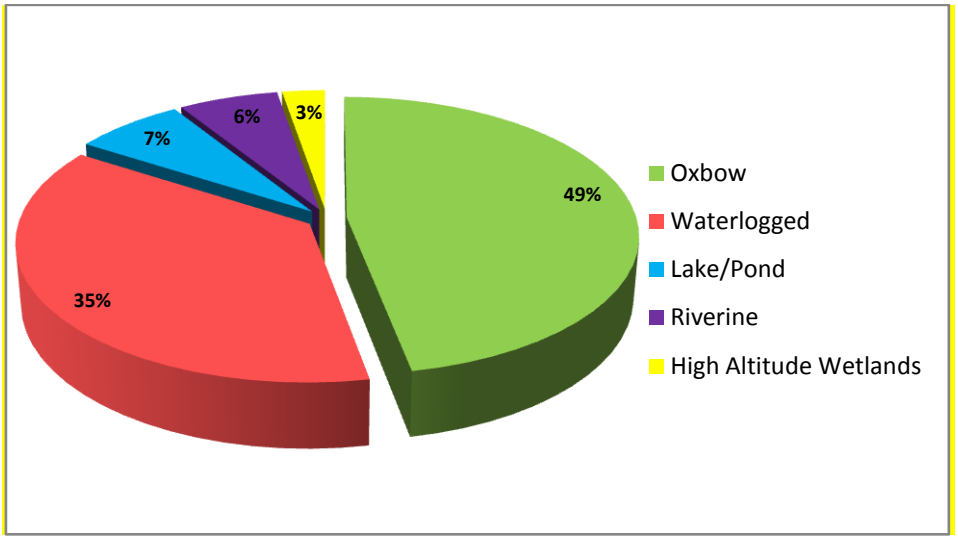

Fig 4.3: Category wise distribution of wetlands in the Lower Subansiri Basin in percentage

District and state wise distribution of wetlands of Lower Subansiri Basin is presented in ***Table 4.2.*** State wise distribution of different categories of wetlands is also presented in ***Fig4.4.*** Dhemaji is the leading District on the basis of wetland area coverage with 30.53 sq. km of the total wetland area coverage of 57.63 sq. km, however Arunachal Pradesh has the lowest area with only 2.9 sq. km. Although Lakhimpur has the highest number of wetlands, it lacks in their sizes and area coverage and hence falls in the second place on account of the total area coverage. Most of the bigger wetlands of the basin were seen in the districts of Dhemaji.

The wetlands of the Dhemaji and Lakhimpur districts have been observed in varying sizes. Lakhimpur and Dhemaji have similar topographical and geo-environmental conditions and hence the wetland patterns and diversity were also found to be proportionate. The wetlands found in the Arunachal Pradesh part of the basin were very few and small in context of distribution and sizes and the wetlands are very sparsely present. The hills and the rivers do not justify being compatible for wetland formation unlike the alluvial plains of Assam.

Table 4.2: District and State wise distribution of wetlands of Lower Subansiri Basin

Type	Dhemaji	Lakhimpur	Assam	Arunachal Pradesh	Total
Oxbow	95	170	265	17	282
Waterlogged	28	21	49	2	51
Lake/Pond	13	14	27	2	29
Riverine	10	6	16	-	16
High Altitude Wetlands	-	-	-	15	15
Total no. of wetlands	146	211	357	36	393
Total area Coverage (sq.km)	30.53	24.20	54.73	2.9	57.63
In % Wetland Area	53%	42%	95%	5%	100%

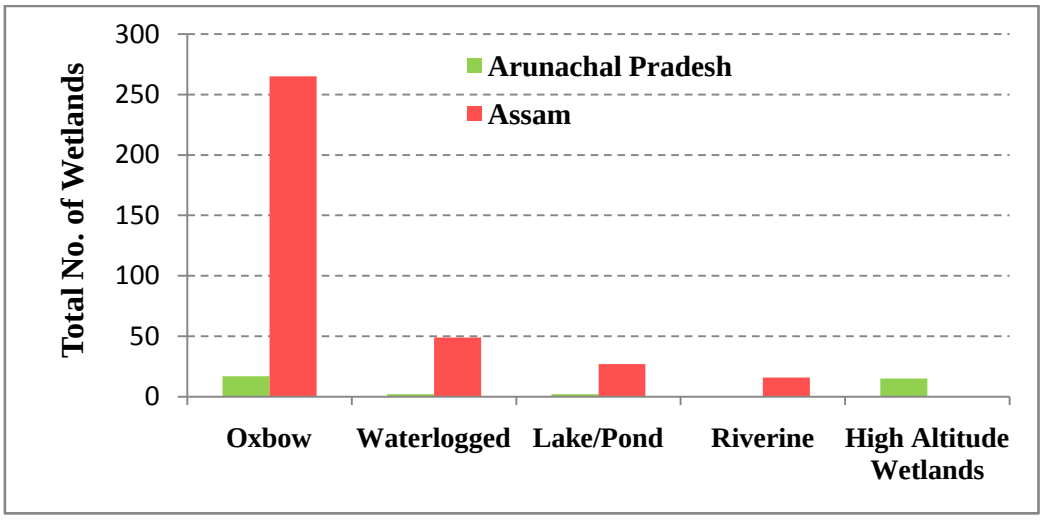

Fig4.4: State wise distribution of wetlands in the Lower Subansiri Basin

4.4. Conclusion

Mapping and delineating the wetlands was an initiative and significant contribution towards the improvement of wetland management and conservation. The use of most advanced GIS techniques and spatial analysis allowed performing cartography with a great level of accuracy and confidence. The above data were developed as part of the conservation and planning tool. The accuracy of the GIS data has been verified to the greatest extent possible. It has been observed that wetlands cover around 0.8% in the basin with five different types of wetlands viz. - oxbow, waterlogged, Lake/Pond, Riverine and High Altitude wetlands. Appearance of more number of wetlands towards the downstream of the basin reflects the fluvial activity to be more effective in the Assam part of the basin. Hence oxbow wetlands were also observed to be more in the downstream that generally originates due to the change in the river course. Arunachal Pradesh being mostly hilly, the advantage for depressional and waterlogged wetlands formation is very less.

The tributaries of Subansiri flowing through Lakhimpur district are Ranganadi, Dikrong and Kherkatia, while the tributaries flowing through Dhemaji district are Nadasuti, Tengagrahjan and Champara. Besides these rivers, many small '*jaan'* and '*suti*' also flows through both the districts and most of the wetlands of the basin are interconnected with these rivers and rivulets directly or indirectly. The primary objective behind this mapping was to provide users with the information about the location and variety of wetlands to use as a planning tool for the overall management of wetlands.

-oOo-