ASSAM LEGISLATIVE ASSEMBLY
DATE OF REPLY – 12/09/2022
UNSTARRED QUESTION NO. - 38

Sub. : Eviction

Shri Sherman Ali Ahmed, Hon'ble MLA.

Will the Minister of Home be pleased to state :

(a) How many families are Evicted till date by the new Government ? Please furnish details along with status of land from which they are evicted.

(b) Whether the evicted people are Indian citizens or foreigners ? Please furnish details for each family.

(c) If foreigners, what action has been taken against them for deportation ?

(d) How many of these evicted people are homeless due to erosion ?

(e) Is not, "Shelter over Head" a Fundamental Right ?

(f) Has not the Ministry taken oath to bear true faith and allegiance to the constitution ?

(g) If yes, how the state machinery could abrogate the fundamental rights of its citizens ?

(h) How many persons are arrested as Jihadis during last 10 years ? How many are proved innocent and how many are prosecuted ? Please furnish details.

(i) Is it true that Assam Police Deptt. has completed mapping of char areas ? If yes, Please furnish the report.

ANSWER

Dr. Himanta Biswa Sarma, Hon'ble Minister of Home Department will reply -

(a) A total of **4,449 nos**. of families have been evicted till date by the new Government. District-wise number of families evicted along with the status of land from where they were evicted is enclosed at **Annexure- 'A'**.

(b) Govt. has not carried out any investigation whether they are foreigner or Indian so far.

(c) Does not arise in view of (b).

(d) Not aware.

(e) No. These rights are available only for legal occupation. Rights to property is not a Fundamental Right.

(f) Yes.

(g) Answer in (e).

(h) During last 10 years, a total of 114 cadres were arrested as Jihadi in Assam out of which 65 cadres are of JMB (Jamat-Ul-Mujahideen Bangladesh), 9 cadres are of HM (Hijbul Mujahideen) and 40 cadres are of ABT (Ansarullah Bangla Team).

Out of these 114 cadres, cases of 23 arrestees were transferred to NIA for investigation. In case of Jamunamukh PS, out of the 09 arrestees, 05 have been chargesheeted and the case is under trial. The 02 cases of Barpeta (transferred to NIA) where 14 persons were arrested are currently pending trial.

Out of the remaining 91 arrestees, cases of 54 arrestees are still pending investigation and rest 37 arrestees have been chargesheeted and are under trial.

(i) North East Space Application Centre (NESAC), Umiam, Meghalaya has completed the mapping of Char areas. Copy of report enclosed as **Annexure-'B'**

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(**Annexure-'A' & Annexure-'B'** are uploaded in *www.alaesession.org*)

Annexure – 'A'

Name of District	No of Families Evicted	Status of Land
Darrang: Mangaldai	2153	Govt. Khas and VGR Land measuring 11,144B-1K-0L has been made encroachment free.
Sonitpur ; Tezpur	321	Govt. Khas Land measuring 888B-2K-11L has been made encroachment free.
Tinsukia	288	Railway Reserved Land measuring 13B-1K-1L has been made encroachment free.
Goalpara	81	Govt. Khas Land measuring 28B-2K-10L has been made encroachment free.
Kokrajhar	Nil	Nil
Bongaigaon	37	Govt. Khas Land measuring Area- 108B-3K-4L has been evicted.
Barpeta	90	VGR and Satra Land measuring 50 Bighas has been made encroachment free.
Jorhat	Nil	Nil
Bajali	Nil	Nil
Kamrup : Amingaon	14	Govt. Khas Land measuring 30B-3K-7L has been made encroachment free
Lakhimpur	Nil	Nil
Dhemaji	Nil	Nil
Hailakandi	Nil	Nil
Dima Hasao	Nil	Nil
Cachar	1	Govt Khas Land measuring 0K-13Ch-10G has been made encroachment free.
Charaideo	1	Govt. Khas Land measuring 1B-1K has been made encroachment free.
Golaghat	Nil	Nil
Sivasagar	Nil	Nil
Dibrugarh	Nil	Nil
Karimganj	127	Evicted from Govt ceiling Khas land.
Dhubri	404	Govt. Khas Land measuring 1105B-1K-9L has been made encroachment free.
Morigaon	66	Govt. Khas, VGR and Satra Land measuring 12 Bighas has been made encroachment free.
Nagaon	5	Evicted from Govt. Khas Land.
Majuli	Nil	Nil
Nalbari	Nil	Nil
Kamrup(M)	36	Wet land measuring 73 Bighas has been made encroachment free.
Hojai	805	Evicted from Lumding Reserved Forest.
Biswanath	20	Evicted from Govt. Khas Land.

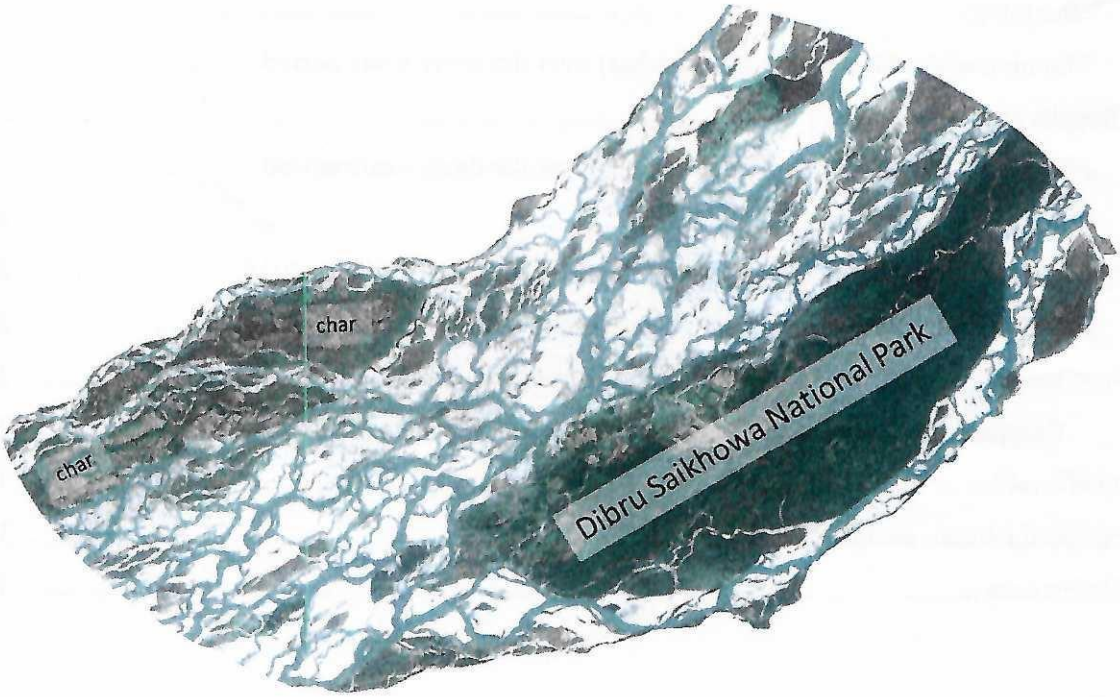
TOTAL- **4449 Nos. of families.**

Annexure- 'B' 194

Study of Brahmaputra river islands (chars) using satellite data

For

Assam Police, Government of Assam



Prepared By

North Eastern Space Applications Centre (NESAC)

Department of Space, Government of India

Umiam, Meghalaya – 793103

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Introduction

Brahmaputra is the seventh largest river and the second largest carrier of sediment load in the world carrying average annual sediment of 735 million tonnes. The Brahmaputra, also called Tsangpo in China, is one of the main rivers in Asia. It has its origin in the Himalayas and flows through China, India and Bangladesh. The Brahmaputra's source is the Chema-yung-dung Glacier, which covers the slopes of the Himalayas. It joins with the Ganges river and empties into the Bay of Bengal and also forms the Gangetic delta, which is the largest delta in the world. Its extensive river system drains unique physical settings of diverse environments such as the cold, dry plateau in Tibet, the steep rain drenched slopes of Himalayas, the landlocked alluvial plains of Assam and the vast dialectic plain in Bangladesh. Originating from Chema-yung-dung glacier mass on the southern slope of the Kailash range in Tibet, the river traverses the total distance of 2906 km through the Tibetan plateau, Himalayan mountains and hills and plains until reaching the Bay of Bengal. The Brahmaputra basin covers the area of 5,80,000 sq. km of which 1,94,413 sq. km falls within India. In India, the basin comprises of the states of Arunachal Pradesh, Assam, Nagaland, Meghalaya, Sikkim and West Bengal. In Assam, Brahamaputra river flows through a distance of 720 km. The Brahmaputra river of Assam is characterised by its highly braided channel pattern. The pattern has a number of river islands of various sizes and shapes. With yearly occurring floods these islands keep on changing in shape, sizes and its orientation. The high intensity of monsoon rains, easily erodible bank materials and their deposition lead to formation of large number of sandbars locally called Chars. Many of such chars remain stable for long period of time allowing vegetation to grow up and settlement to establish. Many of the stable chars are characterized by having habitation. In many places, these chars are characterized by good cultivation of paddy and other crops, meeting the food requirements of the local inhabitants and also providing shelter to them. Keeping in view the changes in the river configuration of the Brahmaputra main channel a study has been undertaken to map the changes and present status in order to assess the stability/instability of the chars using satellite remote sensing. These chars can be utilised for agriculture expansion, solar power installation and other activities. This will cope up the loss of agricultural land use bank erosion. The study includes assessment of total aggradation and degradation to the chars during the study period. The present study is carried from the multispectral satellite data acquired during November to April in the year of 1987-88, 1997-98, 2007-08 and 2017-18. For identification of stable islands during peak monsoon season, Synthetic Aperture Radar (SAR) data is used for the year 2015 to 2018 in the months of May to September.

Objective

1) To identify the Stable River Island/vegetative islands (char) over the thirty years period from 1988, 1998, 2008 and 2018 using multi-spectral satellite data.

2) To identify the stable river islands during peak monsoon season, using SAR data and analyse them for their stability for the year 2015, 2016 and 2017 and compare them with chars obtained from optical data for the same period.

3) District wise quantification of changes in area of chars for the thirty years interval.

4) To identify and map the chars having settlement for the year 2017-18.

Study area:

Brahmaputra originates at an altitude of 5300 m about 63 km south-east of the Mansarovar lake in Tibet. Flowing eastward for 1625 km over the Tibetan plateau, the river enters a deep narrow gorge at Pe (3500 m) and continues southward across the east-west trending ranges of the Himalayas, viz. the Greater Himalayas, Middle Himalayas and sub-Himalayas. After crossing the Indo-China border near Pasighat the river is called as the Siang or the Dihang. The river flows westward through Assam for about 700 km distance from Dhola until downstream of the town Dhubri, where it abruptly turns south and enters Bangladesh.

For the present study, a reach of approximately 650 km on the main stem of Brahmaputra River, i.e., its entire course in Assam from upstream of Dibrugarh up to the town Dhubri near Bangladesh border has been considered. The geographical bounds of the area are 25°45' to 28°N latitude and 90° to 96°30'E longitude. Figure 1. shows the study reach of the river.

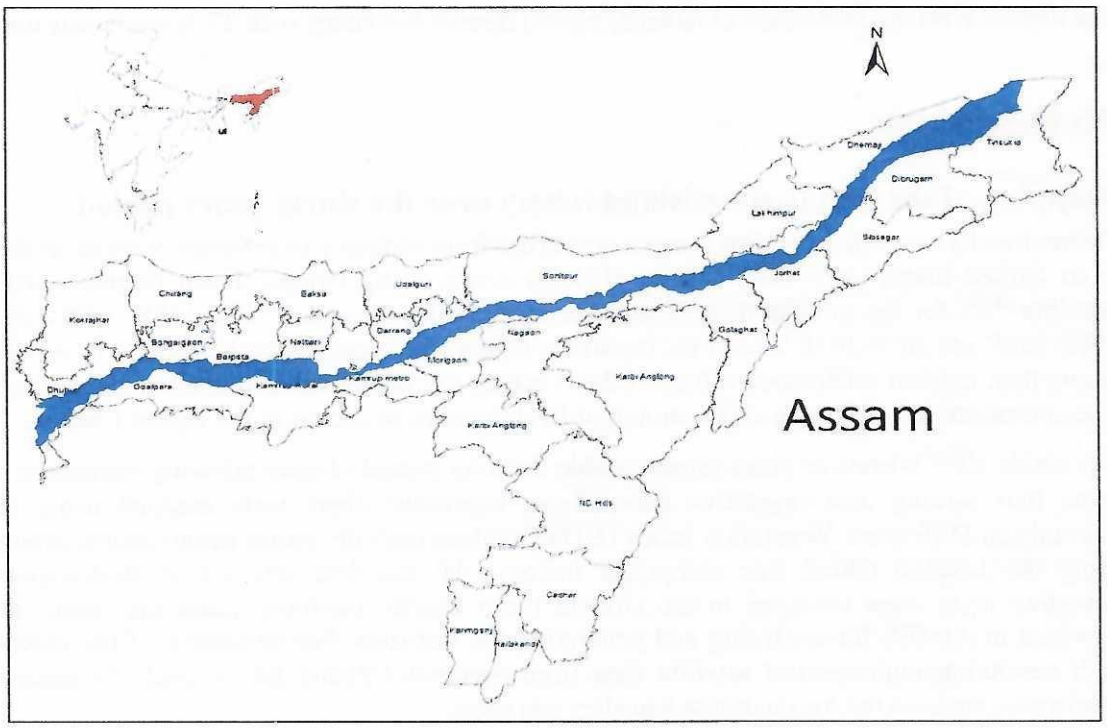


Figure 1. Study area showing Assam in Indian map (red color) and Brahmaputra River in Assam (blue color)

Data used

(1) To identify the Stable river island (char) over the thirty years period

Landsat 5 and Landsat 8 satellite data having 30 meter resolution for the entire stretch of Brahmaputra is used. Landsat 5 data is used from 1988 to 2003 and Landsat 8 data is used from 2003 to 2018. Both having the revisit frequency of 16 days.

(2)To identify flood resilient chars during peak monsoon season:

Sentinel-1 SAR data acquired in dual polarisation mode (VV and HV) with 20 meter resolution has been used during the peak monsoon season when cloud free optical data is not available from 2015 to 2017 along the entire stretch.

3) To Identify the chars having settlements:

Sentinel-2 multispectral satellite data having 10 m resolution is utilized for identifying the inhabited islands. The duration of the satellite data acquired is from November, 2017 to February, 2018.

(4)Brahmaputra boundary:

Brahmaputra boundary layer available from Brahmaputra Board is utilized for the study. Boundary layer was validated with the respective year satellite data. The river boundary for year 1988, 1998, 2008 and latest boundary of 2015 is used for analysis. These four boundaries are combined for common maximum extent of river and then buffer of 500 meter was taken over it in order to incorporate any missing river bank changes.

(5) Assam District boundary:

For district wise quantification of islands, Assam district boundary with 27 districts was used.

Methodology

Mapping of the Stable river island (char) over the thirty years period

Geometrically corrected Landsat images converted from radiance to reflectance were fetched from United States Geological Survey (USGS) server using Google Earth Engine (GEE). Satellite data for the months from November to April for the years 1987-1988, 1997-1998, 2007-2008 and 2017-2018 is used for the study. Cloud free scenes from November to April is taken, than median reflectance values of these scenes are combined to prepare a single cloud free composite image for the entire stretch of Brahmaputra as shown in the figure 1 below.

The stable river islands or chars remain stable for long period of time allowing vegetation to grow thus turning into vegetative bars. These vegetative chars were mapped using the Normalised Difference Vegetation Index (NDVI) values over the entire Brahmaputra stretch, using the Landsat Cloud free composite images. All the data sets within Brahmaputra boundary layer were analyzed in the Google Earth Engine platform. Later the results are exported in ArcGIS for analyzing and generating the statistics. For validation of the results, high resolution multispectral satellite data from Sentinel-2/Planet lab is used. To generate district wise statistics the Assam district boundary was taken.

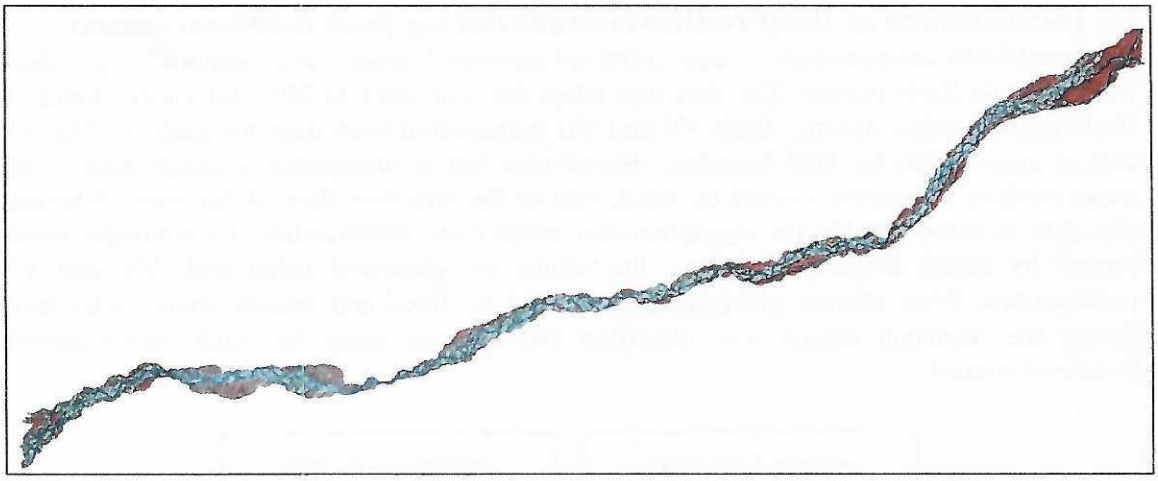


Figure 2. Brahmaputra river extent in Assam as seen in Cloud free Landsat-8 composite

NDVI signatures of the vegetative bars were identified using the validation data collected from high resolution Sentinel-2 satellite imagery. The NDVI threshold value for differentiating the chars and the sand bars were estimated. The flowchart of the methodology adopted is shown in figure 3.

The NDVI threshold map was exported from GEE to the ArcGIS platform. In ArcGIS, temporal vegetative island maps were integrated in GIS environment for detecting of stability/instability and quantification of stable portions of chars over the stipulated 30 year period from 1988 to 2018. Newly formed chars in last 30 years were also extracted. Area and the count of the stable and newly formed chars were also calculated. District wise river islands maps were prepared along with corresponding areas and count of these islands.

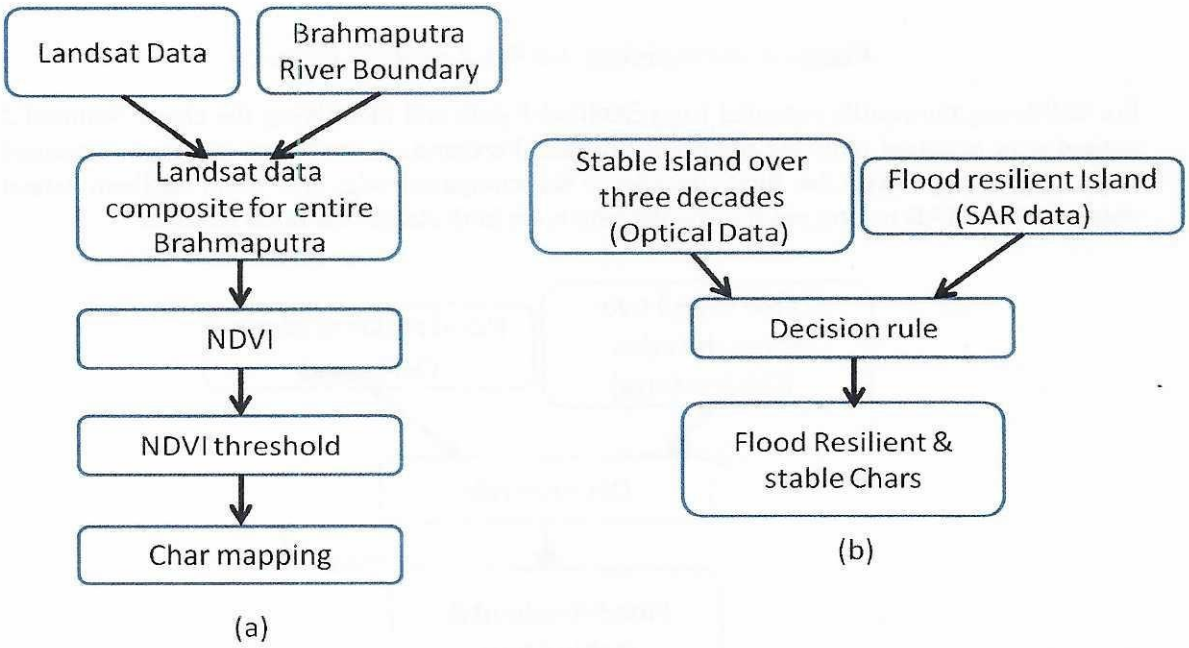


Figure 3. Methodology flowchart (a) Char identification for individual year (1988, 1998, 2008, 2018) (b) Stable char identification for 30 years, 20 years and 10 years.

(2) Identification of flood resilient islands during peak monsoon season:
Radiometrically calibrated and terrain corrected Sentinel-1 images were acquired from USGS using Google Earth engine. The data was taken for year 2015 to 2017 for entire stretch of Brahmaputra within Assam. Both VV and VH polarization were used for analysis. The VV data is more suited for land boundary demarcation but is susceptible to roughening of the water surface, commonly caused by wind, rain or the turbulent flow of the river. Whereas, VH data is more suitable for vegetation and water-body demarcation. To eliminate issues caused by taking single polarization, the results are generated using both VV and VH polarisations. River islands which are not affected by flood and remain above water level during the monsoon season was identified and mapped using the SAR backscattering threshold method.

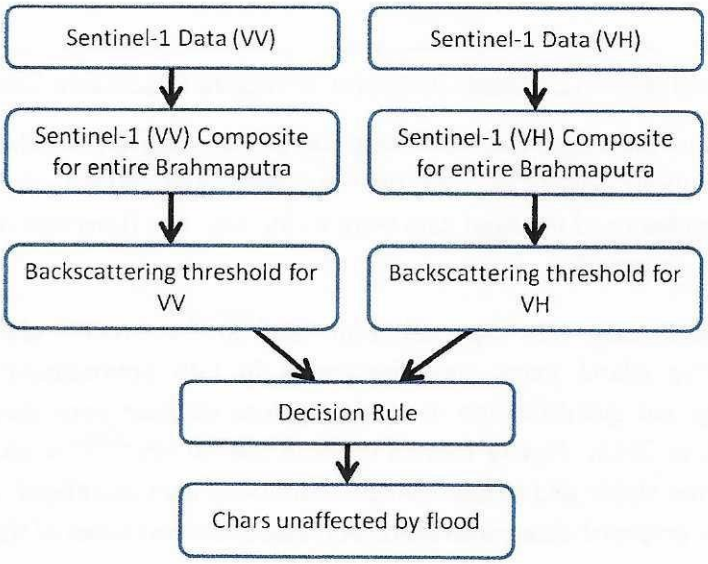


Figure 4. Methodology for flood resilient chars

For validating the results obtained from Sentinel-1 data and identifying the chars, Sentinel-2 optical data acquired over the region is utilized. Furthermore, stable river islands obtained from optical data over the three decades were compared with the flood resilient island obtained from SAR to find out the islands which are both stable and flood resilient.

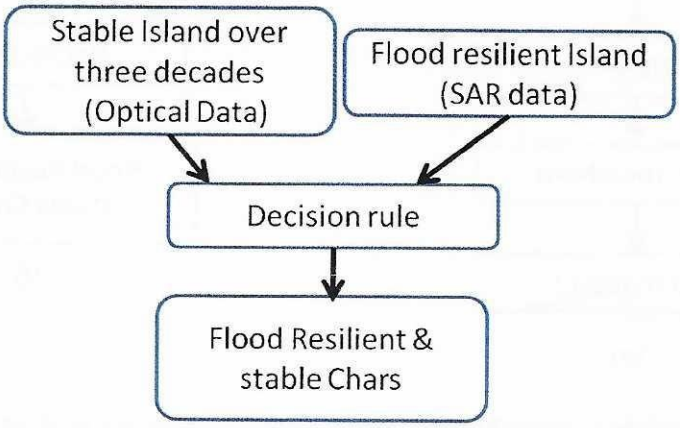


Figure 5. Methodology for flood resilient and stable chars

(3) Identifying the chars having settlements

Sentinel-2, Level 1C, Top of Atmosphere (TOA), multi-spectral, cloud free data having 10m resolution was taken from November 2017 till March 2018. Visual interpretation keys were used to identify the settlements and habitation. Chars having settlement will show signs such as presence of roads or pathways, houses having tin sheds, definite settlement pattern (Figure 17). These visual interpretation keys were used to identify the chars having settlements. It was observed that the settlements are mainly having tin roofs which are easily identifiable because of their high brightness compared to the vegetation and sand bars present. For mapping and quantification of the chars having settlement and to calculate statistics, the entire Brahmaputra stretch is divided into three regions,

1. Lower Brahmaputra Valley (LBV) - From Bangladesh Border in Dhubri to Saraighat Bridge in Guwahati.
2. Central Brahmaputra Valley (CBV) - From Saraighat to Kalia Bhomora Bridge and
3. Upper Brahmaputra Valley (UBV) - From Kalia Bhamora bridge to Tinsukia bordering Arunachal.

Results and discussions

The stable island maps were prepared in ArcGIS and statistics were calculated using Microsoft Excel. The Chars mapped during 1988, 1998, 2008, 2018 are shown in Figure 6-9. Stable chars for past 30 years, 20 years and 10 years are shown in Figure 10-12 respectively. Newly formed islands are shown in Figure 13-15 respectively.

Mapping of the Stable river island (char) over the thirty years period

Total area of vegetative chars has increased by 51,590 ha from 173,030 ha in 1988 to 224,620 ha in 2018 as shown in Graph 1. The chars having area of 500 ha or above has continuously increased in the last three decades whereas chars having area less than 1 ha, 1ha to 10 ha, 10 ha to 100 ha, 100 ha to 500 ha has either increased or decreased. So far stable vegetative chars in last 30 years is concerned, a total of 2363 number of stable chars have been identified from 1988 till 2018 as shown in Graph 2, where the smallest being 0.002 ha, and the largest is 2535.364 ha. Total stable chars area is approximately 68,180.00 ha. The maximum area (approx 65 %) of these stable chars is occupied by islands having size of more than 500 ha.

It is observed that the number of islands greater than 500 ha has continuously increased from 59 in 1988 to 82 in 2018 whereas the count of all other islands having size less than 500 ha has either increased or decreased. From Graph 2, it can also be estimated that more than 95 % of area is covered by chars having size less than 100 ha and they contribute only 12 % of total area. Thus it can be seen that the large sized islands having 500 ha or greater has not only increased size wise but also the count of these islands has also increased. It is observed that maximum number of islands is less than 1 hectare and as the size of the islands increases its count decreases. At present, there are only 17 islands having size greater than 500 hectares which are stable and most of them are in Upper Assam.

It can also be observed that out of current 6056 islands in 2018, 3859 islands are stable from past 10 years which accounts of more than 63% stable islands (Graph 2-4). In the same way from past 30 years, number of stable islands was 2363 which accounts to approximately 40 %

of the islands. From these graphs, it can also be calculated that the total area of stable islands in 2018 was approximately 2,24,620 ha out of which 1,46,000 ha is stable from past 10 years. From these stable islands of past 10 years, approximately 68,180 ha is stable since past 30 years i.e. from 1988 onwards.

It is observed that the total area of Brahmaputra river has increased from 616,600 ha in 1988 to 669,700 ha in 2018 as shown in Graph 7. Total river extent has increased to 53,000 ha in the last 30 years. It can be observed that the rate of Brahmaputra river expansion was less compared to creation of these vegetative chars as shown in Graph 8. In 1988, islands occupied approximately 28.1 % of the area which increased to 33.5 % in 2018.

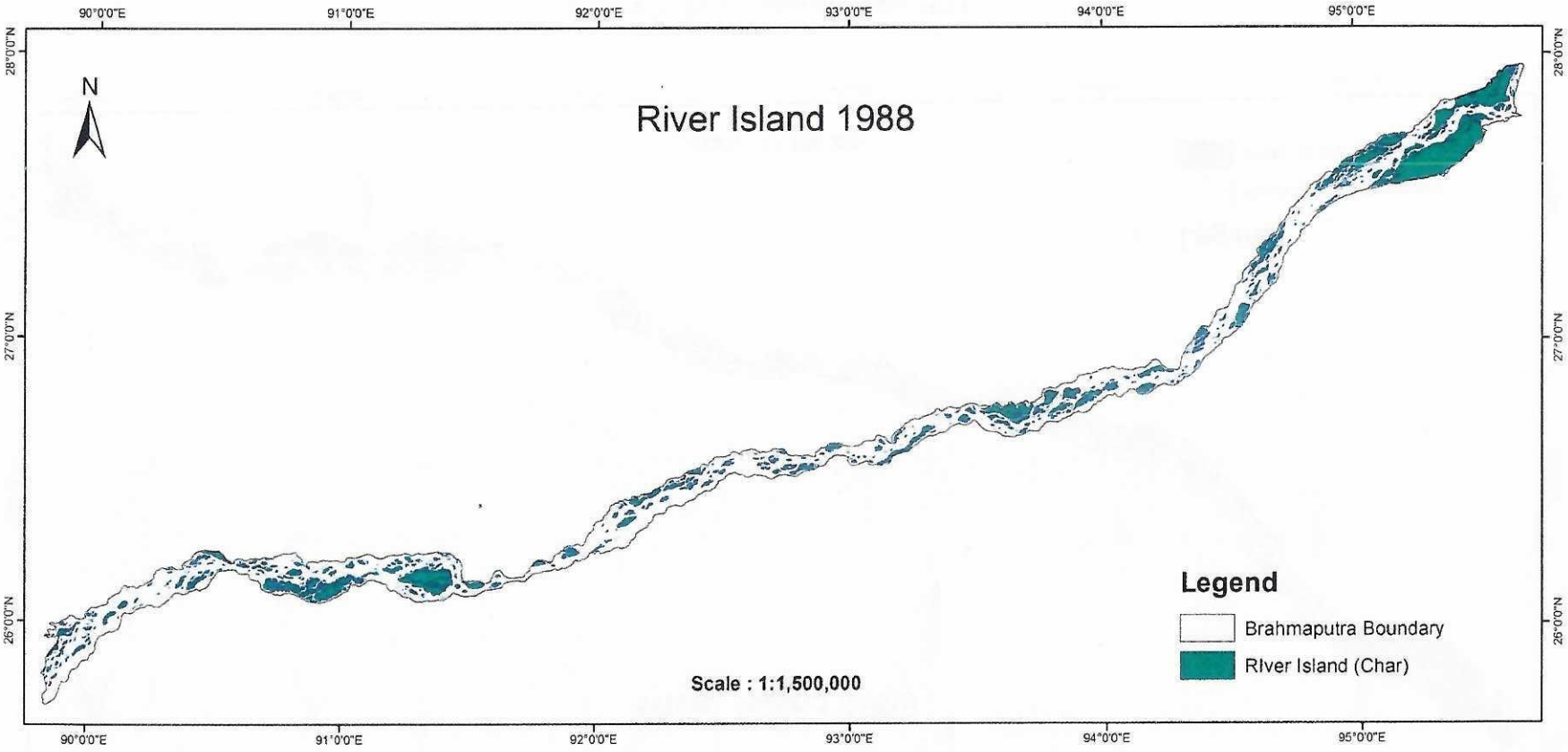


Figure 6. River Islands (Chars) 1988

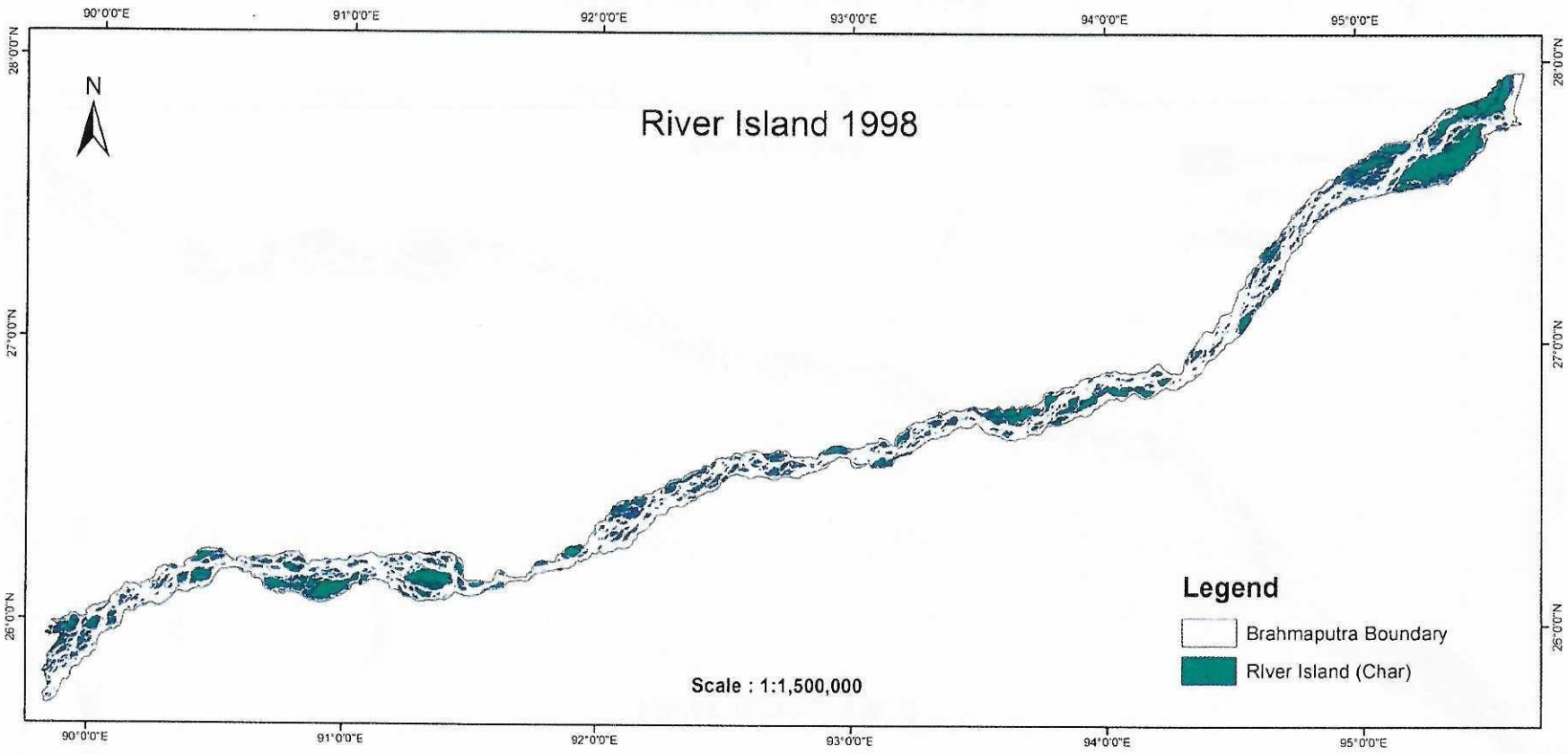


Figure 7. River Island (Char) 1998

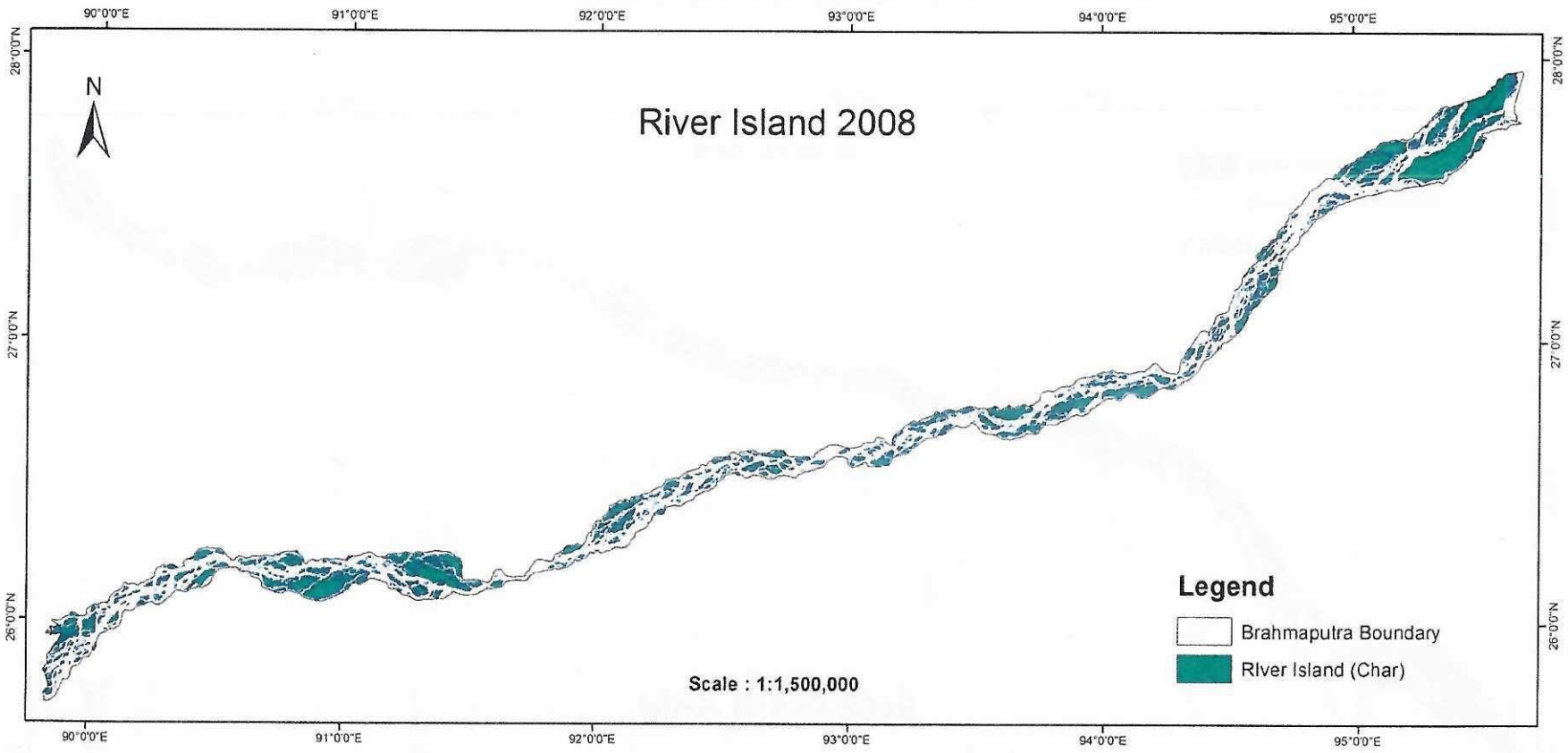


Figure 8. River Island (Chars) 2008

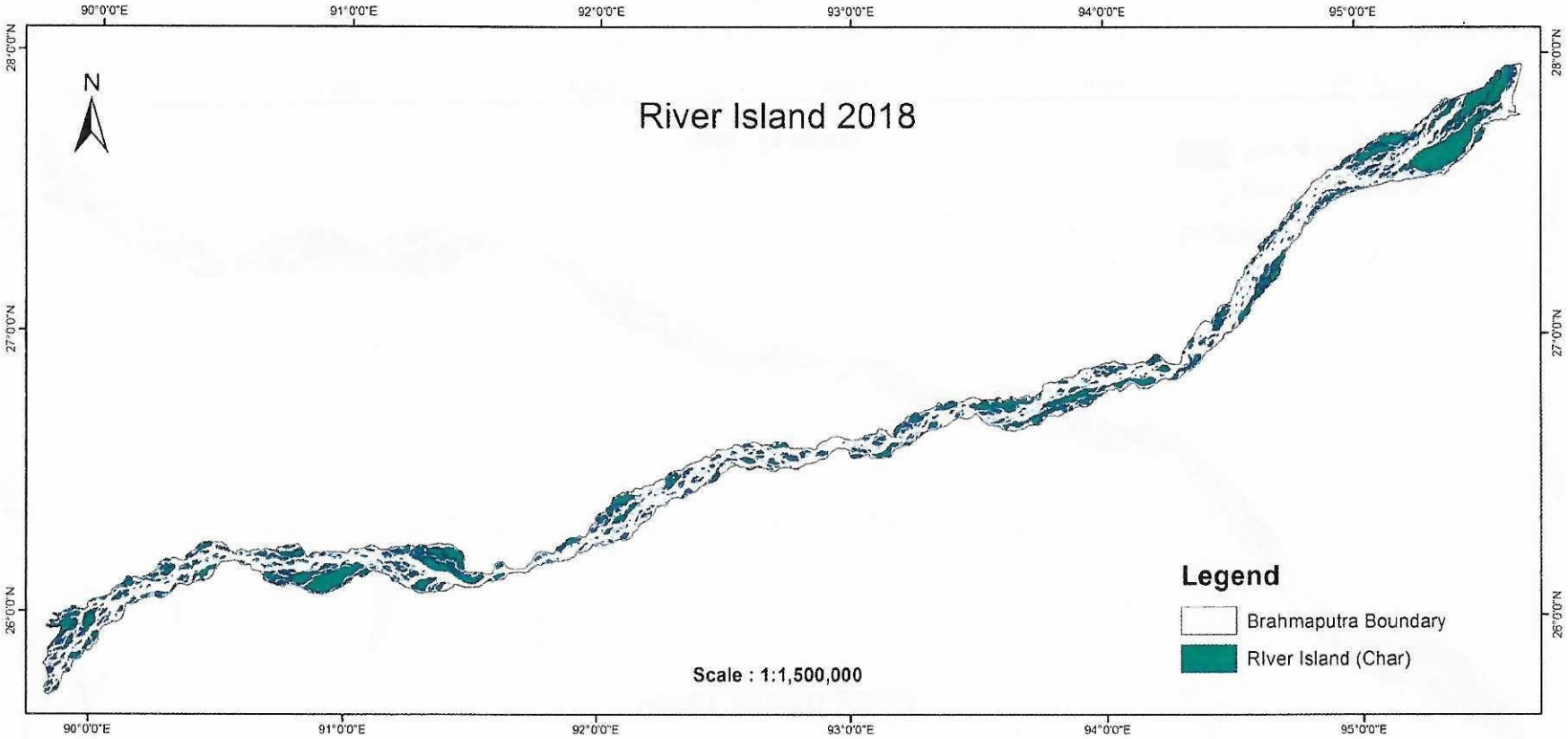


Figure 9. River Island (Chars) 2018

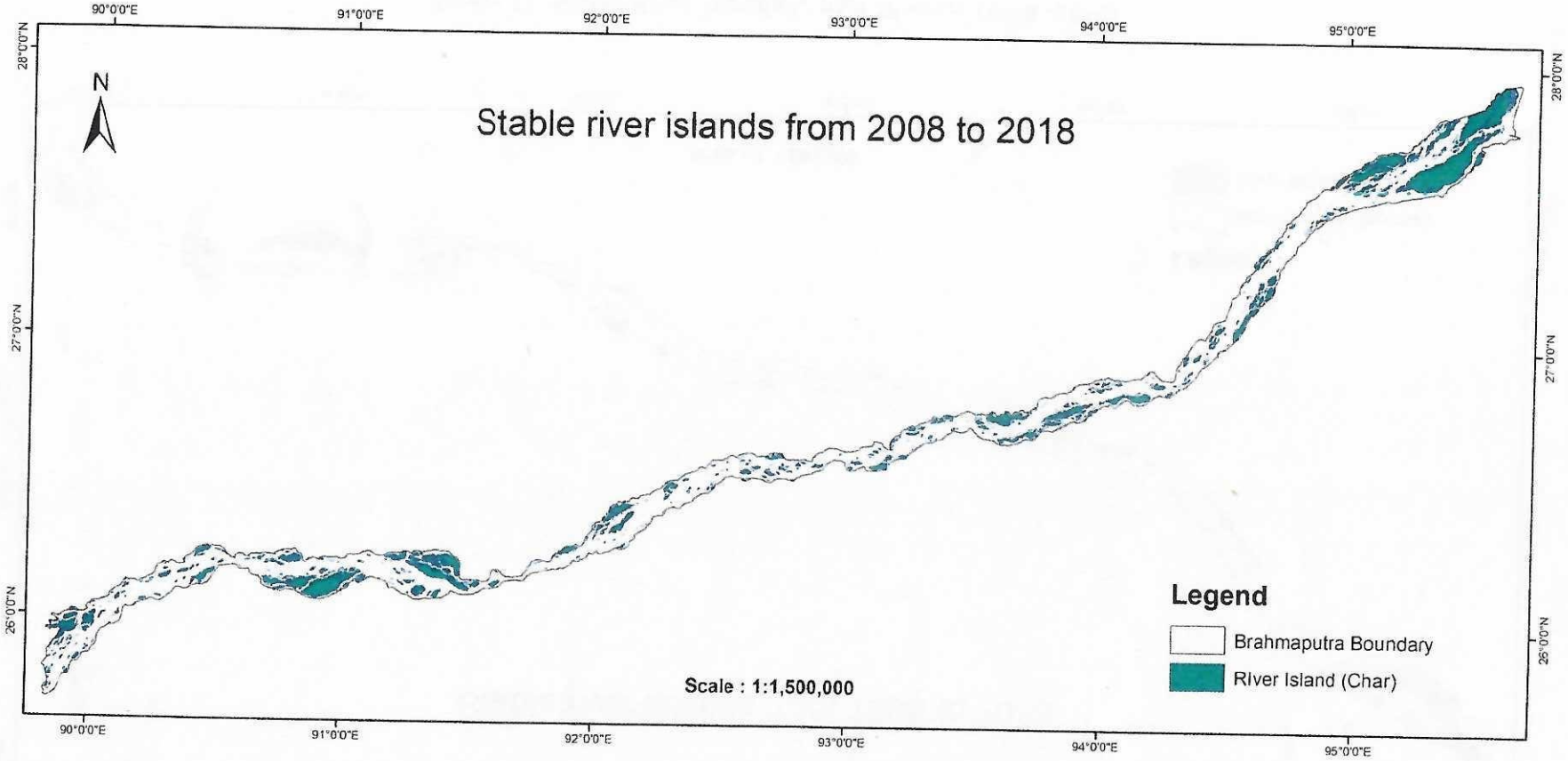


Figure 10. Stable River Islands in past 10 years (2008 -2018)

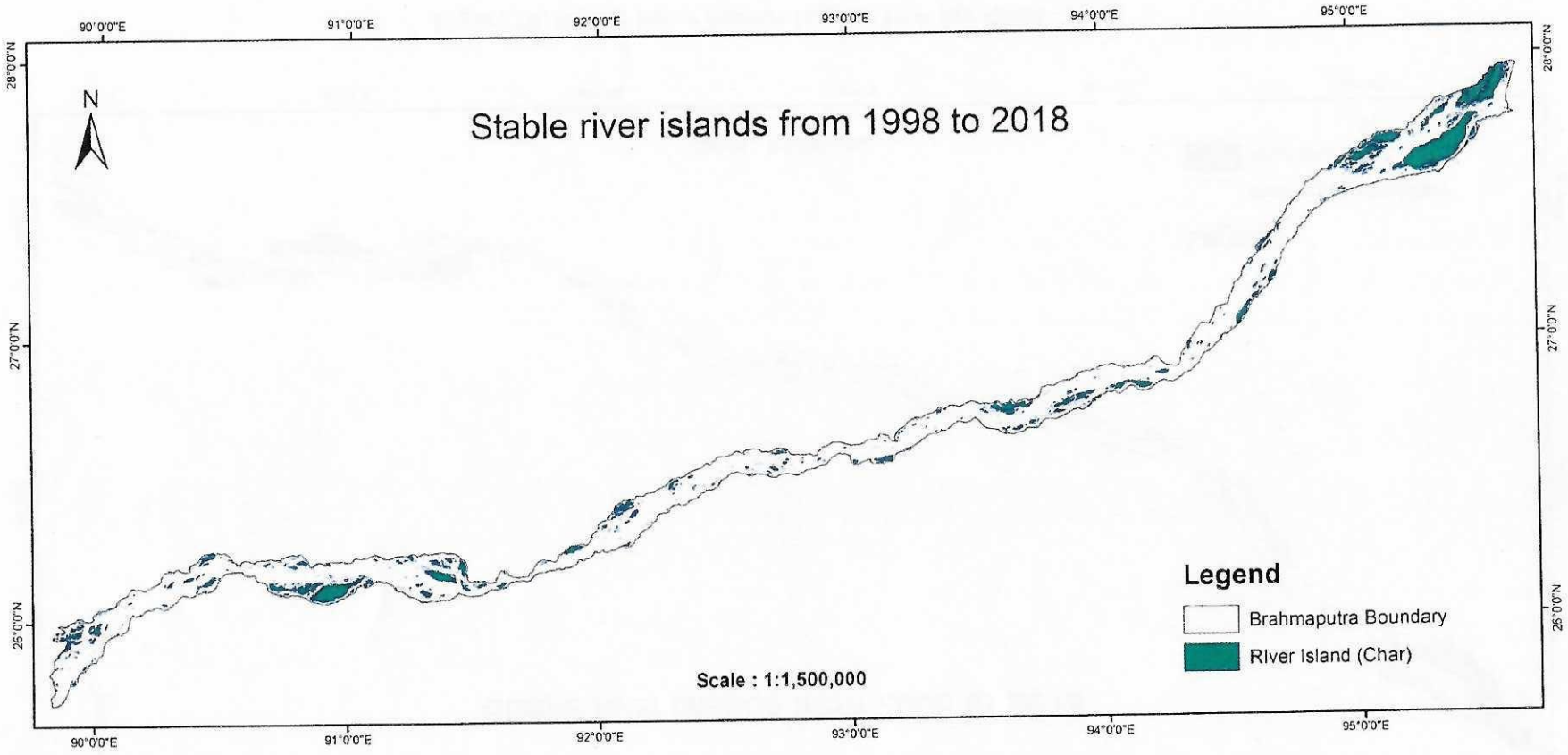


Figure 11. Stable River Islands in past 20 years (1998 -2018)

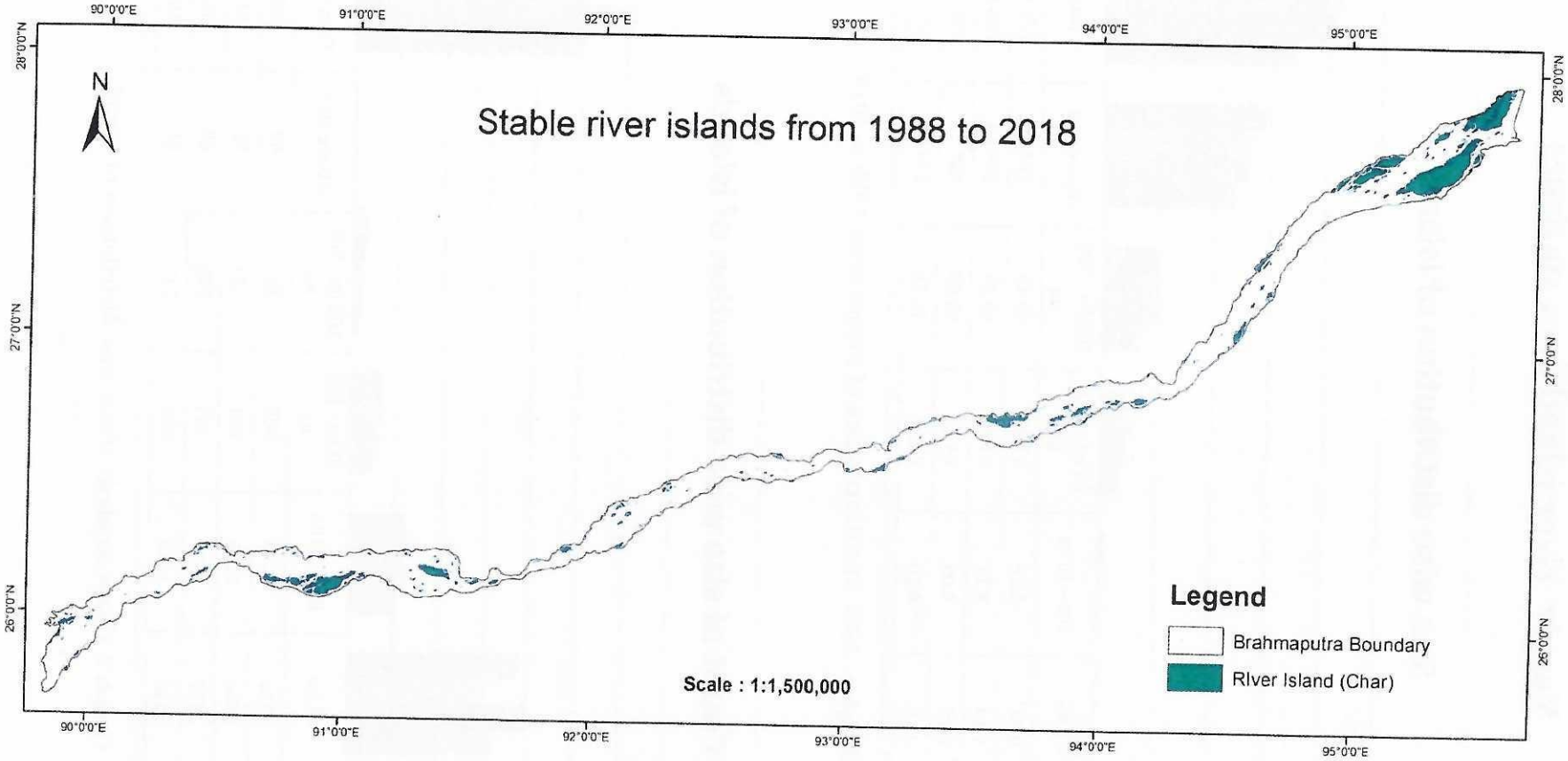
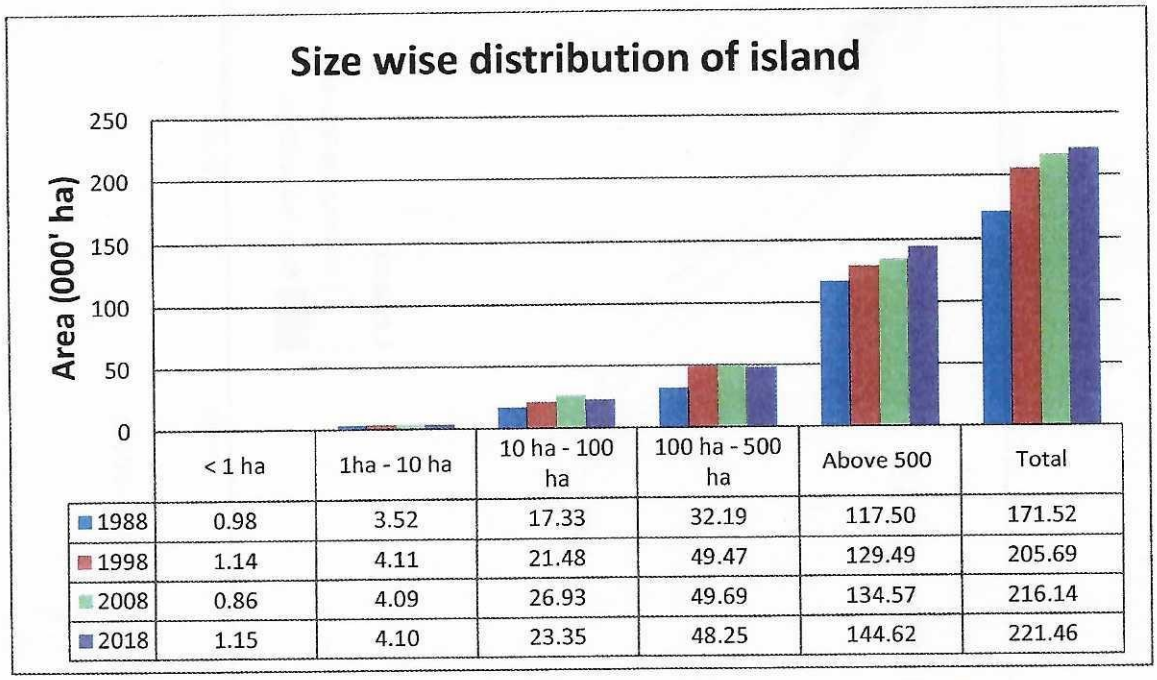


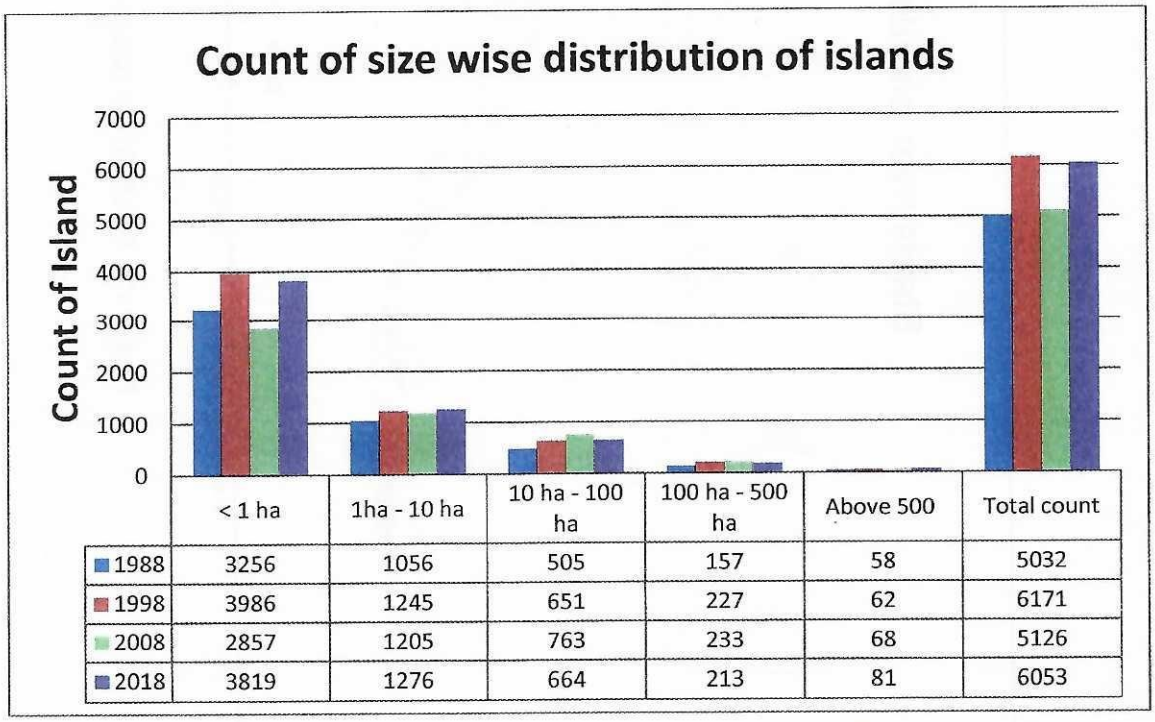
Figure 12. Stable River Islands in past 30 years (1988 -2018)

Yearly river island area statistics



	< 1 ha	1ha - 10 ha	10 ha - 100 ha	100 ha - 500 ha	Above 500	Total
1988	0.98	3.52	17.33	32.19	117.50	171.52
1998	1.14	4.11	21.48	49.47	129.49	205.69
2008	0.86	4.09	26.93	49.69	134.57	216.14
2018	1.15	4.10	23.35	48.25	144.62	221.46

Graph 1. Area wise distribution of islands from 1988 to 2018

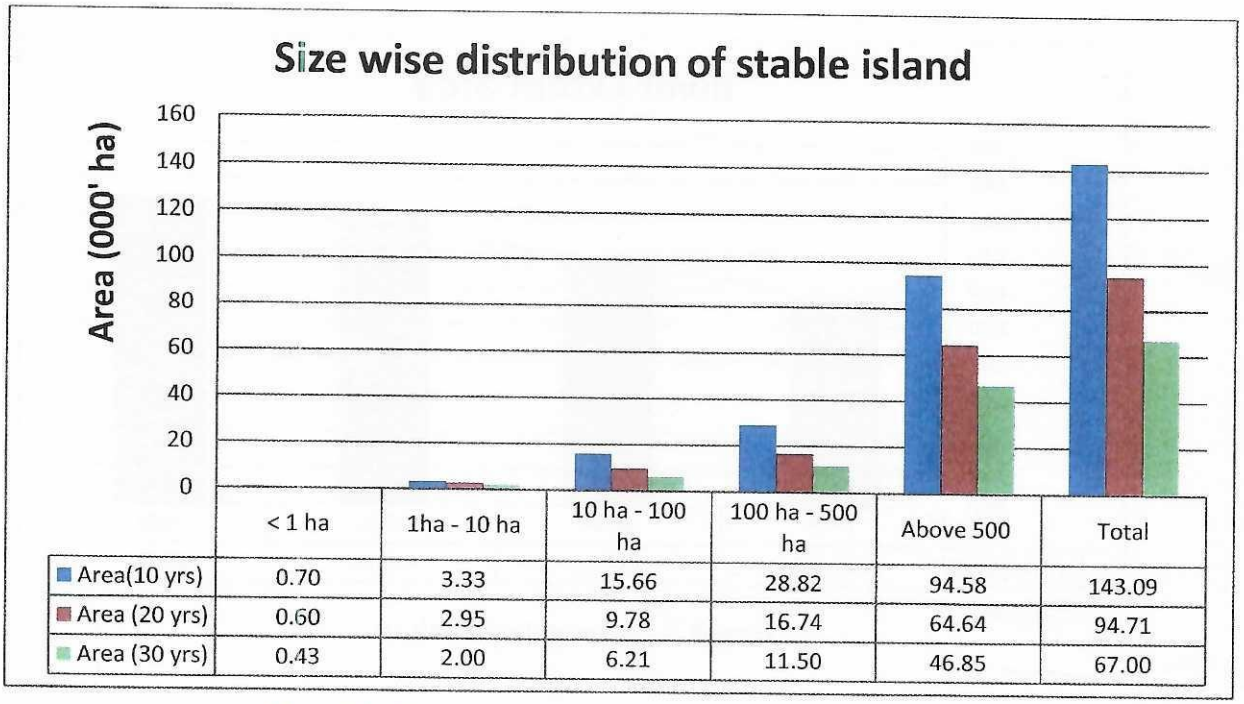


	< 1 ha	1ha - 10 ha	10 ha - 100 ha	100 ha - 500 ha	Above 500	Total count
1988	3256	1056	505	157	58	5032
1998	3986	1245	651	227	62	6171
2008	2857	1205	763	233	68	5126
2018	3819	1276	664	213	81	6053

Graph 2. Count Analysis of size wise distribution of islands

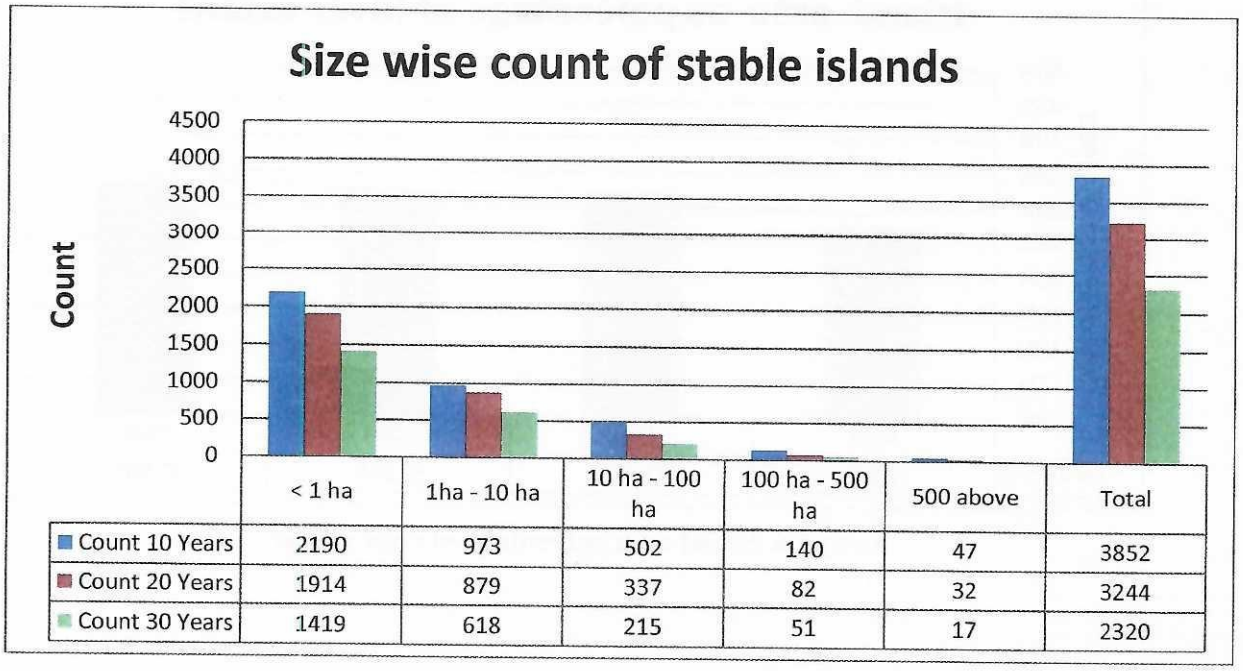
Statistics of Stable River Island

Stable Islands analysis



	< 1 ha	1ha - 10 ha	10 ha - 100 ha	100 ha - 500 ha	Above 500	Total
Area(10 yrs)	0.70	3.33	15.66	28.82	94.58	143.09
Area (20 yrs)	0.60	2.95	9.78	16.74	64.64	94.71
Area (30 yrs)	0.43	2.00	6.21	11.50	46.85	67.00

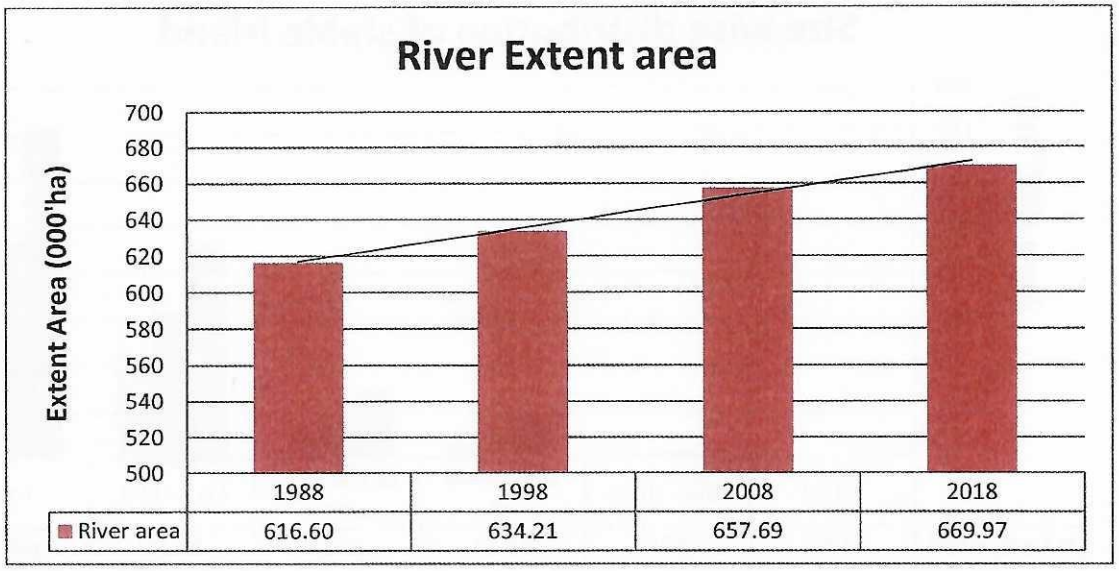
Graph 3. Size wise distribution of Stable Island



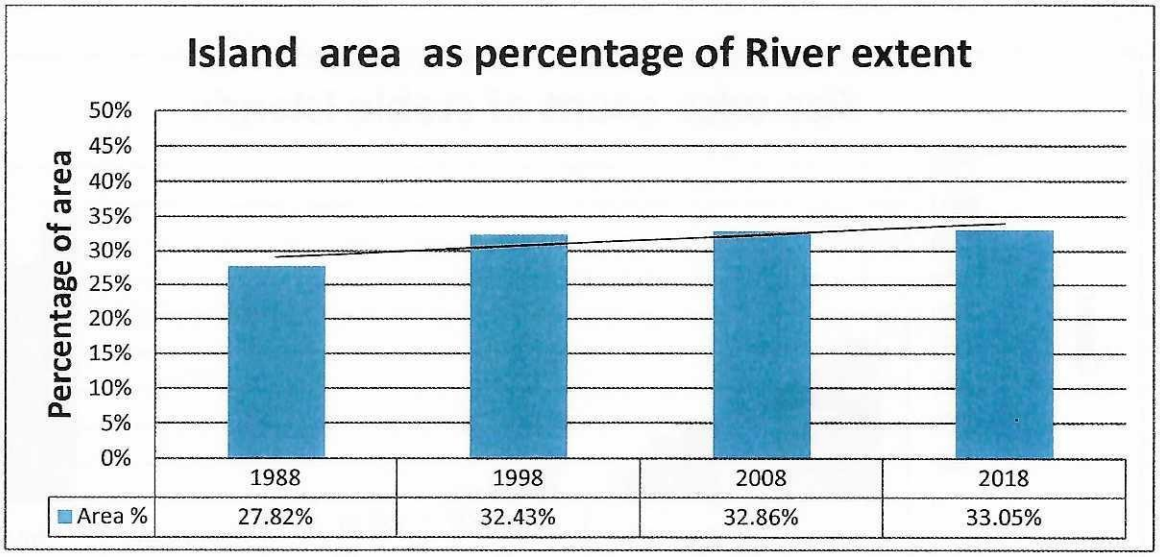
	< 1 ha	1ha - 10 ha	10 ha - 100 ha	100 ha - 500 ha	500 above	Total
Count 10 Years	2190	973	502	140	47	3852
Count 20 Years	1914	879	337	82	32	3244
Count 30 Years	1419	618	215	51	17	2320

Graph 4. Percentage of size wise distributed islands

Brahmaputra River Extent Analysis



Graph 5. River extent analysis



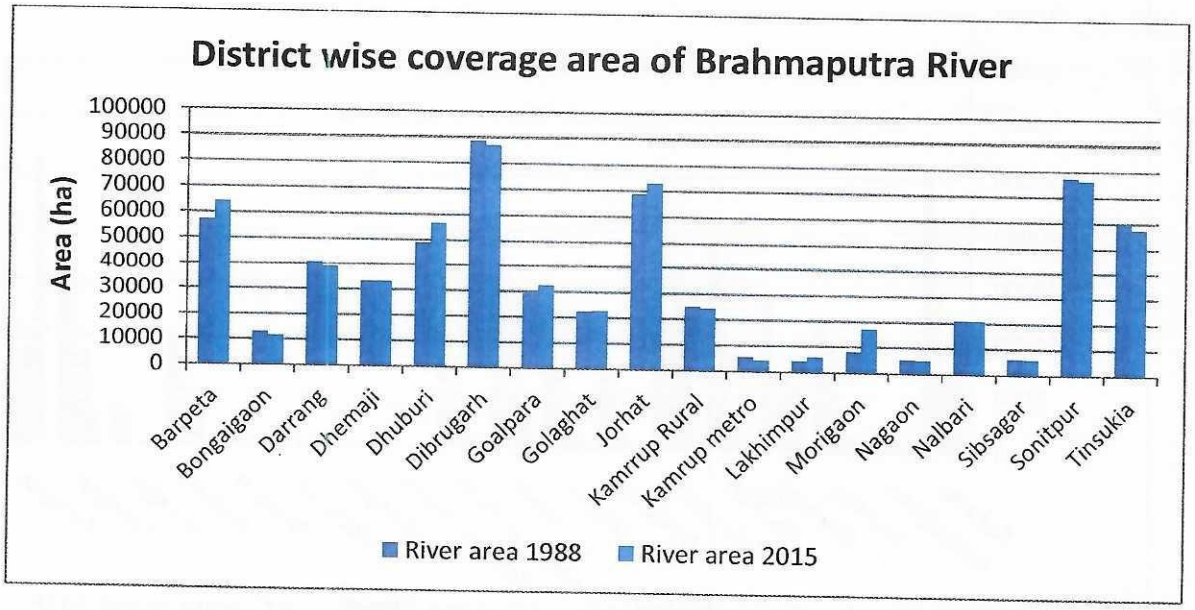
Graph 6. Island area percentage of river extent

District wise Analysis

District wise statistics for the stable river islands from 1988 to 2018

For calculating the area statistics of the stable river islands from 1988 to 2018, district boundary layer having 27 districts was overlaid on the stable islands map and statistics were generated. It was observed that Tinsukia has the largest area under river islands which remained stable from past three decades. It was due to presence of Dibru Saokhwa National park and having large quantity of sand accreditation because of being present between two major rivers Brahmaputra and Lohit. Lakhimpur has the least area under stable chars (Table 1 and Graph 7). There are districts in the Karbi Anglong and Barak region from where the Brahmaputra doesn't pass, thus these districts were not considered for statistics generation.

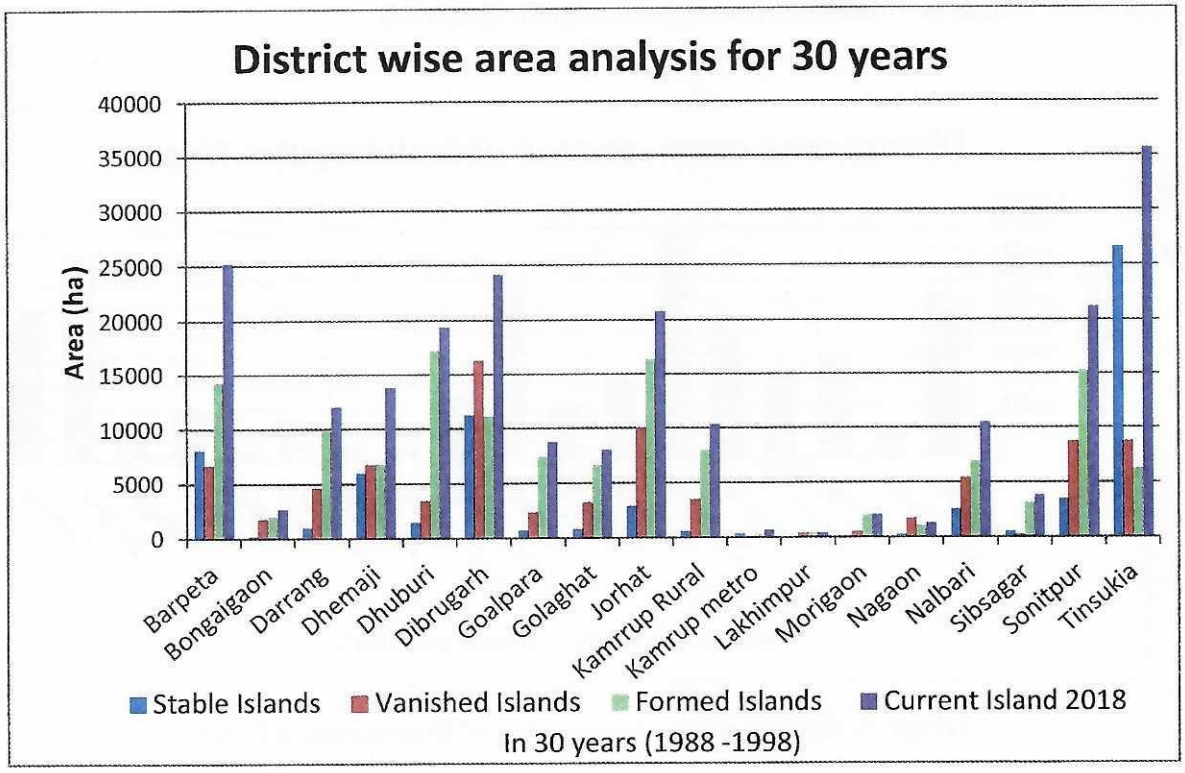
Brahmaputra River is having maximum extent in Dibrugarh followed by Sonitpur and Jorhat districts where as the least in Kamrup metro followed by Nagaon and Lakhimpur (Graph 7 & 8). It is also observed that in last three decades, overall river area has increased the most in Morigaon, followed by Dhubri and Barpeta. These are also the districts suffering from maximum erosion and losing their alluvial lands. Area of stable chars is also maximum in Tinsukia. It can be observed that Dibrugarh shows maximum island dynamics (Graph 8). Presently, island area with respect to river coverage area is maximum in Tinsukia and Sibsagar (Graph 9). In both these districts, approximately 62 percent of river area is covered with islands. If we consider the district wise count of islands, than Barpeta is having 351 islands followed by Tinsukia with 272 islands, whereas district which has the maximum area of stable islands is Tinsukia followed by Dibrugarh (Graph 10).



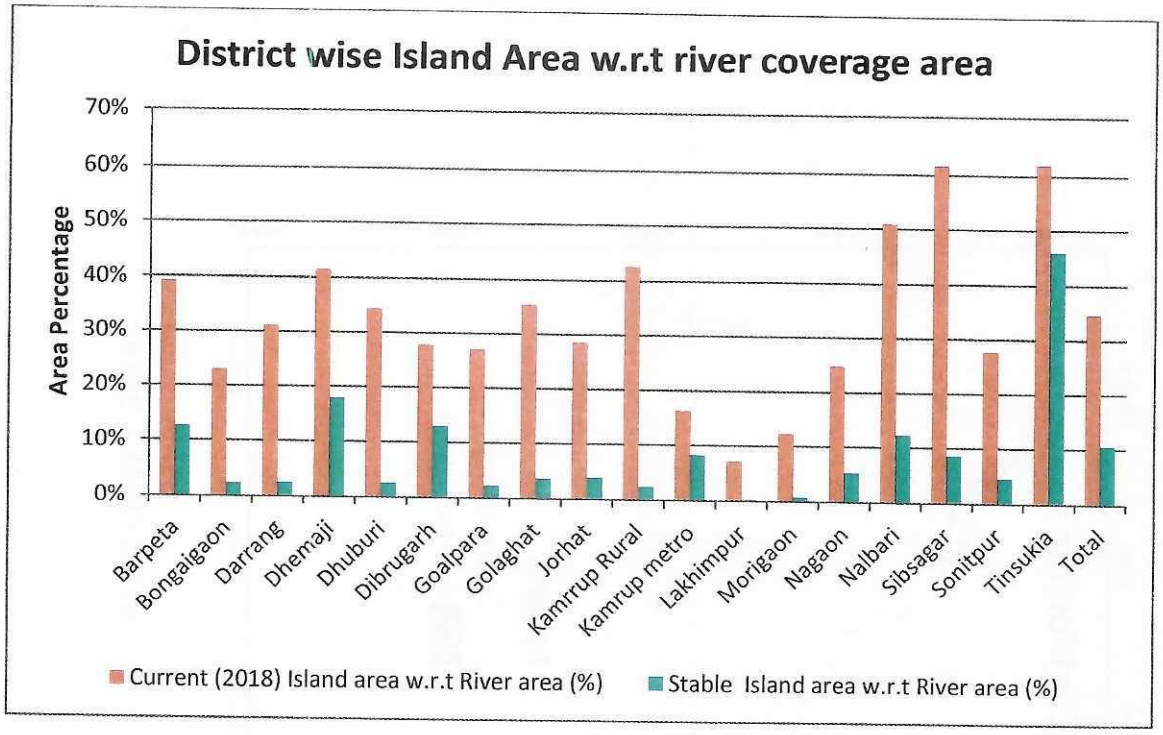
Graph 7. District wise coverage area of Brahmaputra River

Table 1. District wise statistics of stable and current island w r t river area coverage

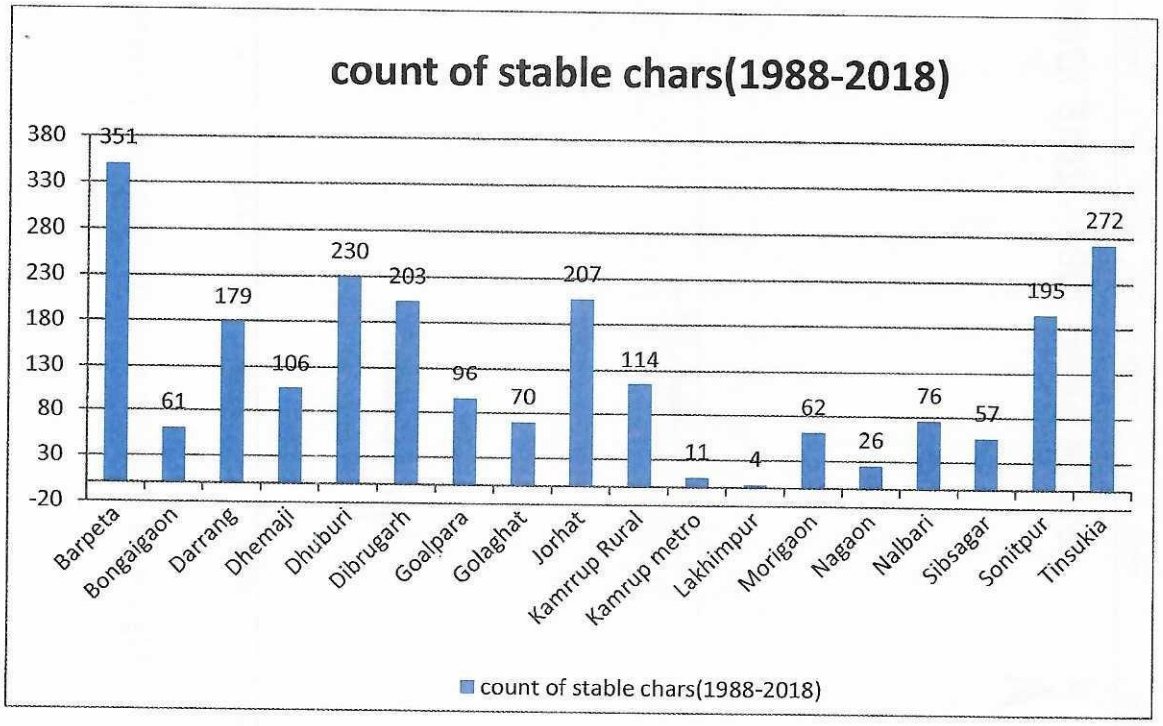
District	Stable Islands	Vanished Islands	Formed Islands	Current Island 2018
Barpeta	8109.1	6691.9	14261.4	25267.7
Bongaigaon	267.6	1806.1	1980.2	2669.7
Darrang	960.9	4672.8	9939.8	12104.9
Dhemaji	5957.2	6760.3	6781.5	13822.9
Dhuburi	1426.4	3446.8	17284.7	19450.8
Dibrugarh	11273.2	16346.5	11143.6	24243.4
Goalpara	708.6	2346.0	7411.6	8783.8
Golaghat	830.6	3280.2	6624.4	8083.8
Jorhat	2892.2	10079.4	16367.5	20858.2
Kamrrup Rural	580.3	3527.2	8025.3	10402.0
Kamrup metro	362.6	117.0	311.7	723.0
Lakhimpur	17.1	395.7	432.1	433.2
Morigaon	135.4	520.6	2004.5	2109.6
Nagaon	286.8	1755.0	1003.3	1324.4
Nalbari	2529.8	5441.7	6907.6	10560.5
Sibsagar	532.7	273.8	3148.3	3809.4
Sonitpur	3494.2	8799.2	15231.7	21221.2
Tinsukia	26624.9	8825.0	6227.6	35788.4
Total	**66989**	**85085**	**135087**	**221657**



Graph 8. District wise islands area analysis from 1988 to 2018



Graph 9. District wise Island Area w.r.t river coverage area



Graph 10. Count of stable chars for the period (1988 - 2018)

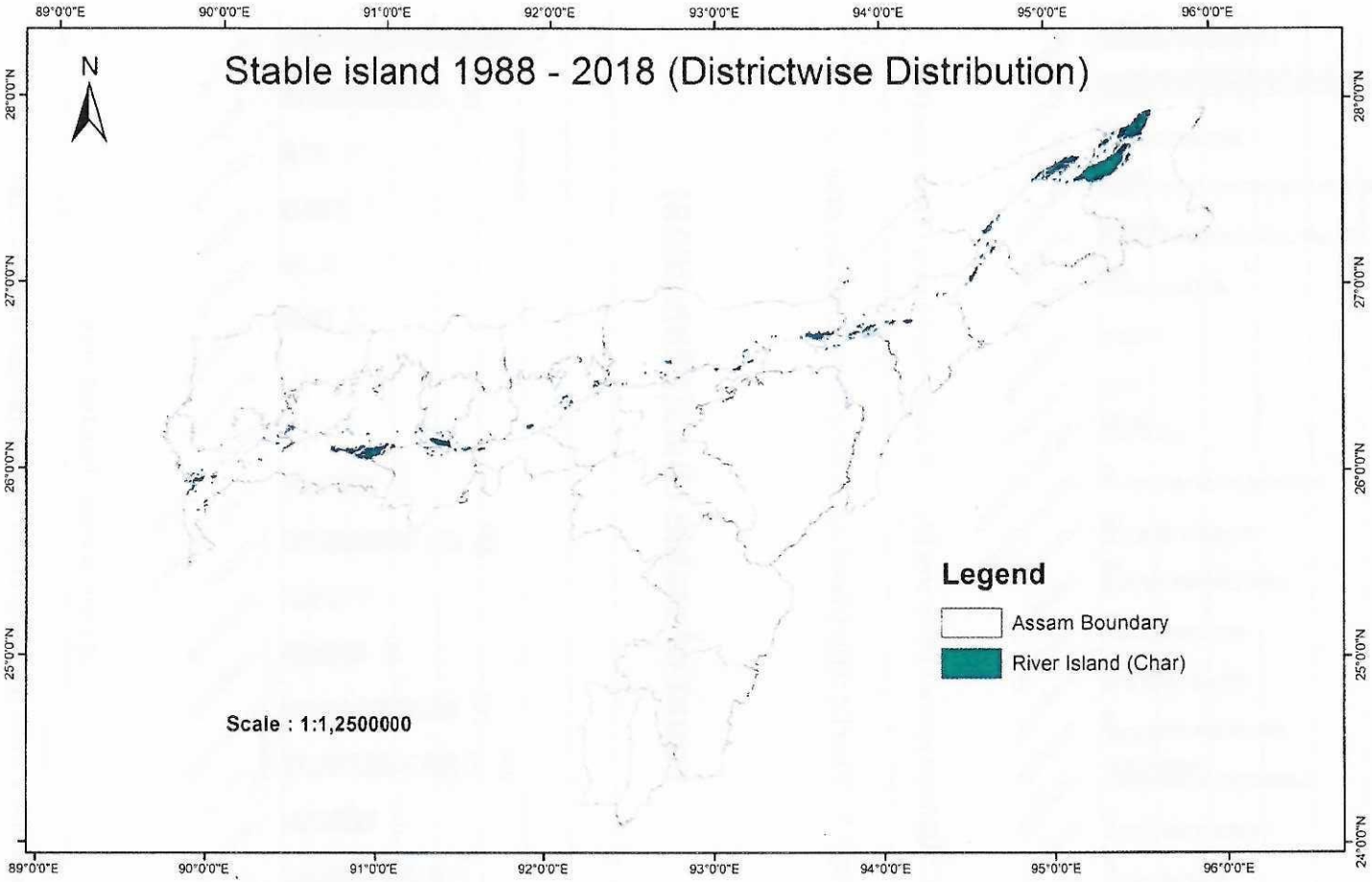


Figure 13. District wise distribution of Stable Island for the period (1988 – 2018)

Identification of stable chars during peak monsoon season using SAR data

Identification of flood resilient islands during peak monsoon season:

During the peak monsoon season identification of stable vegetative chars become difficult due to non availability of optical data. To identify the chars which are not affected by flood inundation during the monsoon season, Sentinel-1 SAR data is used. In the end, 30 years (1988-2018) stable char which are not affected by floods in the last 3 years (2014-2017) are identified and mapped as shown in Figure.25. It is observed that there are approximately 16 chars having area greater than 500 ha and are not affected by flood inundation. The statistics of the chars is given in Graph 8 & 9.

Comparison of flood resilient islands with the vegetative chars for year 2018

During this study, for the season 2017-18, flood resilient islands obtained from Sentinel-1 data were compared with the post flood stable vegetative bars as obtained using Landsat data. It is observed that almost all islands which are not affected by floods later turn into stable vegetative bars. This may be also true in the sense that if there are flood in particular islands than the vegetation and other existing features will be destroyed in that island whereas islands which are not affected by floods will allow the healthy vegetation to grow for longer duration and these vegetation can easily be mapped by landsat satellite imagery.

Thus it can be suggested that to identify the stable islands for that particular season, it is highly recommended to use SAR data for identifying the flood resilient islands. Once these flood resilient stable islands are identified than during the post monsoon season activities such as crop expansion and other government schemes can be implemented at an early stage which will provide ample time for execution of these schemes on these islands to flourish before the next monsoon season comes.

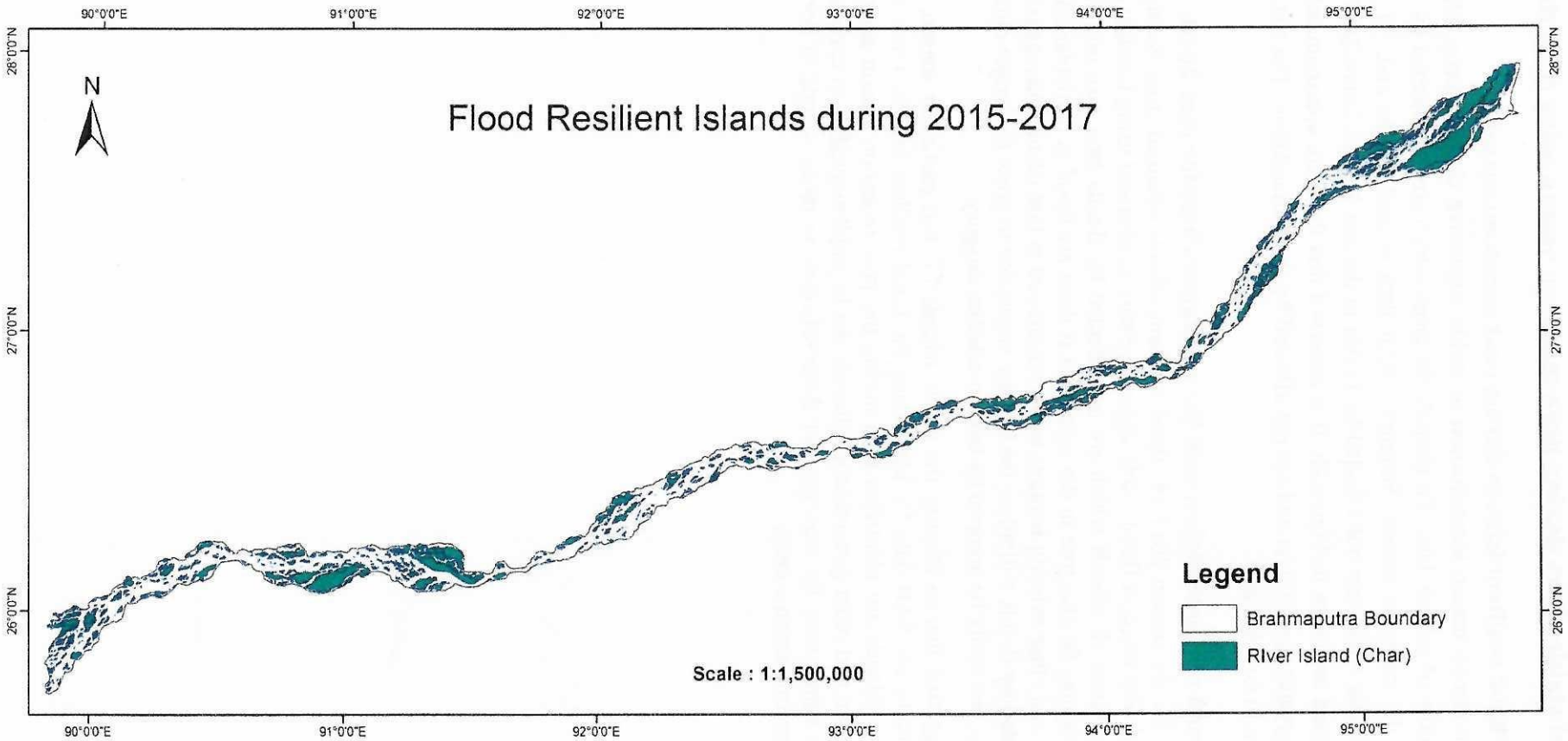


Figure 14. Flood Resilient Island during 2015 - 2017

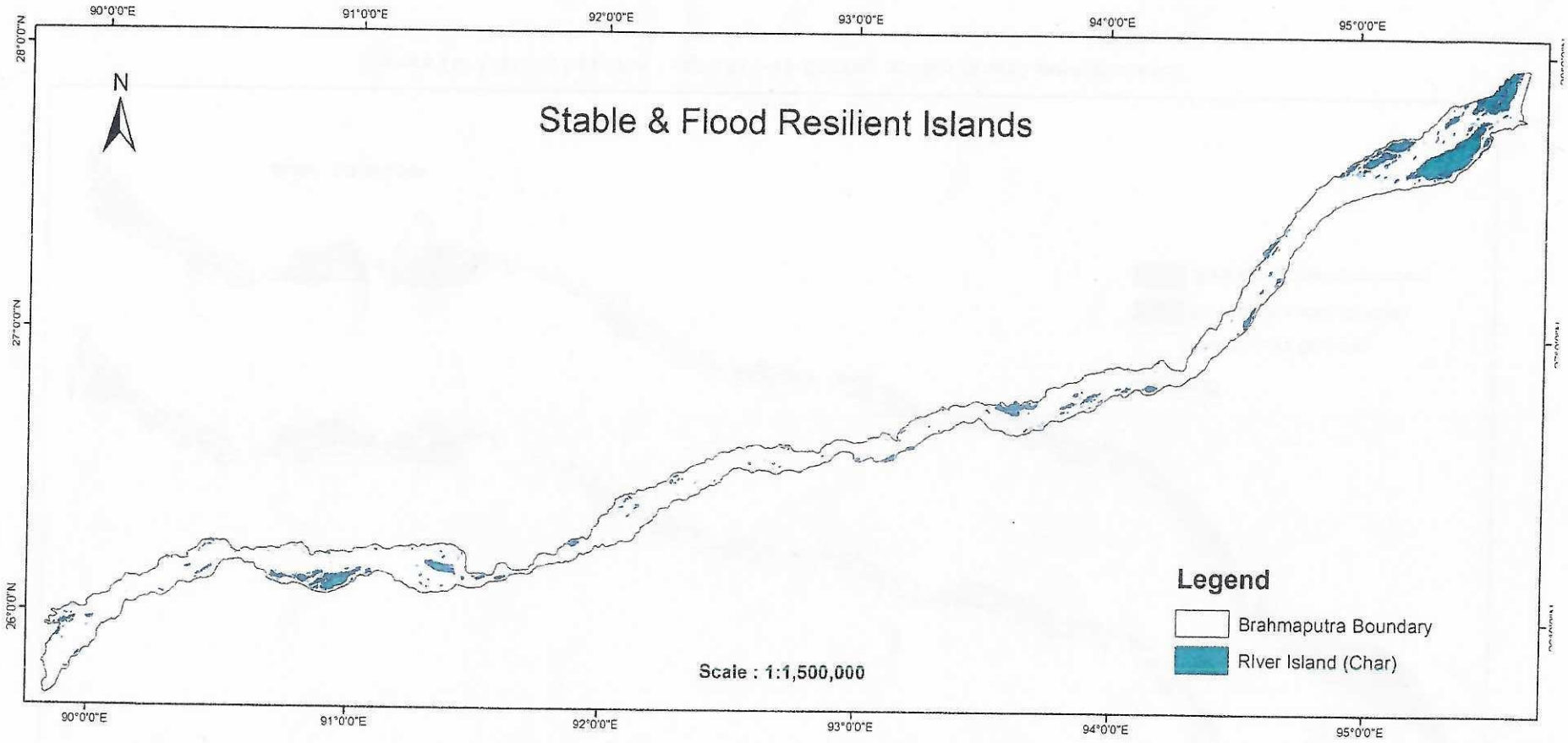


Figure 15. Stable and Flood Resilient Island

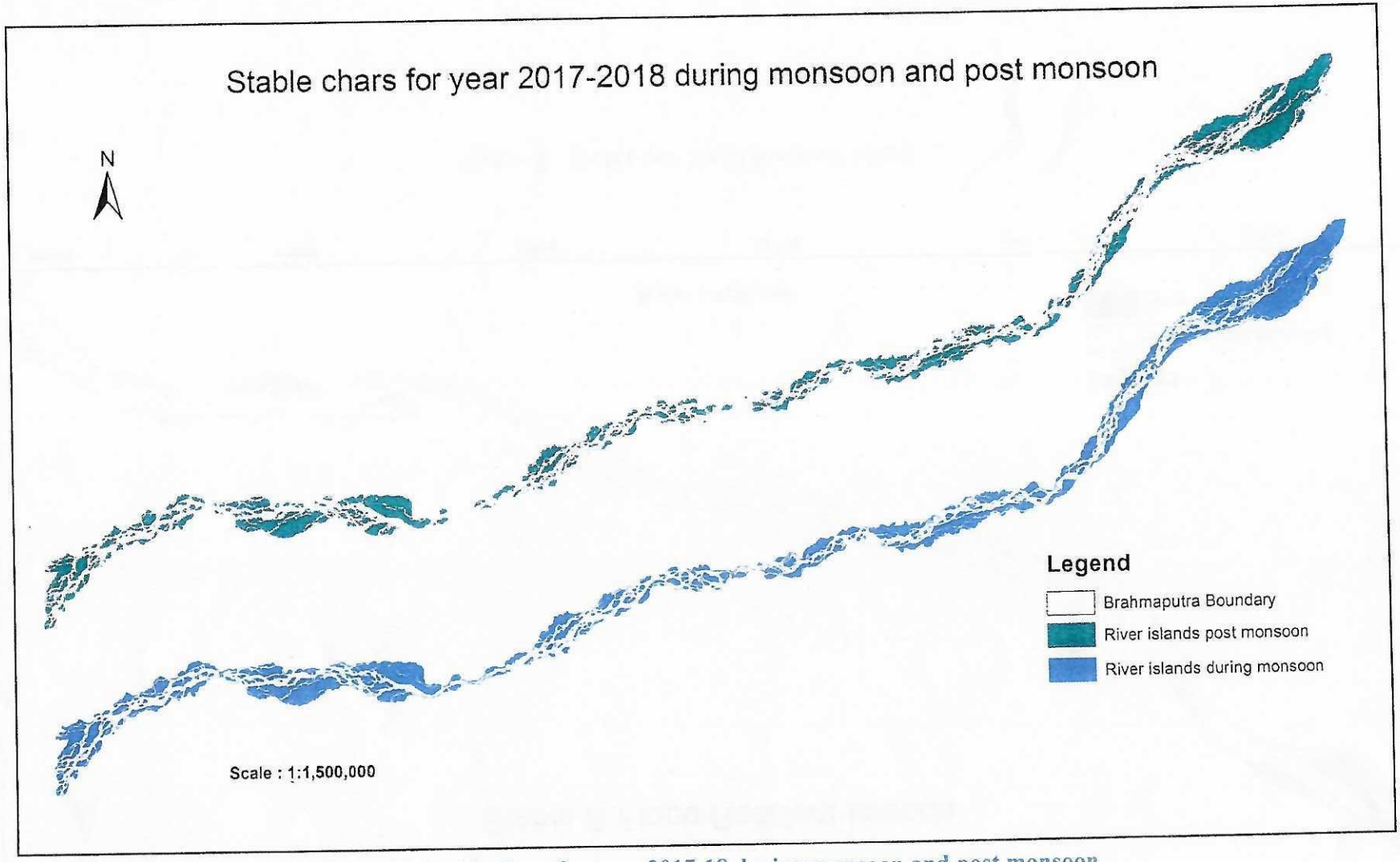
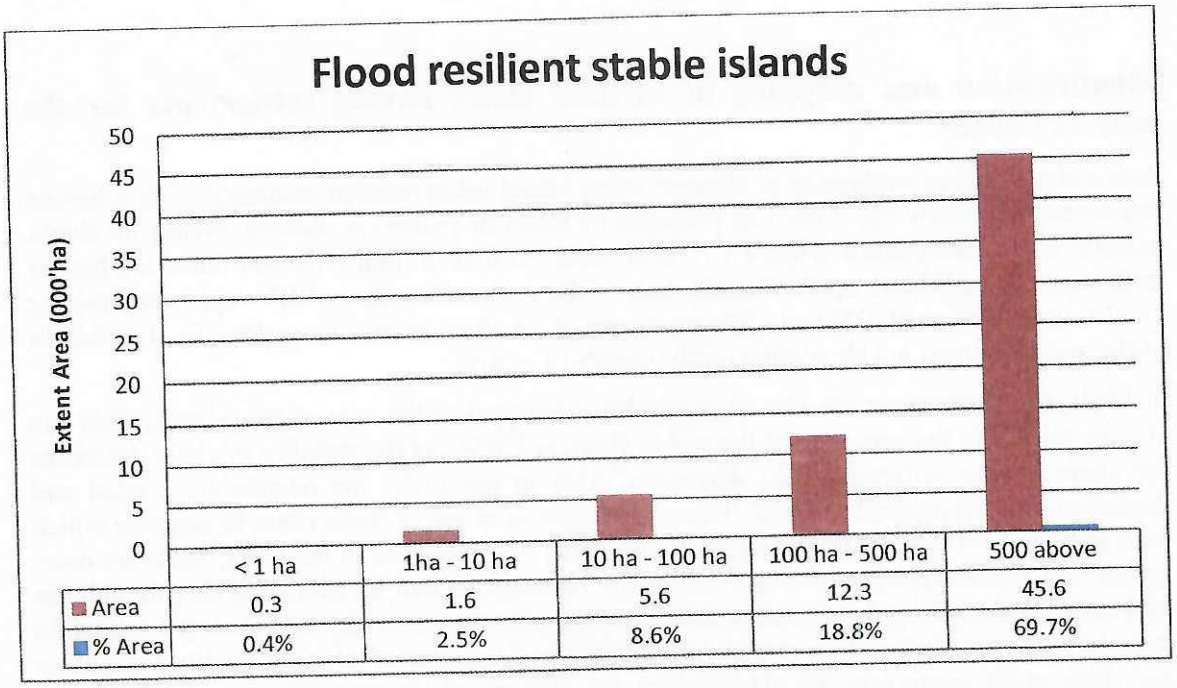
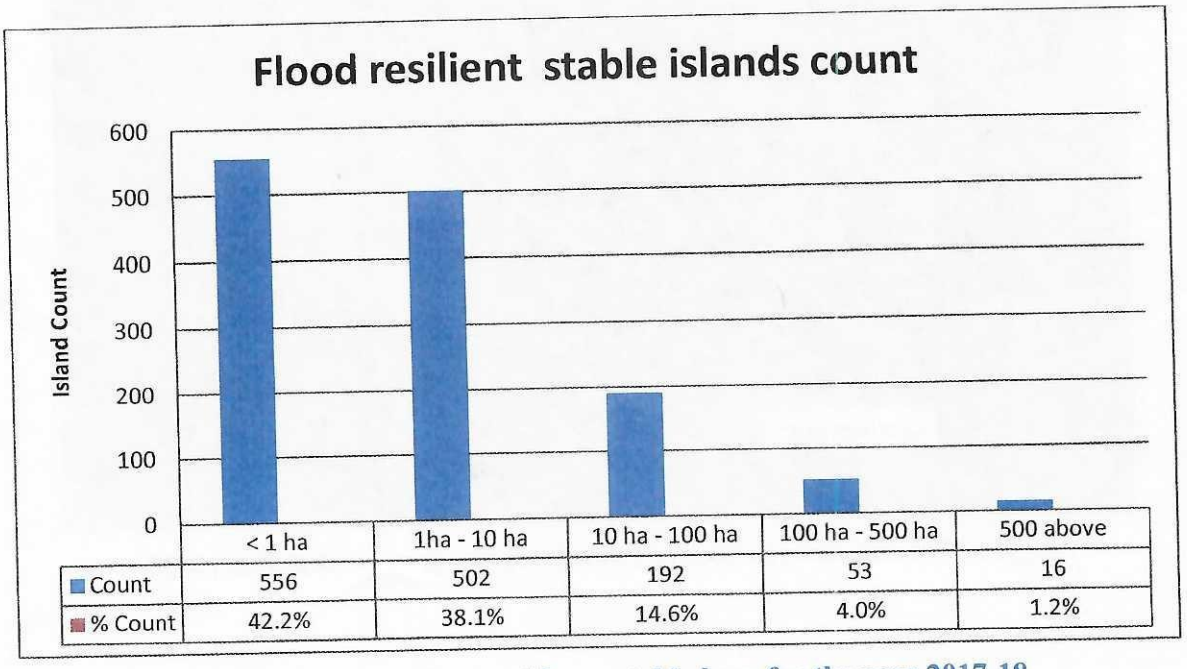


Figure 16. Stable chars for year 2017-18 during monsoon and post monsoon



Graph 11. Flood resilient stable vegetable bars for the year 2017-18



Graph 12. Flood resilient stable vegetable bars for the year 2017-18

Identification and mapping of existing chars having settlements for the year 217-2018:

Stable chars having settlement is mapped using visual interpretation technique. Chars having settlement will show signs such as presence of roads or pathways, houses having tin sheds, definite settlement pattern (Figure 17). It is observed that in total only 449 chars are having settlement. Out of these, approximately half of the settlements are in LBV region comprising of 213 chars whereas CBV and UBV comprise of 74 chars each (Figure 18 -20). The details of the stats observed are shown in Graph (Graph 13 – 20)

In UBV, the settlements are almost negligible compared to the size of the islands. This can also be related to the presence of the stable chars in UBV. As the stability of chars decreases the chars having settlement also decreases. Also in the LBV, the islands are eroded and deposited more compared to UBV. The erosion forced many of these chars to separate which used to be part of the mainland originally. It is also observed that in the CBV, there are more agriculture farms showing presence of variety of crops. It can be predicted that though the habitation in these islands is less but seasonal migration is more. And this seasonal migration is mainly to grow crops. This can also be related to the presence of good quality vegetables and other crops coming to the market from the districts of Darrang, Morigaon and Nagaon falling in the CBV region.

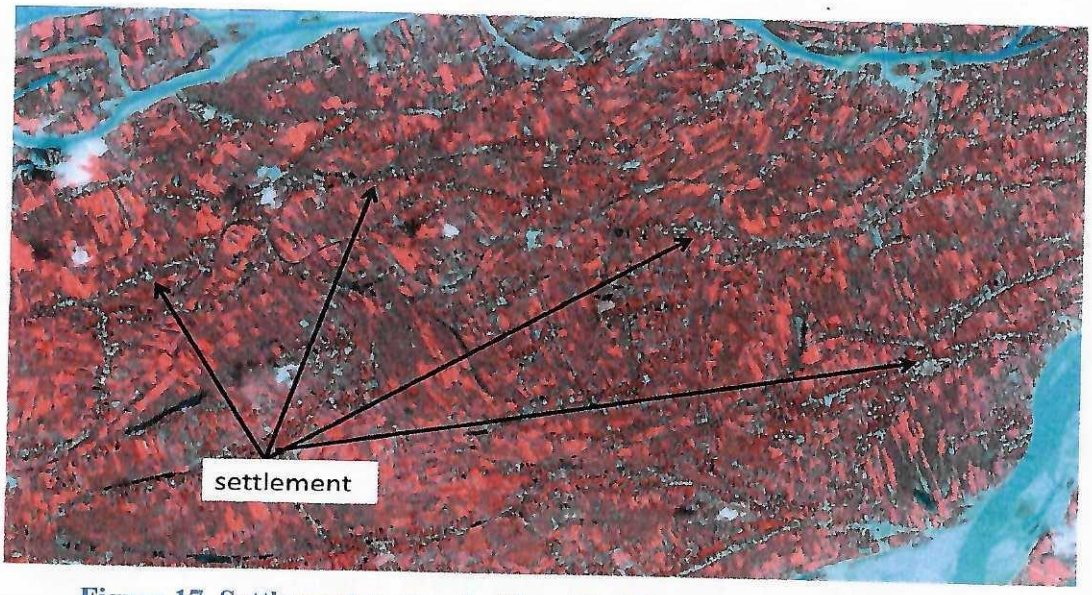


Figure 17. Settlement as seen in Planet Lab imagery for 3rd June, 2018

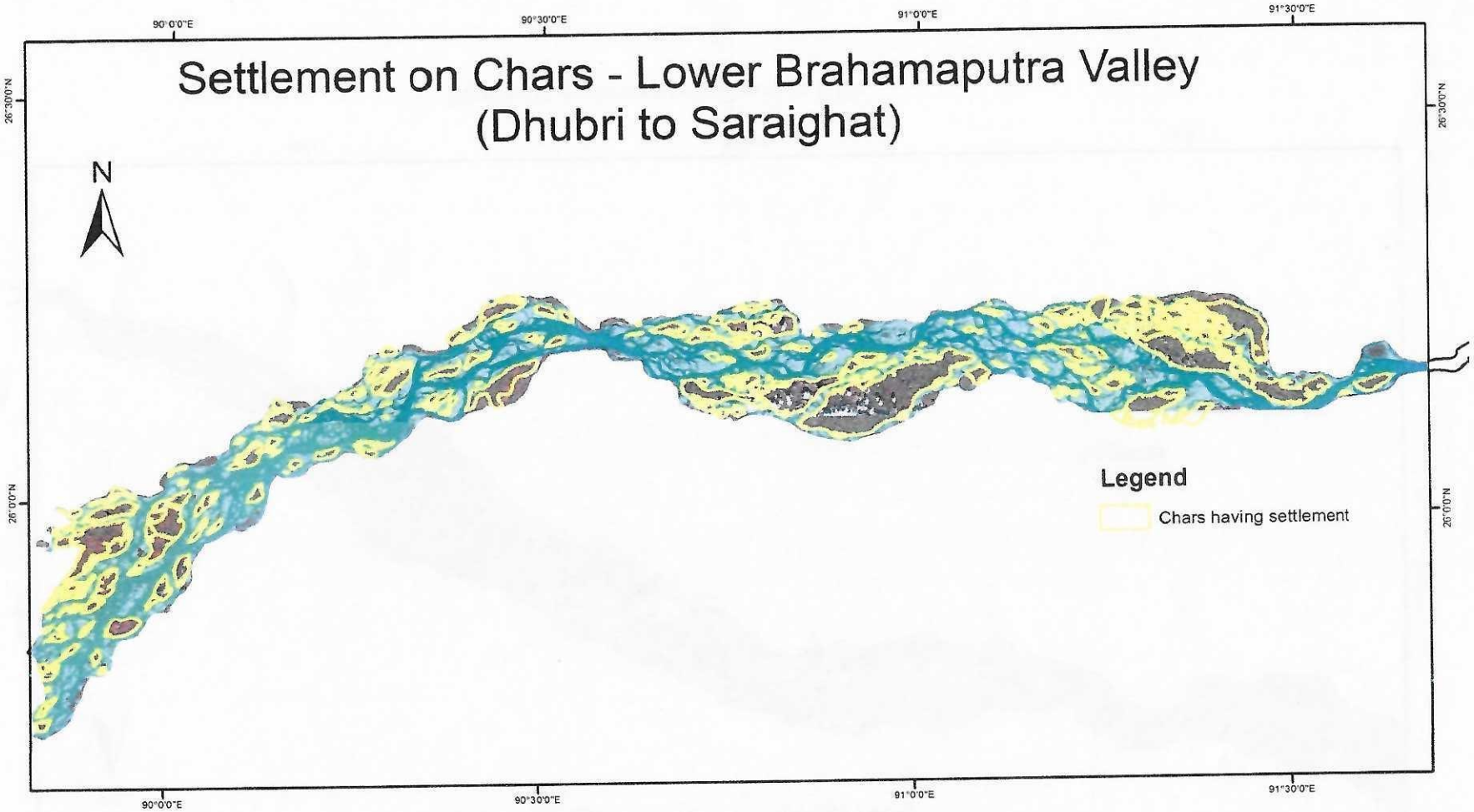


Figure 18. Settlement on Chars in LBV

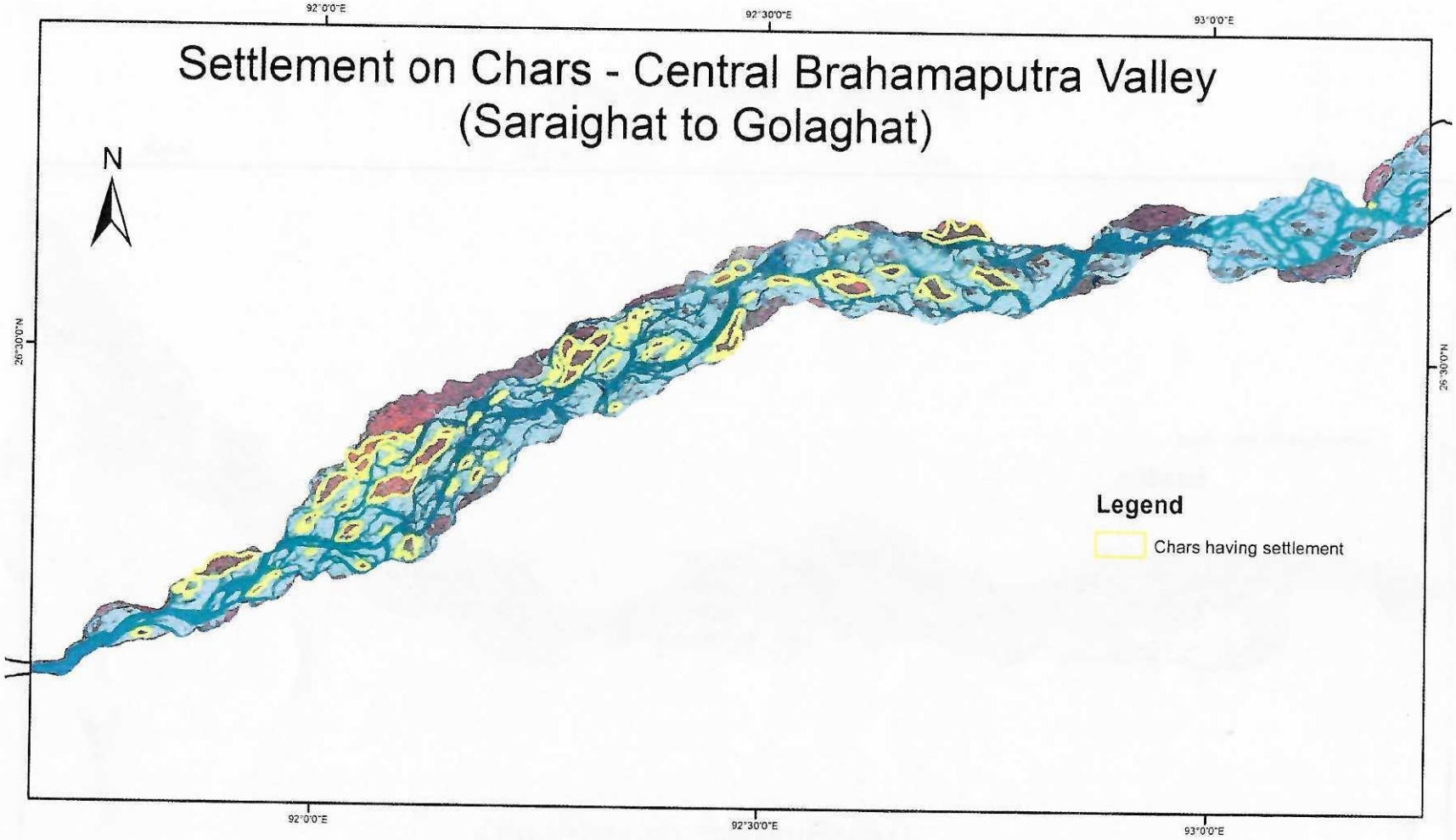


Figure 19. Settlement on Chars in CBV

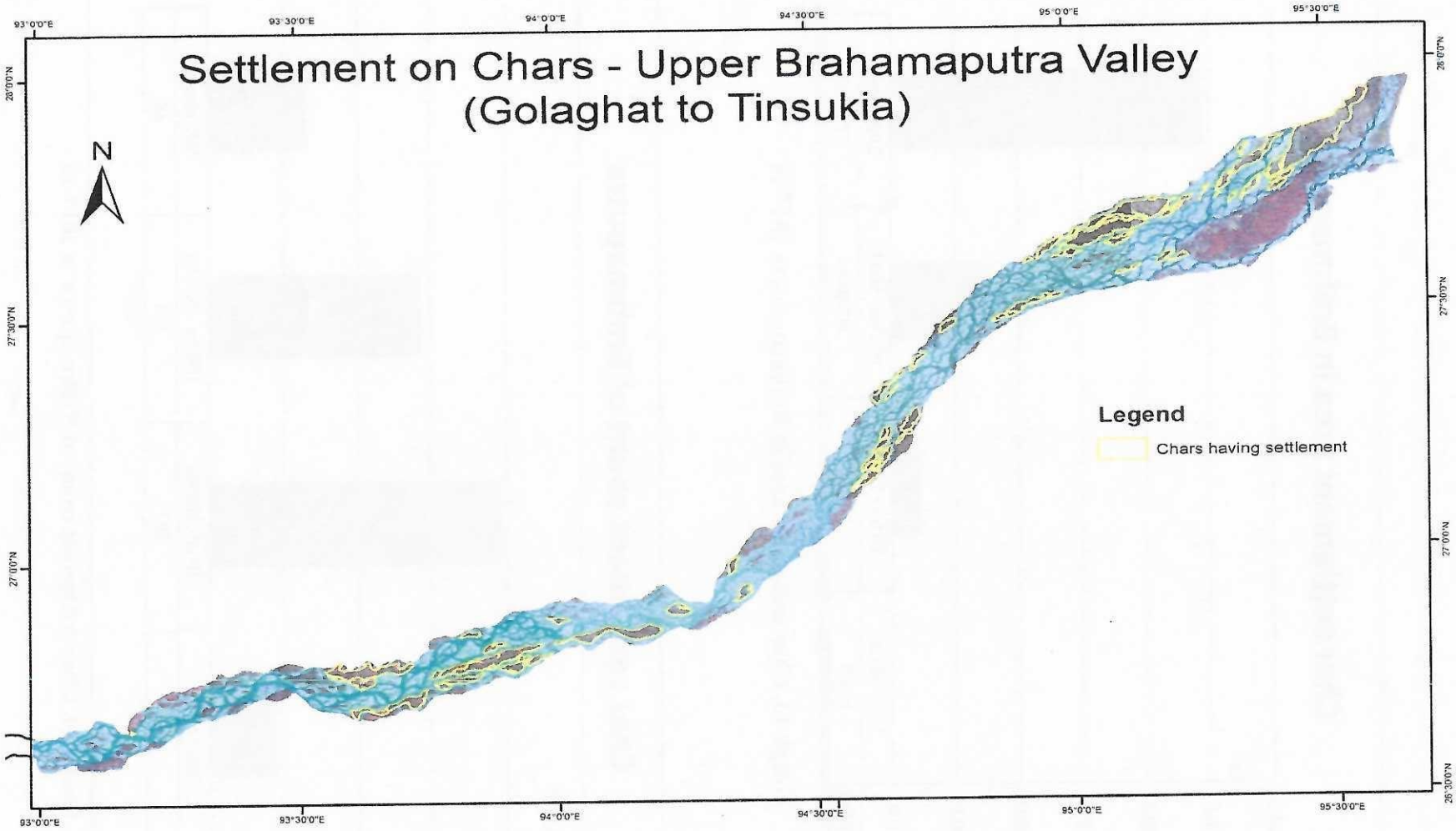
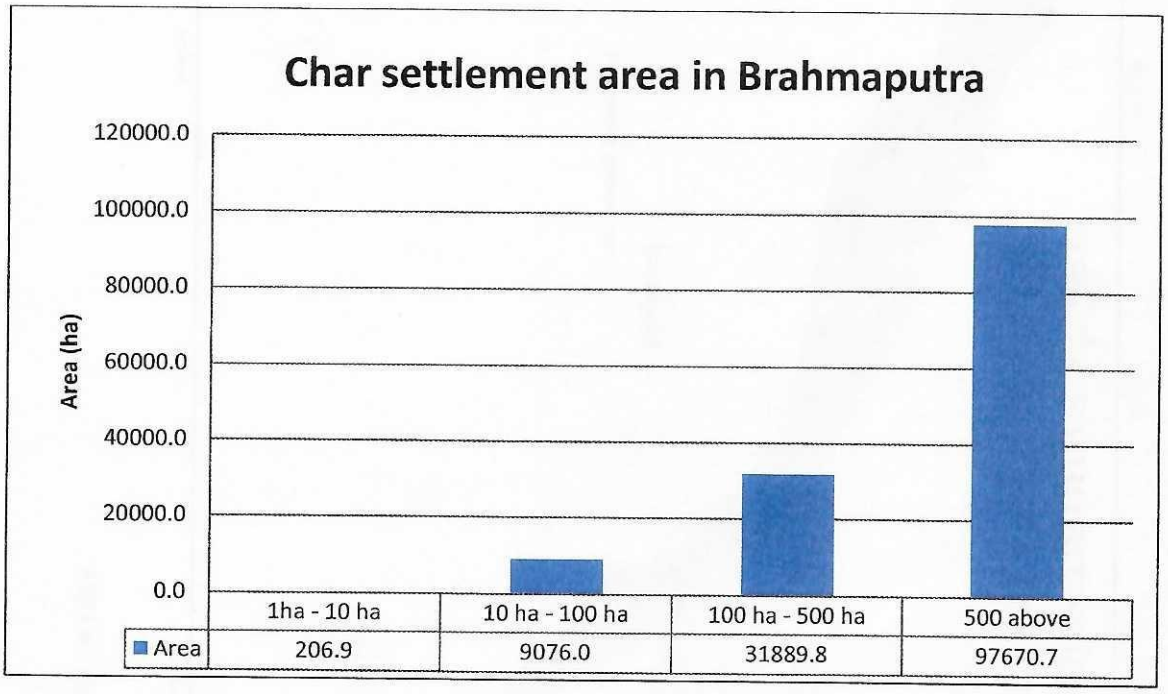
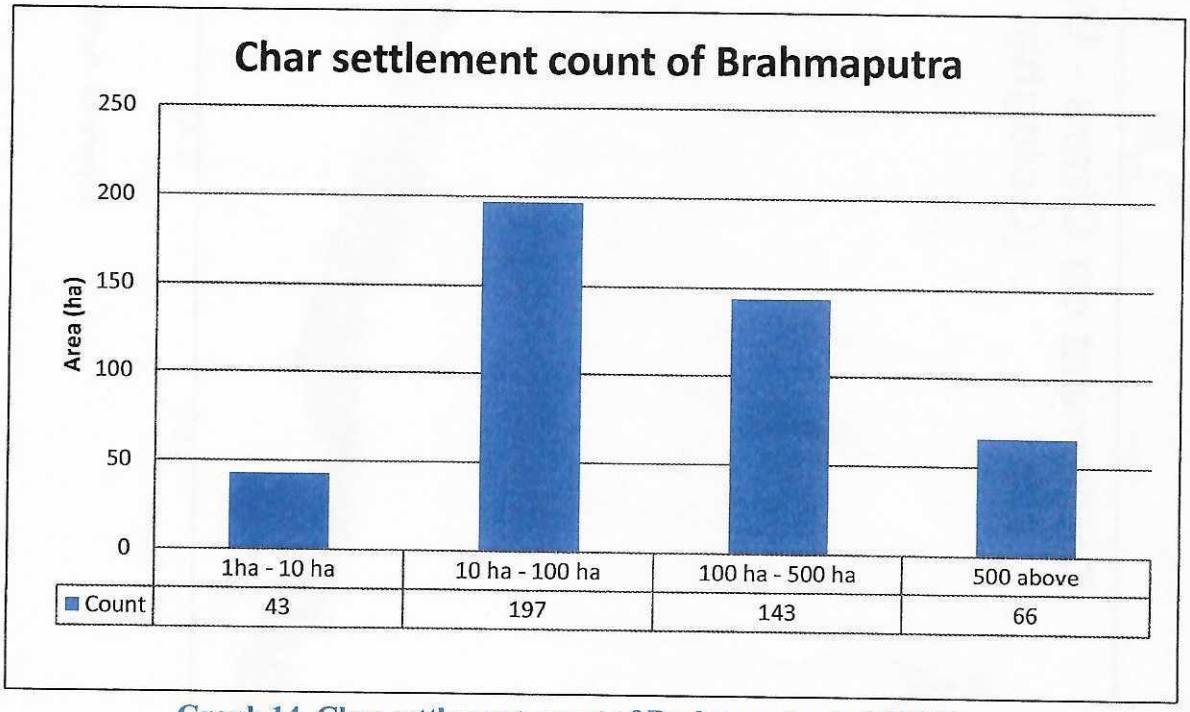


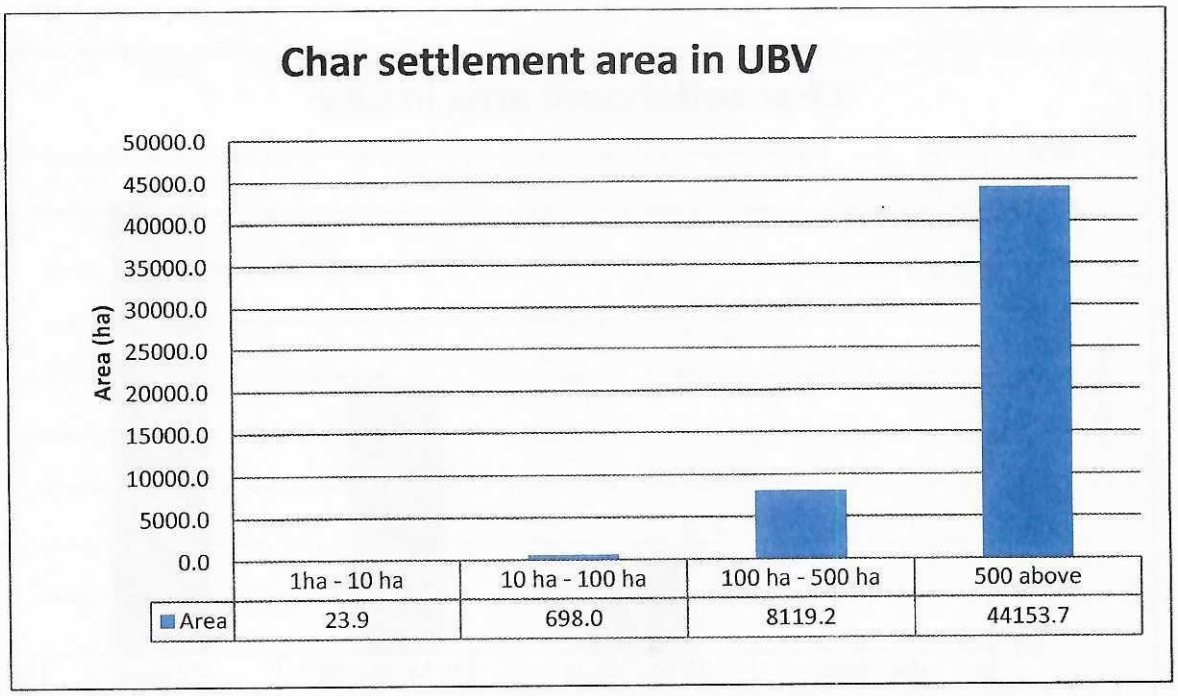
Figure 20. Settlement on Chars in UBV



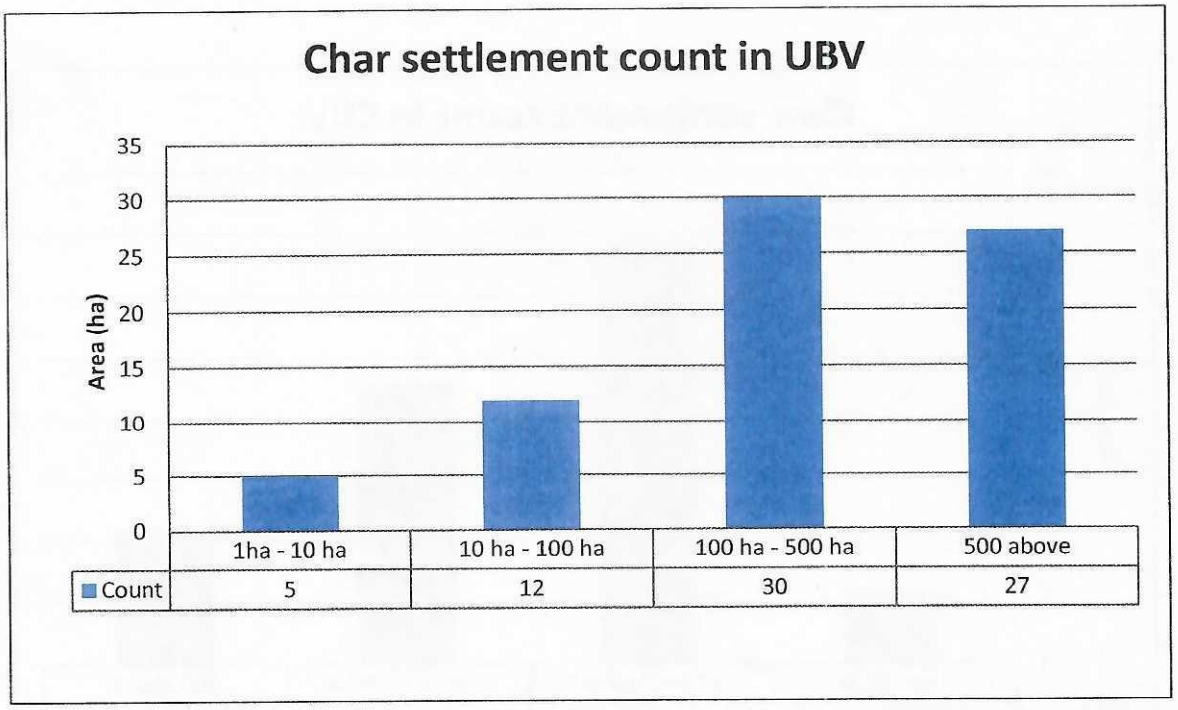
Graph 13. Char settlement area in Brahmaputra in 2017-18



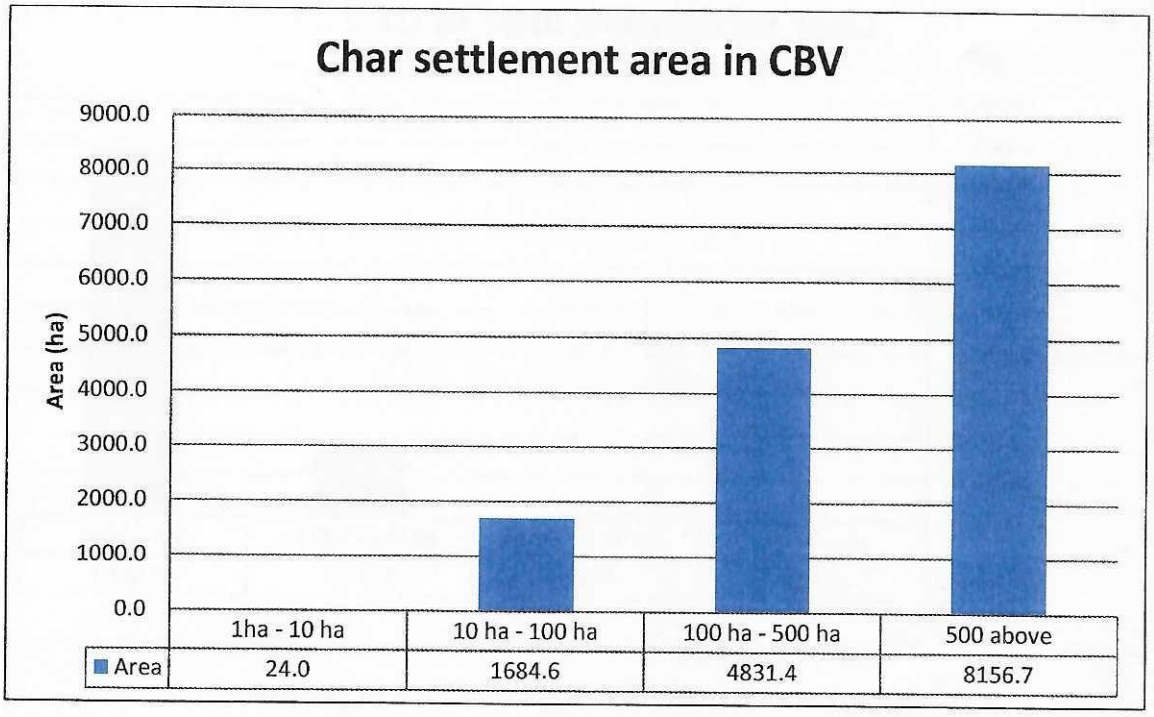
Graph 14. Char settlement count of Brahmaputra in 2017-18



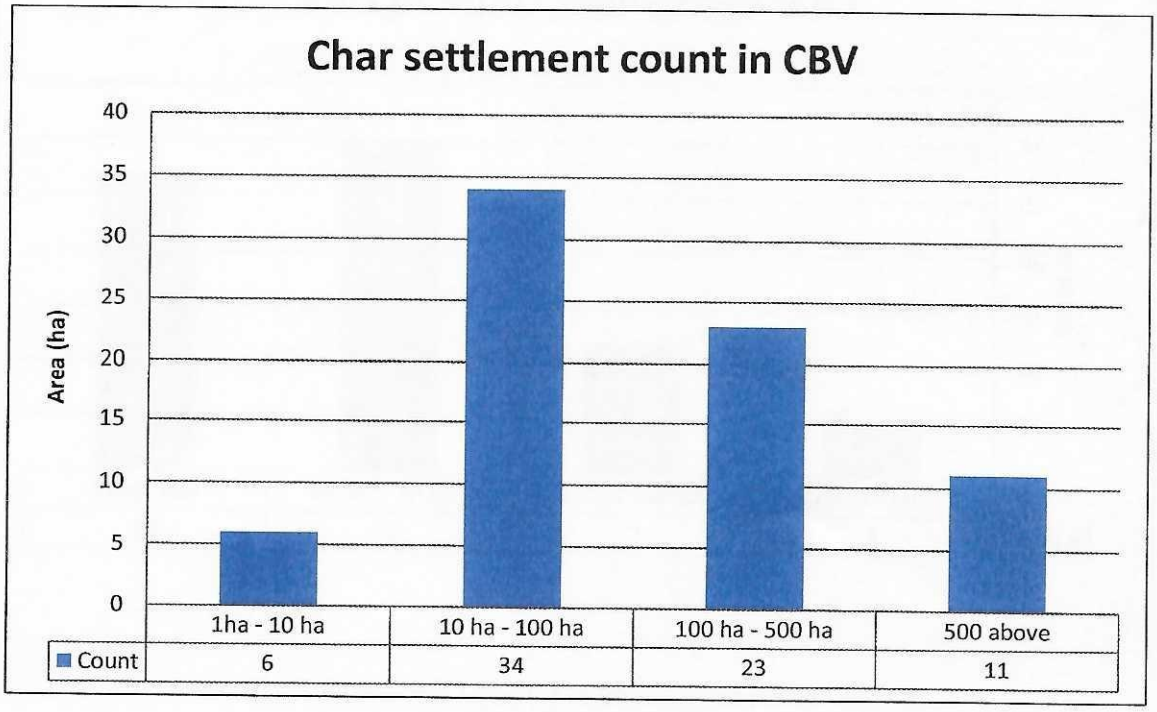
Graph 15. Char settlement area in UBV in 2017-18



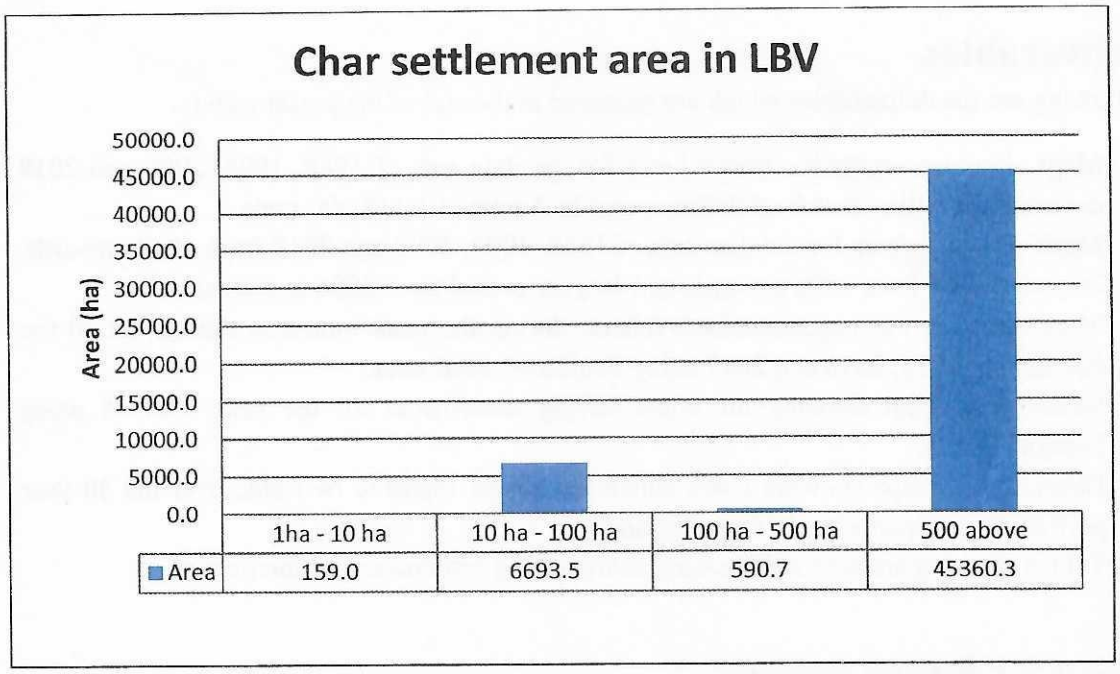
Graph 16. Char settlement count in UBV in 2017-18



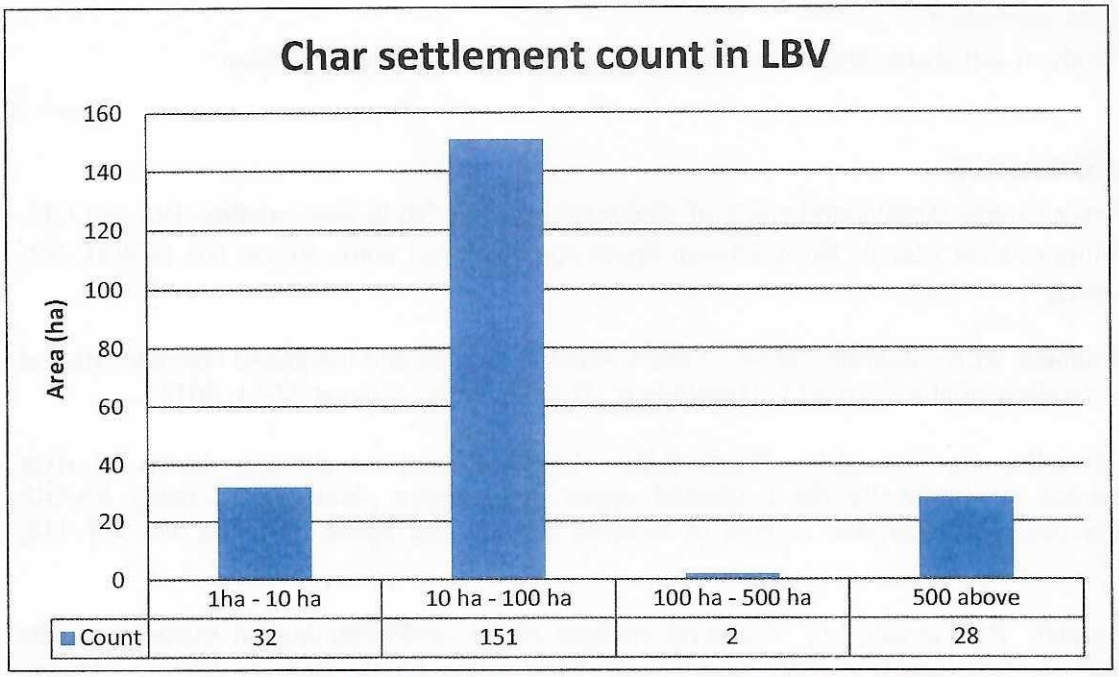
Graph 17. Char settlement area in CBV in 2017-18



Graph 18. Char settlement count in CBV in 2017-18



Graph 19. Char settlement area in LBV in 2017-18



Graph 20. Char settlement count in LBV in 2017-18

Deliverables

Following are the deliverables which are prepared at the end of the present study.

1. Maps showing vegetative bars (chars) for the data sets of 1988, 1998, 2008 and 2018 covering the entire stretch of Brahmaputra in Assam at 1:150,000 scale.
2. Maps showing chars for the data sets of 1988, 1998, 2008 and 2018 from 1988 onwards, 20 year period from 1998 onwards and 10 year period from 2008 onwards.
3. Maps showing the vegetative bars (chars) during the peak monsoon season for all the data sets of 2015, 2016 and 2017 using Sentinel-1 SAR data.
4. Sector wise Map showing the chars having settlements for the year 2017-18 using Sentinel-2 data.
5. District wise maps showing chars which have been found to be stable over the 30 year period, 20 year period and 10 year period.
6. Tables showing areas of stable chars, chars having settlement and their count.

Scope for future studies

a) Study of Bank line migration, erosion of Brahmaputra main channel with high resolution (both spatial and temporal) data and finer scale of mapping for suggesting locations for bank protection.
b) Study of soil characteristics for site suitability analysis for crop expansion.

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