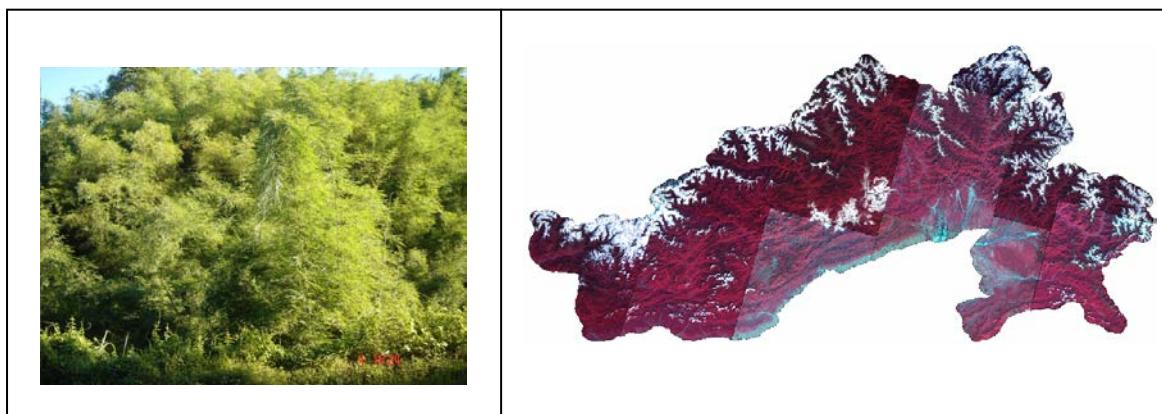


# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH USING REMOTE SENSING AND GIS

*Project Report*



*Sponsored by*  
**State Forest Research Institute, Itanagar**

*Prepared by*  
**NORTH EASTERN SPACE APPLICATIONS CENTRE**  
**Department of Space, Govt. of India**  
Umiam – 793103, Meghalaya

March 2008

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**Project team**

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# **1. INTRODUCTION**

## **1.1 Bamboo in NER**

Bamboo is a wonderful gift of nature. Bamboo, one of the oldest building materials used by the mankind, is also known as poor mans wood. Bamboos are giant, woody, tree-like grasses and have a long history as a versatile and widely used renewable resource. Bamboos provide construction material for shelter, tools and implements for agriculture, pulp for paper, and materials for many handicrafts. In addition, bamboo conserves soil. People of North Eastern Region heavily depend on bamboos for various domestic and agricultural purposes. The handicraft prepared in this region using bamboo has gained popularity both nationally and internationally. Besides having its multifarious uses, bamboos have rarely been planted in forest. Previously, bamboo formed a perpetual resource because of its vigorous growth. It is estimated that more than 66% of India's bamboo stock is located in the North Eastern States of India. Bamboo is found in abundant in all states of the North Eastern Region of India (NER). The state wise distribution of bamboo genera in NER is given in Table 1. The maximum number of genera has been reported from Arunachal Pradesh. (Seethalakshmi *et.al.*, 1998). But at present, overexploitation of forest resources including bamboo associated with growing human population, destruction of tropical forests and demands for industrial uses have together contributed to severe loss of stock. The alarming rate of deforestation has also accelerated genetic erosion, especially in areas of indigenous bamboo diversity, in India mostly in the eastern part (Banik, 2000). There is an urgent need to explore ways and means to promote genetic conservation. The situation calls for immediate attention to mapping and monitoring of bamboo resources and area expansion under bamboo plantation to meet the increasing demand of planting materials.

As part of the attempt to popularize bamboo products, the Government of India has also taken up the membership of the International Network for Bamboo and Rattan (INBAR). On world environment day in June, 1999, the Prime Minister of India announced a major initiative, committing the government of India to a comprehensive and integrated programme to develop the bamboo sector in the country. It involves a number of Ministries and individual state governments and aims to give a major boost to the sector for economic development, income and employment, particularly in the north east, where the plentiful natural bamboo

resources can be an important vehicle for substantial and widespread economic development. Indeed, the governments of the North east have the greatest interest in developing the sector. Not only do they have the natural capital on which to base such development (we have two thirds of India's bamboo growing stock is in the seven north east states), but they have the crucial and traditional associations with the material, and crucially, a limited number of alternative options for regional development (INBAR, 2001; Talukdar, 2001).

Table1: State wise distribution of bamboo genera in NER

SI No	States	Genera
1	Arunachal Pradesh	<i>Arundinaria</i> , <i>Bambusa</i> , <i>Chimonobambusa</i> , <i>Dendrocalamus</i> , <i>Gigantochloa</i> , <i>Phyllostachys</i> , <i>Pleioblastus</i> , <i>Schizostachyum</i> , <i>Sinarundinaria</i> , <i>Thamnochalamus</i> and <i>Thyrsostachys</i>
2	Assam	<i>Bambusa</i> , <i>Dendrocalamus</i> , <i>Dinochloa</i> , <i>Gigantochloa</i> , <i>Melocanna</i> , <i>Oxtenanthera</i> , <i>Phyllostachys</i> , <i>Racemobambos</i> and <i>Schizostachyum</i>
3	Manipur	<i>Bambusa</i> , <i>Chimonobambusa</i> , <i>Dendrocalamus</i> , <i>Dinochloa</i> , <i>Melocanna</i> , <i>Racemobambos</i> , <i>Schizostachyum</i> and <i>Sinarundianaria</i>
4	Meghalaya	<i>Bambusa</i> , <i>Chimonobambusa</i> , <i>Dendrocalamus</i> , <i>Dinochloa</i> , <i>Gigantochloa</i> , <i>Melocanna</i> , <i>Recemobambos</i> , <i>Phyllostachys</i> , <i>Schizostachyum</i> and <i>Sinarundianaria</i>
5	Mizoram	<i>Bambusa</i> , <i>Chimonobambusa</i> , <i>Dendrocalamus</i> , <i>Gigantochloa</i> , <i>Melocanna</i> , <i>Oxytenanthera</i> , <i>Schizostachyum</i> and <i>Siarundinaria</i>
6	Nagaland	<i>Bambusa</i> , <i>Chimonobambusa</i> , <i>Dendrocalamus</i> , <i>Racemobambos</i> , <i>Schizostachyum</i> and <i>Sinarundianaria</i>
7	Sikkim	<i>Arundinaria</i> , <i>Bambusa</i> , <i>Dendrocalamus</i> , <i>Melocanna</i> , <i>Phyllostachys</i> , <i>Racemobambos</i> , <i>Schizostachyum</i> , <i>Sinarundinaria</i> and <i>Thamnochalamus</i>
8	Tripura	<i>Bambusa</i> , <i>Dendrocalamus</i> , <i>Dinochloa</i> , <i>Gigantochloa</i> , <i>Melocanna</i> , <i>Pseudosasa</i> , <i>Schizostachyum</i> , <i>Sinarundinaria</i> , <i>Thamnochalamus</i> and <i>Thyrsostachys</i>

About 57 species of bamboo have been identified in Arunachal Pradesh, out of these only few species are widely cultivated by the farmers or local people due to commercially viable and widely used (SFRI, *Information Bulletin No. 20*). The commonly used species of Arunachal Pradesh are given in table 2.

The present work has been taken up with the specific request from the State Forest Research Institute (SFRI), Itanagar, Government of Arunachal Pradesh for mapping the bamboo growing areas of the State.

Table 2: Common bamboo species available in Arunachal Pradesh

SI No	Species Name	Local Name
1	<i>Arundinaria maling</i>	Sanu Maling in Sikkim Si (in Mumpa), Yal-yana in Arunachal
2	<i>Bambusa affinis</i>	Lathi and Kanak Kaich in Tripura
3	<i>Bambusa balcoa</i>	Bhaluka
4	<i>Bambusa bamboos</i>	Katabah, thorny bamboo
5	<i>Bambusa nutans</i>	Mokal/Mallo/Kali/Bidhuli, Malabah (Sikkim)
6	<i>Bambusa pallida</i>	Bijli (in common), Hos (in Nyshi) Kalinga (Butia)
7	<i>Bambusa polymorpha</i>	Betuwa, Betua, Bari
8	<i>Bambusa tulda</i>	Jati (common), Karanti bah (in Sikkim) Hos (Nishi)
9	<i>Bambusa vulgaris</i>	Bakal (Manipur)
10	<i>Cephalostachyum pergracile</i>	Khoullam
11	<i>Dendrocalamus asper</i>	Giang bamboo & Sweet bamboo (Eng); Bambu betung (Malaysia); Rebong cina (Singapore)
12	<i>Dendrocalamus giganteus</i>	Worra, Maipo, Sadiya kako, Bilati bamboo
13	<i>Dendrocalamus hamiltonii</i>	Kako/Hate (in Arunachal)
14	<i>Dendrocalamus hookeri</i>	Aepo
15	<i>Dendrocalamus sikimensis</i>	Pugriang-Lepcha, Wadah-Garos
16	<i>Melocana baccifera</i>	Muli (Cachar) Tarhi (Assam), Tador dort (Arunachal)
17	<i>Ochlandra travancorica</i>	Etta in (Kerala) Tao (n Nyishi)
18	<i>Phyllostachys pubescens</i>	Chinese Moso
19	<i>Phyllostachys bambusoides</i>	Tabiu/bije/Zairo bamboo
20	<i>Schizostachyum arunachalensis</i>	Tabum/Tao
21	<i>Schozostachyum polymorphum</i>	Tador (Nishi)

## 1.2 Mapping and monitoring of bamboo resources using satellite technology

Mapping and monitoring of natural resources is one of the foremost requirements for its planning, management and conservation. Monitoring & management of these resources need accurate mapping of existing growing stock. Due to lack of proper resource information i.e. actual growing areas, total available growing stock, etc, bamboo has never achieved the status of high value commercially used resources. Therefore, mapping and monitoring of Bamboos in the NE region is still a high priority requirement for the planners and resource managers. The spectacular development in space technology, particularly, the repetitive satellite remote sensing

across various spatial and temporal scale, offers the most economic means of assessing, planning, managing and monitoring the forestry resources. The spectral reflectance of a plant is determined by characteristics its leaves. The spectral reflectance of an individual leave or needle is controlled by a number of factors, the most important of which are absorption by photosynthetic pigments and water. Linear Imaging Self Scanner (LISS) III of Indian Remote Sensing Satellites (IRS) sensor with 23.5m spatial resolution enables us to discriminate different forest types, grassland and plantations etc. using different spectral bands. The spectral bands available in this sensor are green (0.52 - 0.59  $\mu\text{m}$ ), red (0.62 - 0.68  $\mu\text{m}$ ), NIR (0.77 - 0.86  $\mu\text{m}$ ) and SWIR (1.55 - 1.70 $\mu\text{m}$ ). Various mathematical combinations of the multi-spectral bands have been found to be sensitive indicators of the presence and condition of specific type of green vegetation. These mathematical quantities are called as indices. In the present study, one index was tried to develop and applied to identify the bamboo growing areas in the NE States.

## 2.0 REVIEW OF LITERATURE

The multi faceted Bamboo based livelihood development plan can be effectively planned and monitored using Remote Sensing (RS) and Geographic Information System (GIS) techniques due to its inherent advantages and scientific knowledge based analysis. GIS not only helps in providing various solutions to the planners but its capability to Query the database is an added advantage. Role of RS and GIS in the field of resource mapping have already been established as a scientific and cost/time effective means (Navalgund *et. al.* 2007).

There are very few attempts to identify bamboo growing areas using RS & GIS technique. One attempt was done to prepare a map showing open bamboo brakes and forest areas for the state of Meghalaya using RS&GIS technology. In the study, hybrid knowledge based approach was attempted since unsupervised and supervised classifications have limitation to be used for regional level classification covering large area due to intermixing of various land cover types, radiometry of each scene, mapping of spectrally non discriminable objects etc.,(Talukdar, 2001).

In a study done by Subramaniam & Bharadwaj (2006) used RS & GIS extensively to identify bamboo species growing areas using spectral analysis of forest-cover types and a knowledge-based classification techniques for different bamboo species. In

another study, RMSI (2004) used the GPS, training set data and NDVI to prepare the bamboo resource mapping of Tripura state.

### 3.0 STUDY AREA

Whole Arunachal Pradesh was taken up for preparing the bamboo resource mapping study as per request of the State Forest Research Institute, Itanagar, Arunachal Pradesh. As a part of Bamboo index development site, two wild bamboo growing areas of Assam – one from plain area of Tinsukia district (Upper Dihing Reserve Forest East Block) and the other from hilly district, NC Hills district (Langting Mupa Reserve Forest) were selected. The index, thus generated was validated in the Papumpare district of Arunachal Pradesh (Fig. 1).

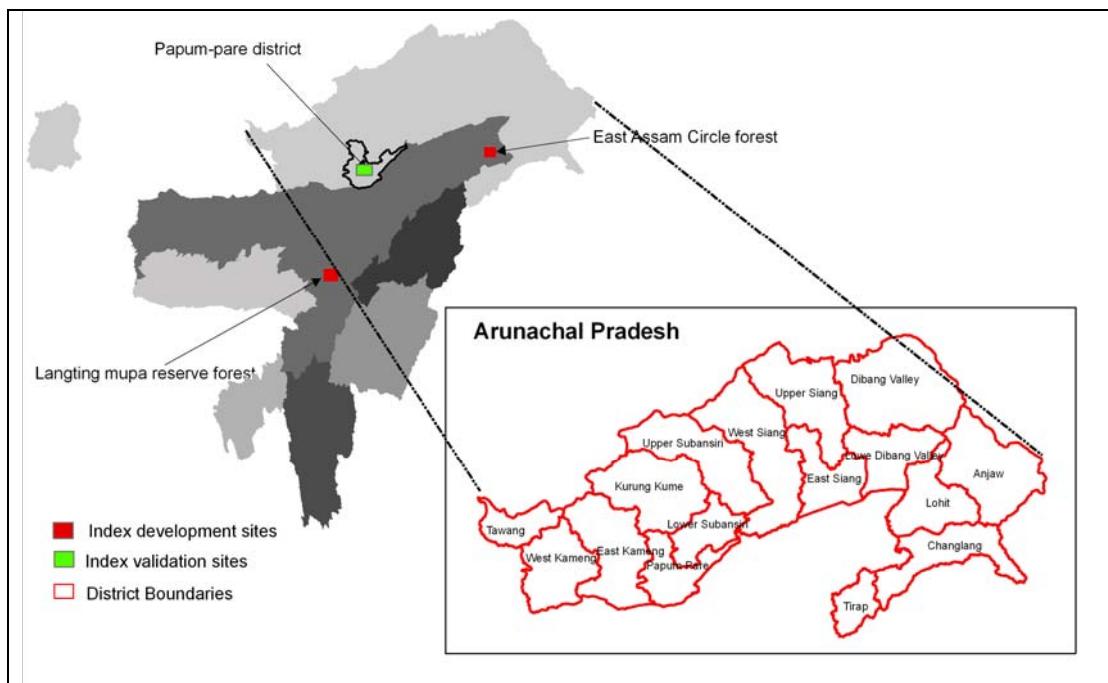


Figure 1: Study Area

### 4.0 METHODOLOGY:

Available study reports conclude that it is difficult to identify bamboo growing areas using supervised and unsupervised classifications technique using raw satellite image. This study attempts to develop an index to map bamboo growing areas over a larger study area using Remote Sensing and GIS Technique.

## **4.1 Satellite imagery used in the study**

In this study, IRS P6 Linear Imaging Self Scanning sensor type III have been used to identify the bamboo growing areas of Arunachal Pradesh. Due to large aerial extent of the study area and sensor characteristics, we could not use satellite image of same date for the whole area.

## **4.2 Preparation of satellite imagery for processing**

### **4.2.1 Acquisition of Remote Sensing Data**

The IRS P 6 LISS III November, 2005 – February, 2006 were acquired in the form of a CD-ROM product from NRSA Data Center ensuring cloud free coverage. It was subjected to various preprocessing techniques in order to obtain geographically referenced data. Steps involved in geometric correction, digital classification and extraction of area statistics are briefly discussed. The list of satellite imagery used in the study is given in table 3.

Table 3: Satellite data used in the study area (IRS P6)

<b>Sl. No.</b>	<b>Path</b>	<b>Row</b>	<b>Date of Pass</b>
1	110	52	06.11.2005
2	111	51	11.11.2005
3	111	52	11.11.2005
4	112	50	05.12.2005
5	112	51	05.12.2005
6	112	52	27.01.2006
7	113	50	15.12.2005
8	113	51	01.02.2006
9	113	52	01.02.2006
10	114	50	06.02.2006
11	114	51	06.02.2006
12	114	52	06.02.2006
13	114	53	06.02.2006
14	115	51	07.11.2005
15	115	52	07.02.2005

### **4.2.2 Geometric Correction**

Remotely sensed data usually contain both systemic and non-systematic geometric errors. Some of the important systematic errors are Scan Skew, Mirror scan velocity, Panoramic distortion, Platform velocity, Earth rotation, Perspective,

Altitude, etc. Because of these geometric errors, the satellite data immediately after acquisition is planimetrically not true to the ground features and standard topomaps.

Hence, in order to measure/estimate area from the satellite data it has to be initially rectified to correct the geometric errors and made planimetrically true to standard topomaps. The systematic errors can be corrected through analysis of sensor characteristics. These errors are corrected in the preprocessing of data after initial data acquisition from satellite data. However, nonsystematic errors caused due to attitude (Pitch, Roll and Yaw) can be corrected only through the use of common Ground Control Points (GCP) (Lillesand and Kiefer, 2000).

The topomaps pertaining to the study area were referred for ancillary information. Common ground control points were selected on the raw satellite data as well as geo-referenced topographic sheets with proper spatial distribution covering the entire study area. The coordinates of the GCPs on the reference image and the corresponding coordinates of the similar GCPs on the raw satellite data were used in the geometric correction of the uncorrected satellite data. This was achieved using a first order polynomial transformation fit.

The geometric correction of the satellite data with reference to geo-referenced topo-base has been evaluated by superimposing geometrically corrected satellite data over mosaiced topomaps in the digital domain. Co-registration of spatial features on rectified image with that of topo-maps was verified using the swipe procedure. Such geometric rectification of satellite data facilitates overlaying of different administrative and infrastructure boundaries to extract and analyze the information at different functional units/levels. It was ensured that RMSE (Root Mean Square Error) was not more than a pixel for geometric rectification.

### **4.3 Bamboo Index development**

Spectral profile - a display that plots the reflectance spectrum of a designated pixel of different landuse/land cover class including bamboo, has been studied in few patches of known bamboo growing areas of East Assam Circle Forest and Langting Mupa reserve forest of N.C. Hills District of Assam using IRS P6 LISSIII (Fig. 2).

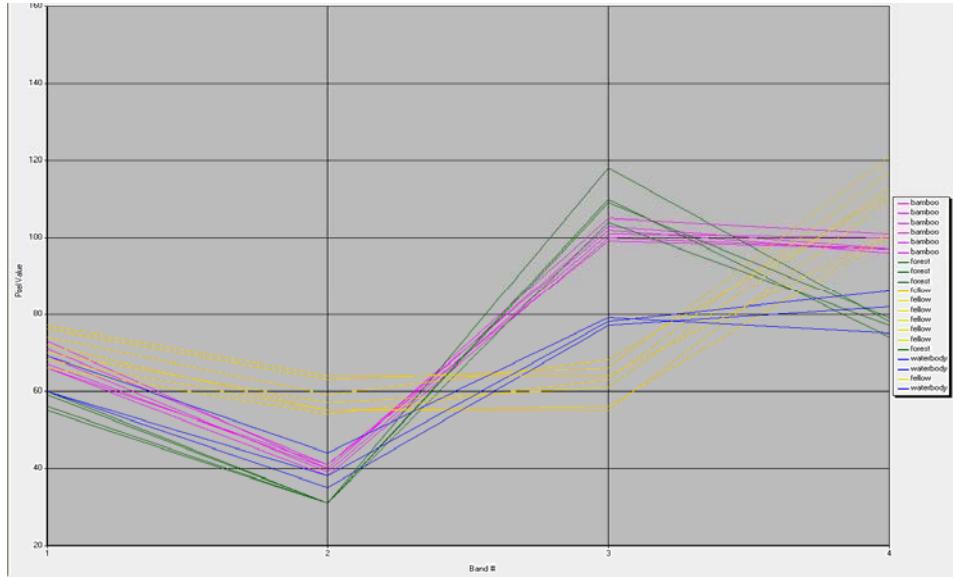


Figure 2: Spectral profile of bamboo and other major land use classes

It has been observed from figure 2 that bamboo growing areas (magenta) can be spectrally differentiated using Red, NIR and SWIR bands. An improved technique has been adopted using a Normalized Differences Vegetation Index (NDVI) as a measure of vegetation health condition and Stress Index (SI) as a measure of leaf water content. These indices are defined as follows (Jensen, 1996, Lillesand & Kiefer 2000):

$$NDVI = \frac{NIR - RED}{NIR + RED}$$

$$SI = \frac{NIR - SWIR}{NIR + SWIR}$$

A Normalized Difference Bamboo Index (BI- proposed name) was prepared using NDVI and SI. The resultant imagery was used to classify bamboo based on the index values. The mathematical combination of bands used to generate Bamboo Index is given below:

$$BI = \frac{NDVI - SI}{NDVI + SI}$$

Bamboo areas have been extracted using bamboo index as shown above for both the development sites (Fig. 3) and it was observed that known bamboo patches for which ground control points were collected under various projects completed by NESAC were matched satisfactorily.

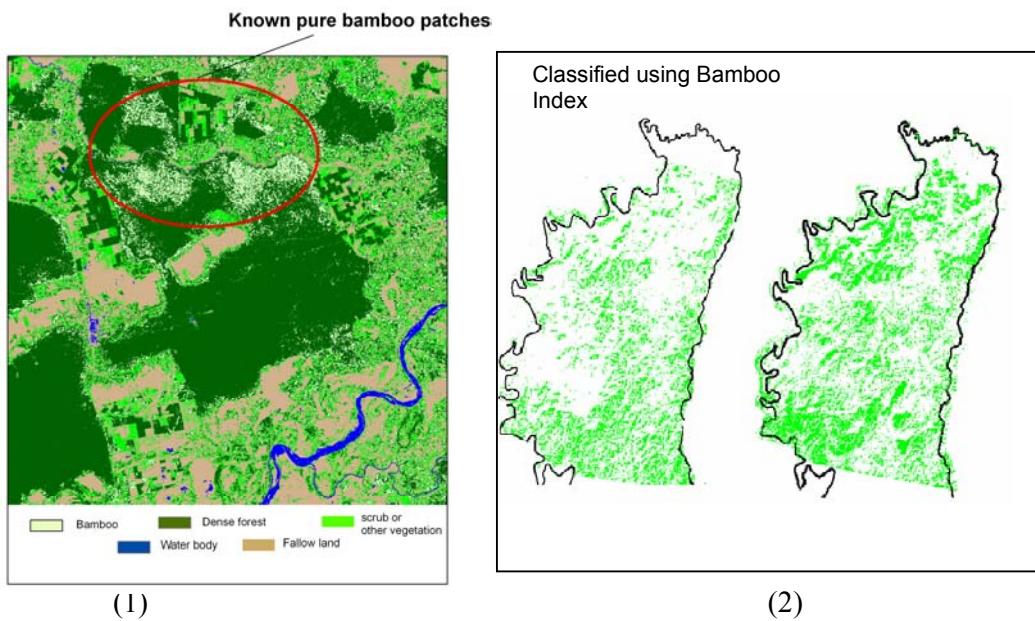


Figure 3: Bamboo area classification using Bamboo Index of East Assam Circle Forest (1), Lagting Mupa Reserve forest (2)

#### 4.4 Bamboo Index Validation

The bamboo index thus generated has been tried in Papum-pare district of Arunachal Pradesh as shown in figure 4 - 7 to validate the methodology developed in other parts of North Eastern plain as well as hilly areas. The classified map was used in ground truth survey and result was found to be satisfactory.

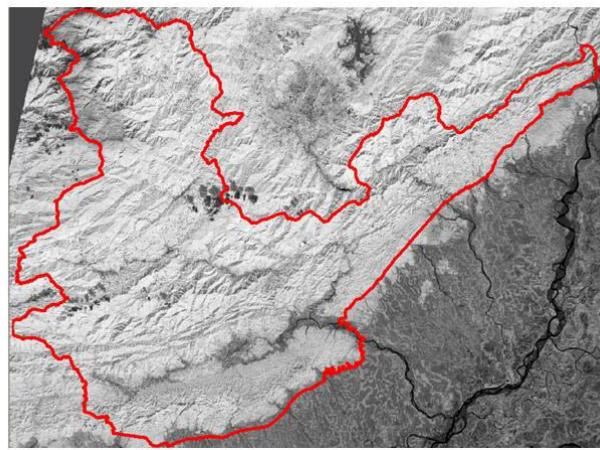


Figure 4: NDVI map of Papum-pare district

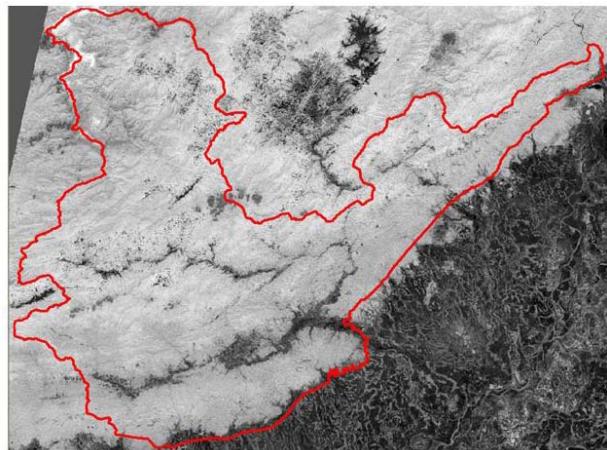


Figure 5: SI map of Papum-pare district

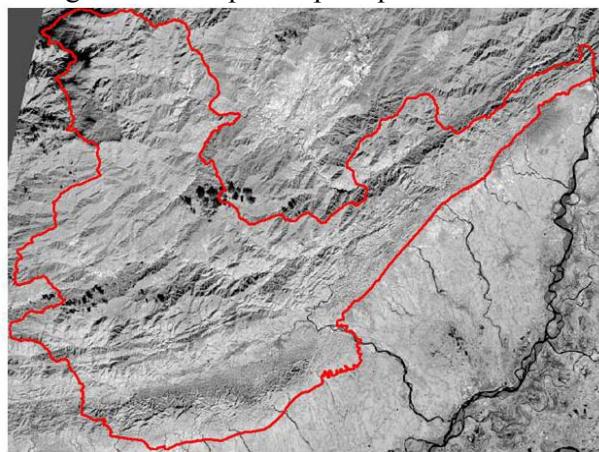


Figure 6: BI map of Papum-pare district

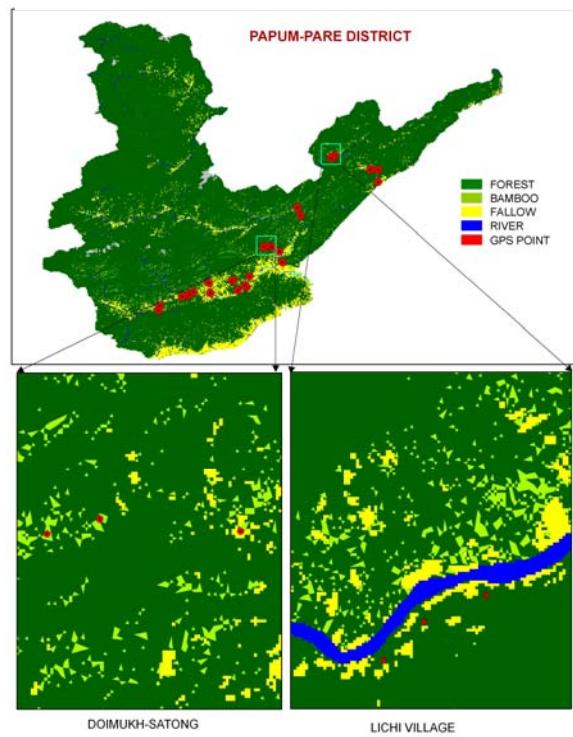


Figure 7: Mapping of bamboo area using Bamboo Index in Papum-pare district

Once the bamboo index was validated in the hilly terrain of Arunachal Pradesh, the same methodology was extrapolated to the other parts of Arunachal Pradesh. It is found that the index value for bamboo class was specific to the scene which may be due to the scenes that were scanned on separate days, and/or are slightly different because of sun angle or atmospheric effects. The overlapped area between two scenes was used to identify index value for bamboo class for adjacent images. It has been observed that land use like tea garden, fellow lands etc. are also sometimes misclassified with bamboo areas. Map accuracy was increased after classifying confused land use land/cover classes based on the various image interpretation keys and subtracted from the bamboo areas.

#### **4.5 Land use land/cover classification**

Multi-spectral images are taken for digital image classification using both supervised and unsupervised approaches to delineate the land-cover class based on the response in spectral reflectance. Unsupervised training enables to define many classes easily, and identify classes that are not in contiguous, easily recognized regions. Supervised classification presumes occurrence of Digital Value (DN) to a particular category. In supervised technique, it is important to have a set of desired classes in mind, and then created the appropriate signatures from the data. Supervised classification also includes using a set of classes that is generated from an unsupervised classification. Supervised classification based on maximum likelihood algorithm was operated upon the image using these purified signature sets. The output classes were compared theme-wise and subjected class merging if there is high similarity between classes. A combination of supervised and unsupervised classification was used for optimum results, especially with large data sets (e.g., multiple IRSP6 LISS III scenes) to identify few major classes such as forest area, scrub land, fallow/agriculture land, water body, snow and cloud.

#### **4.6 Extraction of area statistics**

Different analyses in GIS environment have been done to extract area statistics specifically for bamboo growing areas. Only bamboo class was extracted from bamboo index classified map. To minimize the error, masking of bamboo areas has been done from extracted pure forest and scrub land to eliminate the fallow land misclassified as bamboo.

## 5.0 RESULTS AND DISCUSSION

Since the study was emphasized to identify the bamboo growing areas of Arunachal Pradesh, hence the statistics generated only for bamboo areas of the state. Other land cover classes were identified to see the misclassification and to reduce the error. The study is well supported by adequate ground truth and sampling to achieve accuracy of more than 80%.

Total Bamboo growing area in state of Arunachal Pradesh estimates as 325.74 sq. km while the total geographic area of 82858.96 sq. km of the state. Individual districtwise estimate of bamboo growing areas are given in table 4. The actual geographic area of individual district has been calculated based on district boundary readily available with us. Therefore, there may be little mismatch of total geographic areas from the notified records.

Table 4: Districtwise estimate of bamboo growing areas of Arunachal Pradesh

<b>SL. No</b>	<b>DISTRICTS</b>	<b>Geographical Area (Sq.km)</b>	<b>Area Under Bamboo (Sq.Km)</b>
1	Papum Pare	3391.89	46.16
2	Changlang	5106.34	30.74
3	West kameng	4850.58	27.82
4	Lohit	4507.65	25.82
5	Upper Siang	6511.06	25.74
6	Kurung Kumey	6736.35	23.84
7	Upper Subansiri	6612.23	23.73
8	West Siang	8319.42	19.34
9	Dibang Valley	9163.55	18.32
10	Tirap	1968.24	17.14
11	Lower Subansiri	2826.11	15.27
12	East Kameng	5249.51	12.96
13	Lower Dibang	4167.46	11.71
14	Anjaw	7124.38	11.60
15	East Siang	3956.92	9.77
16	Tawang	2367.27	5.78
<b>Toral</b>		<b>82858.96</b>	<b>325.74</b>

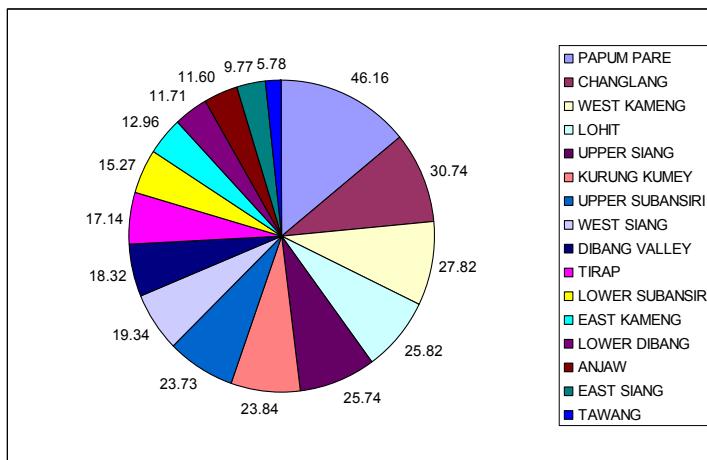


Fig. 8. Distribution of Bamboo area (sq.km.) in Arunachal Pradesh

From the table 4, it is seen that the Papumpare district has the largest share if 46.16 sq.Km of bamboo growing areas followed by Changlang (30.74 sq.km.) and West Kameng (27.82 sq. km).

Circlewise estimated bamboo growing areas along with total geographical areas and percentage of bamboo areas in each Circle have been given in table 5 – 20. Graphical representation of the same is also given in Fig. 9 – 24.

Table 5: Circlewise estimate of bamboo growing areas of Tawang district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
TAWANG	Zemithang	563.64	1.84	31.82
	Lumla	182.82	1.32	22.92
	Mukto	217.29	0.79	13.72
	Tawang	265.25	1.12	19.36
	Jang	302.33	0.40	6.86
	Thingbu	835.93	0.31	5.33
<b>Total</b>		<b>2367.27</b>	<b>5.78</b>	<b>100.00</b>

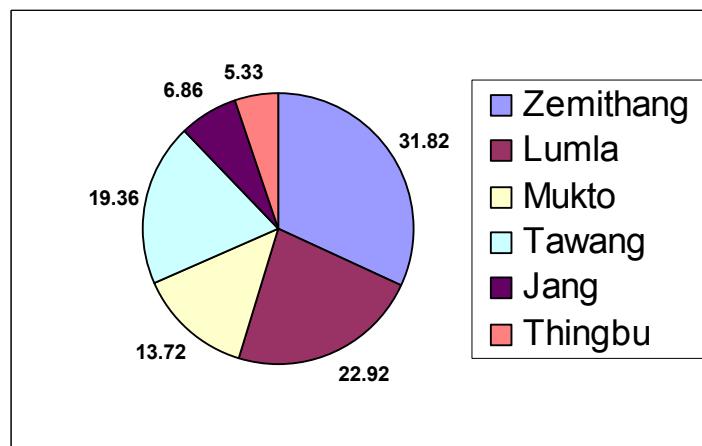


Fig. 9. Distribution of Bamboo area (%) in different Circles of Tawang district

Table 6: Circlewise estimate of bamboo growing areas of West Kameng district

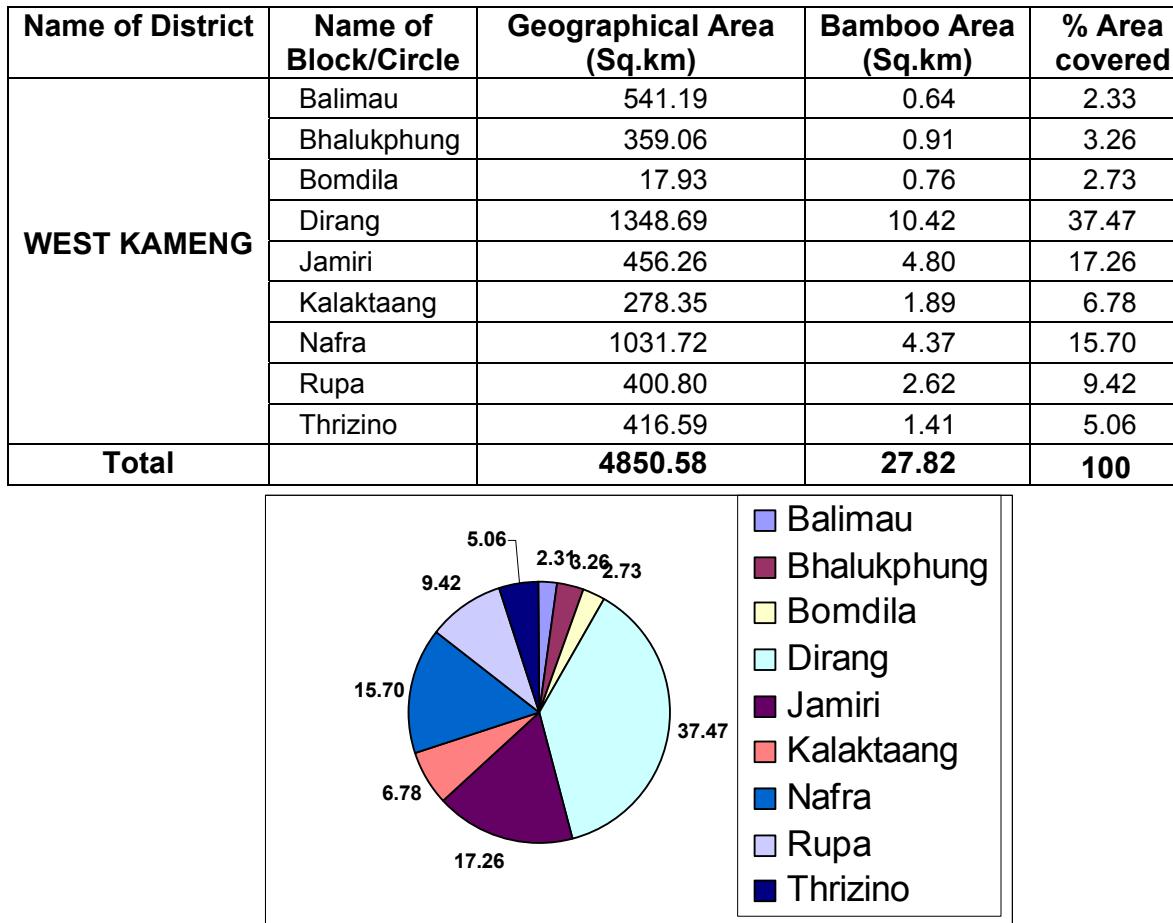


Fig. 10. Distribution of Bamboo area (%) in different Circles of West Kameng district

Table 7: Circlewise estimate of bamboo growing areas of East Kameng district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
EAST KAMENG	Bameng	357.46	0.16	1.26
	Chayangtajo	498.37	1.32	10.19
	Khenewa	297.94	0.15	1.15
	Lada	574.81	0.65	5.02
	Pakke Keshang	882.96	3.64	28.11
	Pipu	490.72	0.80	6.15
	Richukrong	446.78	3.31	25.53
	Seijosa	1121.04	2.33	18.00
	Seppa	579.44	0.59	4.59
	<b>Total</b>	<b>5249.51</b>	<b>12.96</b>	<b>100</b>

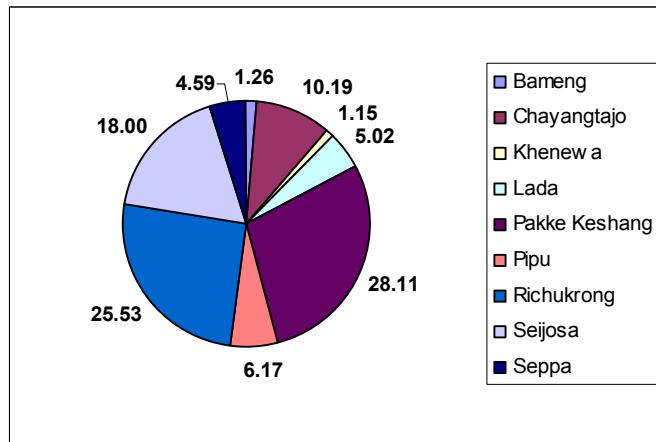


Fig. 11. Distribution of Bamboo area (%) in different Circles of East Kameng district

Table 8: Circlewise estimate of bamboo growing areas of Kurung Kumey district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
KURUNG KUMEY	Chambang	333.50	5.23	21.94
	Hurid (Damin)	1580.87	1.84	7.73
	Koloriang	357.95	0.83	3.47
	Longding Koling	960.72	4.22	17.67
	Nyapin	615.26	0.70	2.92
	Palin	415.91	1.63	6.83
	Parsi Parlo	354.56	0.03	0.13
	Sangram	233.34	0.10	0.41
	Sarli	1349.22	3.09	12.94
	Tali	535.03	6.19	25.96
<b>Total</b>		<b>6736.35</b>	<b>23.84</b>	<b>100</b>

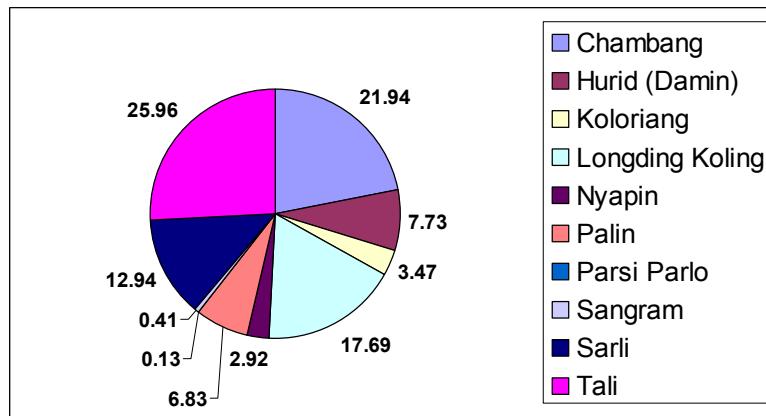


Fig. 12. Distribution of Bamboo area (%) in different Circles of Kurung Kumey district

Table 9: Circlewise estimate of bamboo growing areas of Papum Pare district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
PAPUM PARE	Kimin	549.21	6.63	14.36
	Doimukh	124.72	3.52	7.63
	Naharlagun	172.49	3.33	7.22
	Itanagar	175.23	3.02	6.54
	Balijan	1056.73	17.75	38.46
	Sagalee	733.07	9.34	20.23
	Mengio	580.44	2.57	5.57
<b>Total</b>		<b>3391.89</b>	<b>46.16</b>	<b>100</b>

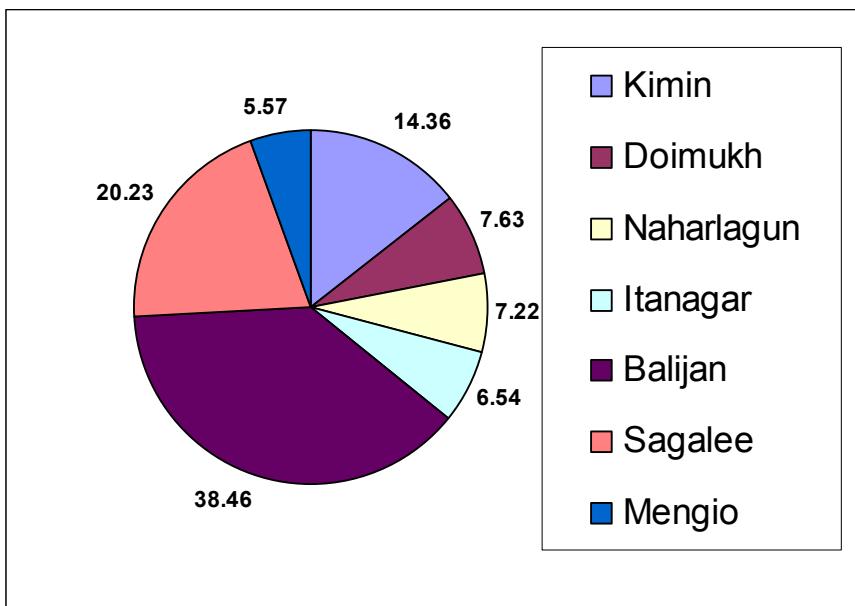


Fig. 13. Distribution of Bamboo area (%) in different Circles of Papum Pare district

Table 10: Circlewise estimate of bamboo growing areas of Lower Subansiri district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
LOWER SUBANSIRI	Dullungmukh	446.31	1.52	9.94
	Yachuli	803.36	5.02	32.87
	Ziro	233.24	0.75	4.90
	Pistana	400.17	2.40	15.73
	Raga	943.03	5.59	36.56
<b>Total</b>		<b>2826.11</b>	<b>15.27</b>	<b>100</b>

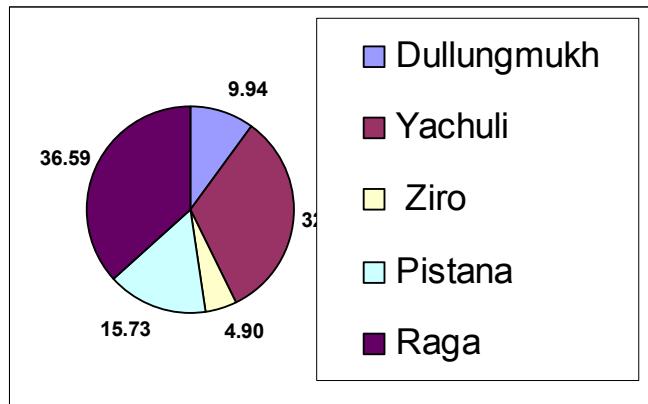


Fig. 14. Distribution of Bamboo area (%) in different Circles of Lower Subansiri district

Table 11: Circlewise estimate of bamboo growing areas of Upper Subansiri district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
UPPER SUBANSIRI	Baririjo	496.74	0.63	2.66
	Dumporijo	384.12	2.40	10.11
	Daporijo	324.24	1.12	4.72
	Giba	594.99	3.57	15.05
	Limeking	976.42	2.01	8.48
	Nacho	1089.95	3.23	13.60
	Payeng	665.85	2.21	9.31
	Puchigeku	300.20	0.94	3.96
	Siyum	492.55	1.36	5.74
	Taksiang	1106.09	4.87	20.53
	Taliha	181.09	1.39	5.86
<b>Total</b>		<b>6612.23</b>	<b>23.73</b>	<b>100</b>

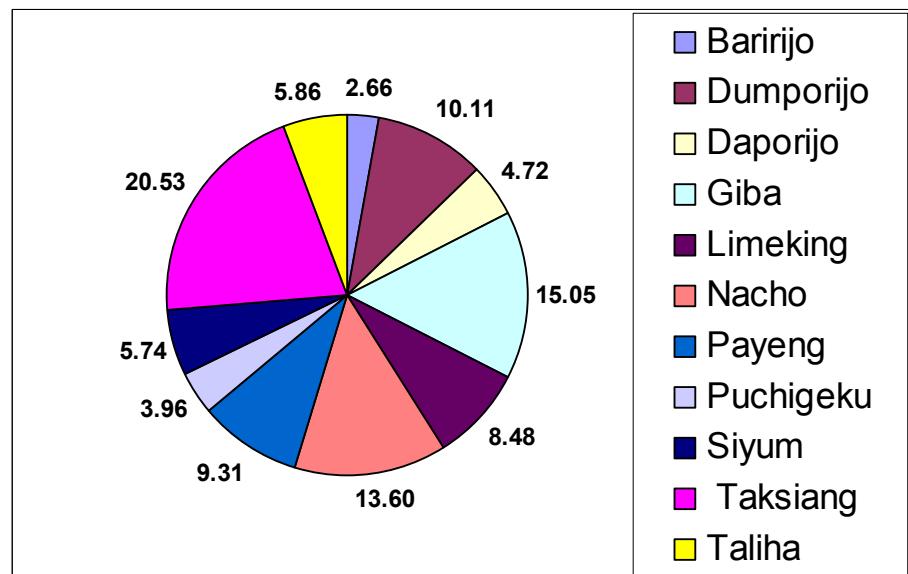


Fig. 15. Distribution of Bamboo area (%) in different Circles of Upper Subansiri district

Table 12: Circlewise estimate of bamboo growing areas of West Siang district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
WEST SIANG	Along	567.23	1.21	6.23
	Basar	361.66	0.33	1.72
	Darak	702.23	4.82	24.91
	Daring	267.24	1.23	6.37
	Gensi	499.09	0.71	3.70
	Jomlu	129.18	0.53	2.74
	Kayeng	288.02	0.48	2.49
	Kongku	442.95	2.00	10.35
	Likabali	321.97	0.95	4.94
	Liromoda	280.68	2.53	13.07
	Mechuka	1173.04	0.51	2.63
	Mobuk	119.26	0.25	1.31
	Monigong	1273.27	0.86	4.44
	Payum	849.68	1.00	5.17
	Pidi	286.51	0.14	0.76
	Tato	525.47	1.07	5.52
	Tirbin	140.15	0.38	1.96
	Yomcha	91.79	0.33	1.71
Total		8319.42	19.34	100

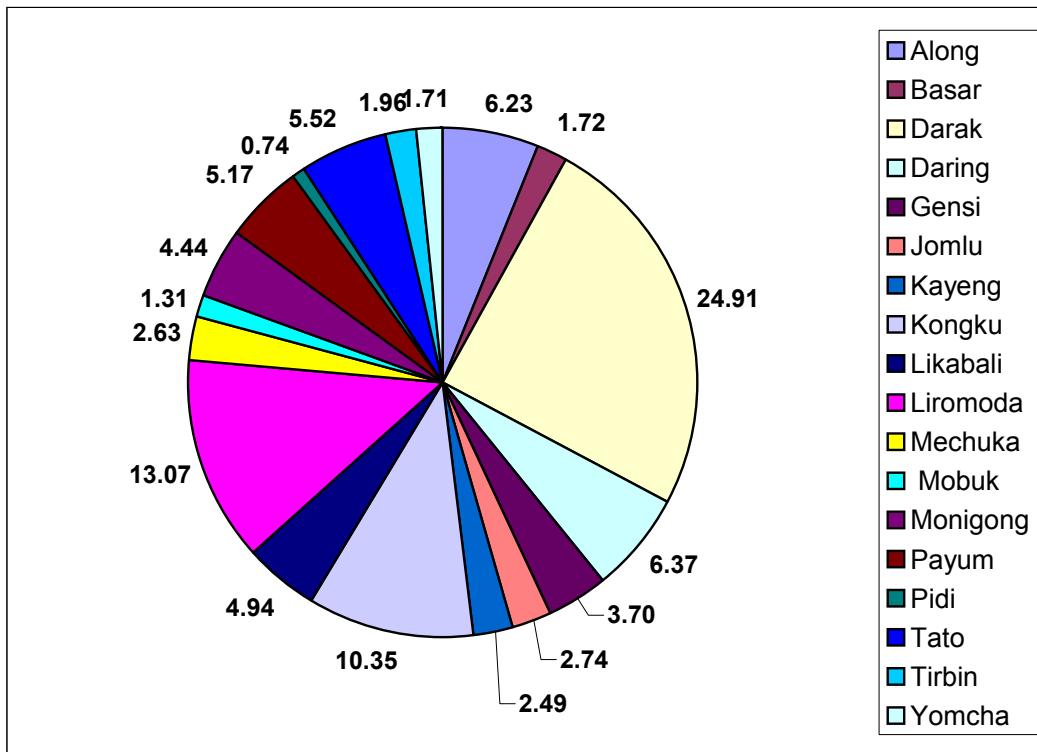


Fig. 16. Distribution of Bamboo area (%) in different Circles of West Siang district

Table 13: Circlewise estimate of bamboo growing areas of East Siang district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
EAST SIANG	Bilat	283.95	1.40	14.30
	Boleng	236.08	1.01	10.31
	Koyu	382.51	1.18	12.07
	Mebo	943.41	2.00	20.45
	Nari	143.13	0.20	2.04
	New Seren	114.66	0.22	2.21
	Oyan	114.42	0.01	0.14
	Pangin	581.07	0.80	8.16
	Pasighat	284.82	0.55	5.59
	Ribotarging	175.34	0.17	1.77
	Riga	574.49	2.16	22.10
	Ruksin	123.05	0.09	0.86
<b>Total</b>		<b>3956.92</b>	<b>9.77</b>	<b>100</b>

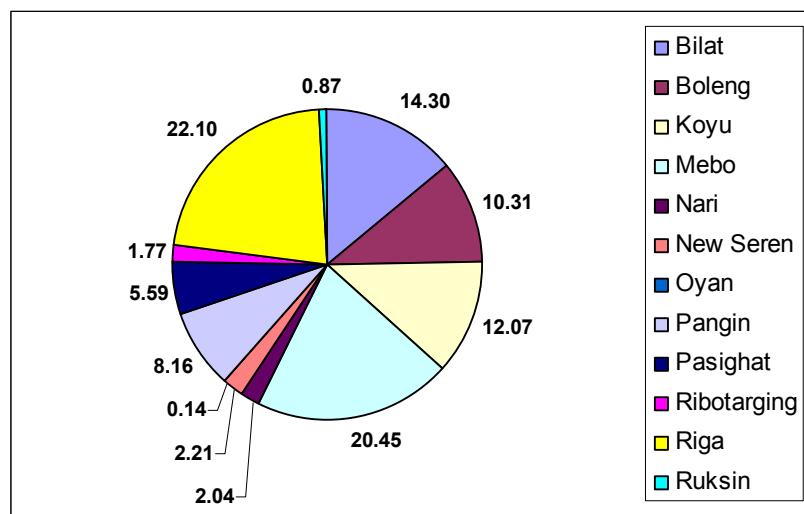


Fig. 17. Distribution of Bamboo area (%) in different Circles of East Siang district

Table 14: Circlewise estimate of bamboo growing areas of Upper Siang district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
UPPER SIANG	Geku	204.65	0.57	2.22
	Gelling	301.80	1.43	5.57
	Jengging	549.68	3.40	13.20
	Katan	454.07	0.76	2.96
	Mariyang	611.19	3.93	15.26
	Migging	1353.33	2.03	7.93
	Palling	164.75	0.97	3.77
	Singa	795.81	4.02	15.62
	Tutin	1527.54	4.87	18.92
	Yingkiong	548.23	3.75	14.56
<b>Total</b>		<b>6511.06</b>	<b>25.74</b>	<b>100</b>

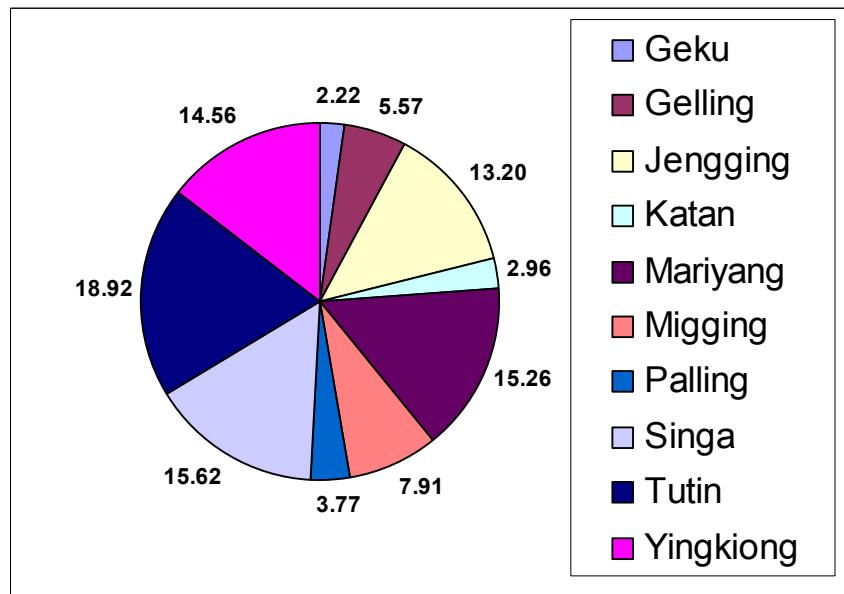


Fig. 18. Distribution of Bamboo area (%) in different Circles of Upper Siang district

Table 15: Circlewise estimate of bamboo growing areas of Dibang Valley district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
DIBANG VALLEY	Anelih	659.84	2.86	15.59
	Anini	1663.54	1.87	10.20
	Alinye	4760.74	7.38	40.32
	Mipi	2079.43	6.21	33.88
<b>Total</b>		<b>9163.55</b>	<b>18.32</b>	<b>100</b>

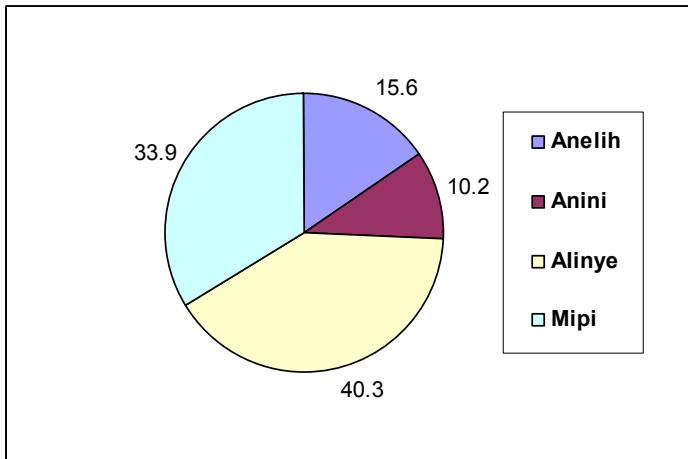


Fig. 19. Distribution of Bamboo area (%) in different Circles of Dibang Valley district

Table 16: Circlewise estimate of bamboo growing areas of Lower Dibang Valley district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
LOWER DIBANG	Dambuk	1164.94	4.12	35.15
	Dasali	860.48	1.88	16.08
	Hunli	475.36	1.11	9.53
	Koronu	188.89	2.33	19.88
	Kronli	594.65	1.06	9.07
	Roing	883.13	1.20	10.29
<b>Total</b>		<b>4167.46</b>	<b>11.71</b>	<b>100</b>

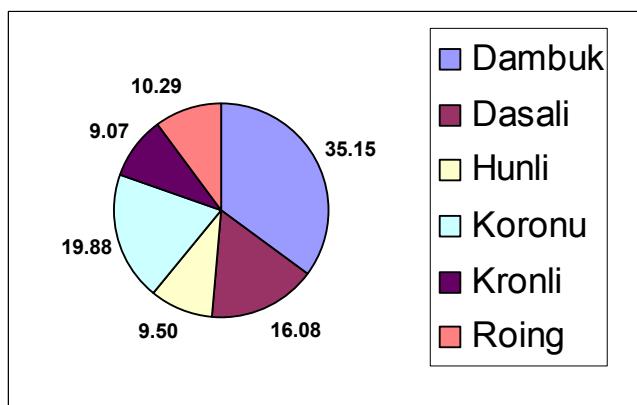


Fig. 20. Distribution of Bamboo area (%) in different Circles of Lower Dibang Valley district

Table 17: Circlewise estimate of bamboo growing areas of Anjaw district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
ANJAW	Changlagaon	1126.09	1.01	8.70
	Goiliang	697.05	1.56	13.41
	Hawai	1671.67	3.32	28.64
	Hayuliang	1285.12	3.81	32.88
	Kibithoo	529.43	0.10	0.87
	Manchal	628.17	0.88	7.60
	Walong	1186.85	0.92	7.89
<b>Total</b>		<b>7124.38</b>	<b>11.60</b>	<b>100</b>

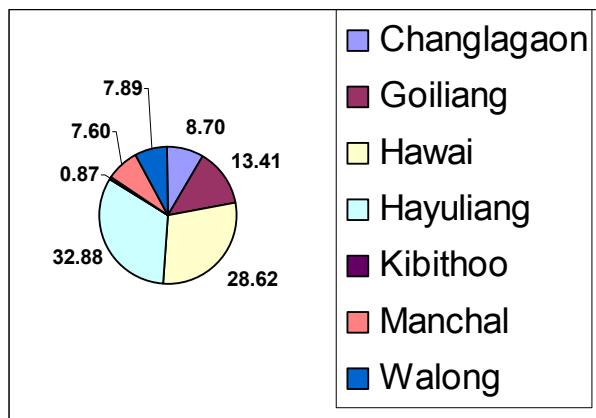


Fig. 21. Distribution of Bamboo area (%) in different Circles of Anjaw district

Table 18: Circlewise estimate of bamboo growing areas of Lohit district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
LOHIT	Chowkham	637.79	2.86	11.09
	Leking	128.33	0.36	1.38
	Namsai	247.40	1.04	4.04
	Payong	163.18	0.62	2.41
	Sanpura	656.84	7.33	28.39
	Tezu	1162.46	3.82	14.78
	Wakro	1511.65	9.79	37.92
<b>Total</b>		<b>4507.65</b>	<b>25.82</b>	<b>100</b>

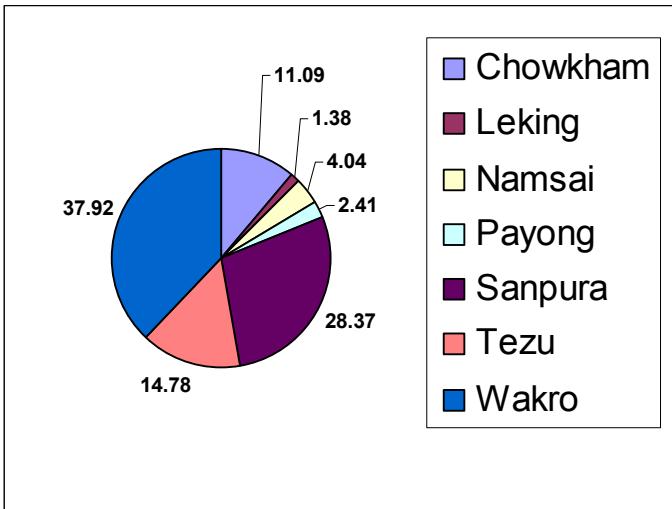


Fig. 22. Distribution of Bamboo area (%) in different Circles of Lohit district

Table 19: Circlewise estimate of bamboo growing areas of Changlang district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
CHANGLANG	Bordumsa	214.16	0.82	2.66
	Changlang	481.60	4.27	13.91
	Diyun	232.79	1.56	5.06
	Jairampur	274.44	0.96	3.14
	Kharsang	99.69	1.05	3.40
	Khimiyong	177.23	1.74	5.68
	Manmao	281.15	1.94	6.32
	Miao	1767.19	11.84	38.51
	Nampong	789.89	1.11	3.60
	Namtak	100.61	1.94	6.30
	Vijoynagar	687.59	3.51	11.42
<b>Total</b>		<b>5106.34</b>	<b>30.74</b>	<b>100.00</b>

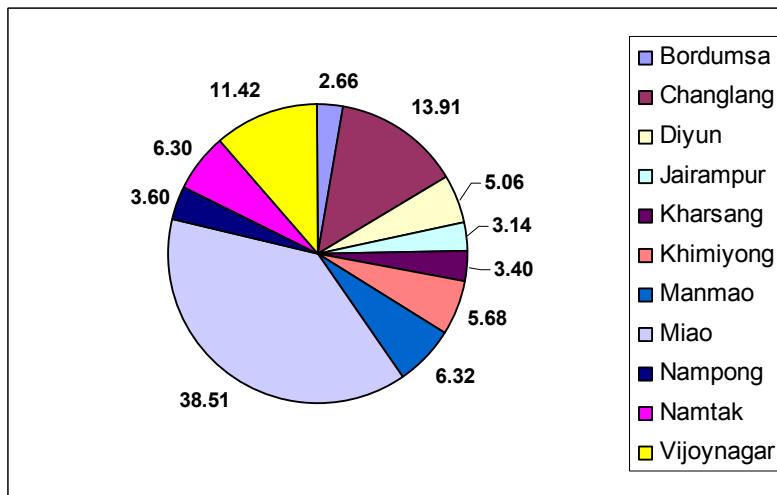


Fig. 23. Distribution of Bamboo area (%) in different Circles of Changlang district

Table 20: Circlewise estimate of bamboo growing areas of Tirap district

Name of District	Name of Block/Circle	Geographical Area (Sq.km)	Bamboo Area (Sq.km)	% Area covered
TIRAP	Deomali	323.84	3.99	23.28
	Kanubari	152.92	0.54	3.13
	Khonsa	459.18	2.91	17.00
	Laju	221.91	4.93	28.78
	Longding	209.87	1.38	8.05
	Panchao	208.42	1.04	6.07
	Pumao	174.17	1.30	7.61
	Wakka	217.92	1.04	6.07
<b>Total</b>		<b>1968.24</b>	<b>17.14</b>	<b>100</b>

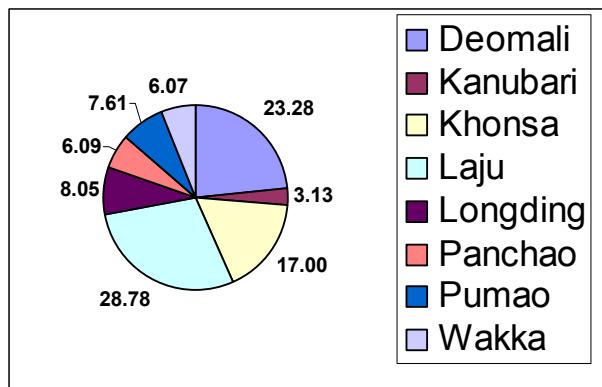


Fig. 24. Distribution of Bamboo area (%) in different Circles of Tirap district

Circlewise maps of bamboo growing areas of Arunachal Pradesh overlaid with major land cover classes are given in Annexure – I.

## **6.0 References:**

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Annexure – I : Circlewise map of Bamboo growing areas of Arunachal Pradesh.

91°35'0"E

91°40'0"E

91°45'0"E

91°50'0"E

27°55'0"N

27°50'0"N

27°45'0"N

27°40'0"N

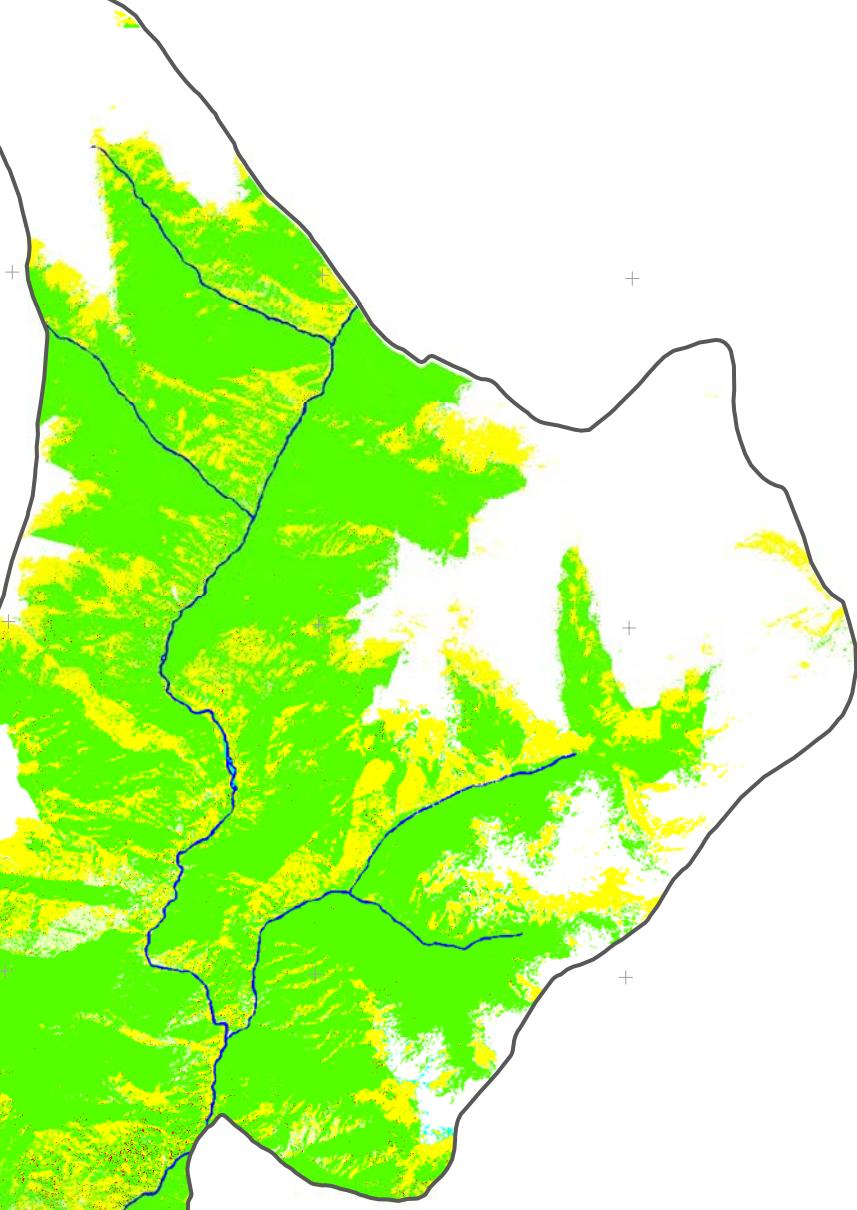
27°35'0"N

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

TAWANG DISTRICT: ZEMITHANG CIRCLE



N

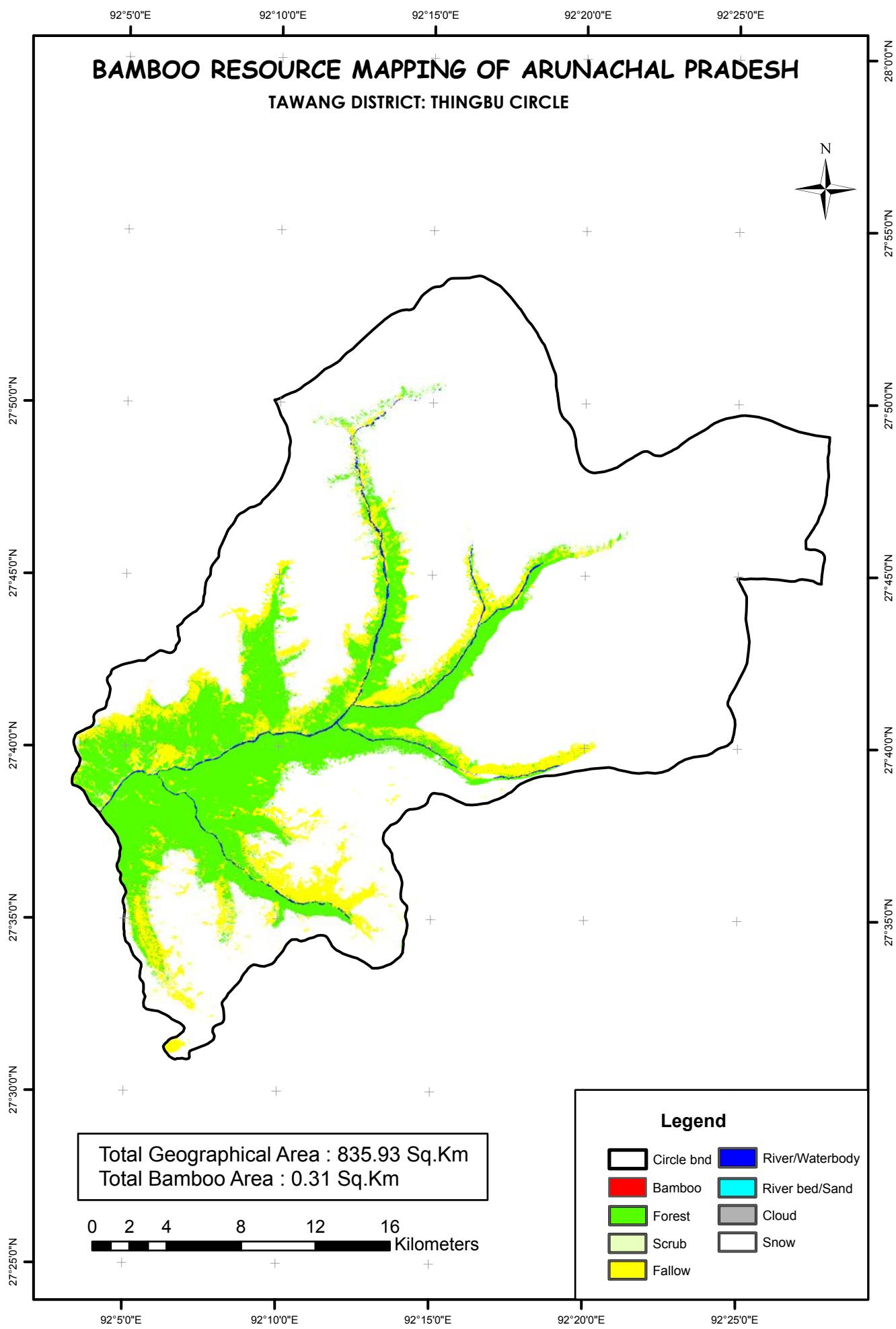


Total Geographical Area : 563.64 Sq.Km  
 Total Bamboo Area : 1.84 Sq.Km

0 1.5 3 6 9 12 Kilometers

## Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	



91°50'0"E

91°55'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## TAWANG DISTRICT: TAWANG CIRCLE



27°45'0"N

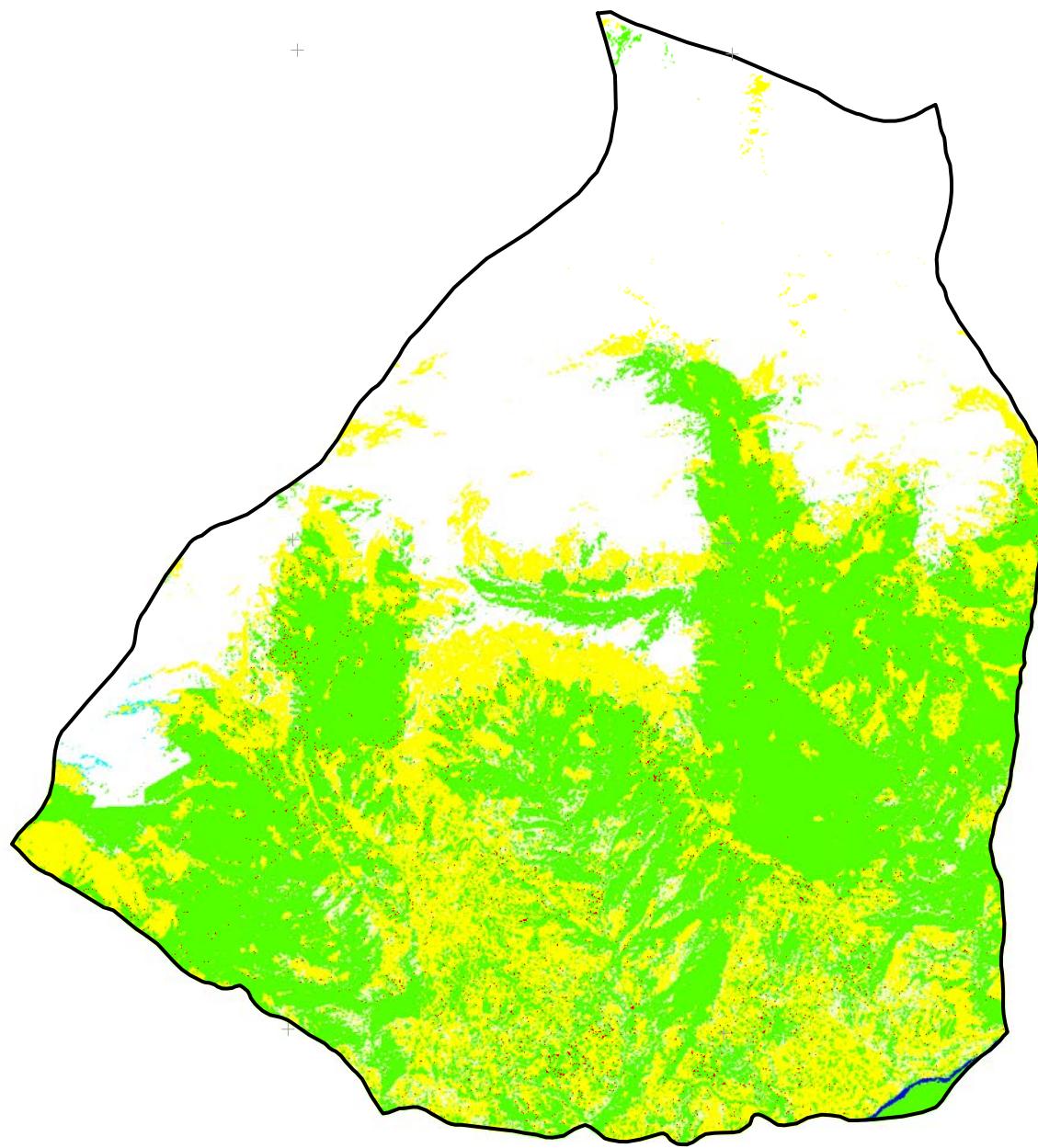
27°40'0"N

27°35'0"N

27°45'0"N

27°40'0"N

27°35'0"N



Total Geographical Area : 265.25 Sq.Km  
 Total Bamboo Area : 1.12 Sq.Km

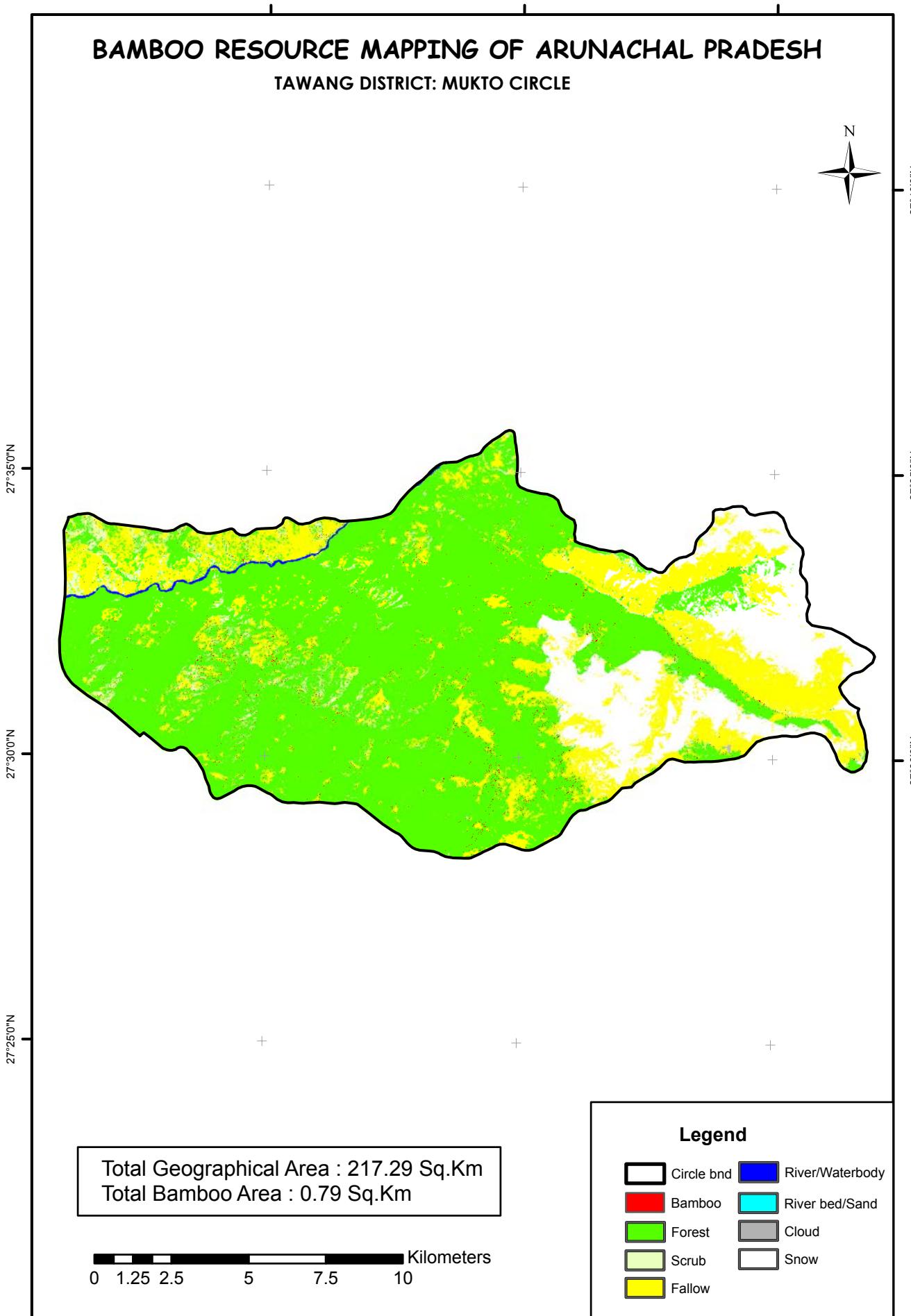
0 1 2 4 6 8 Kilometers

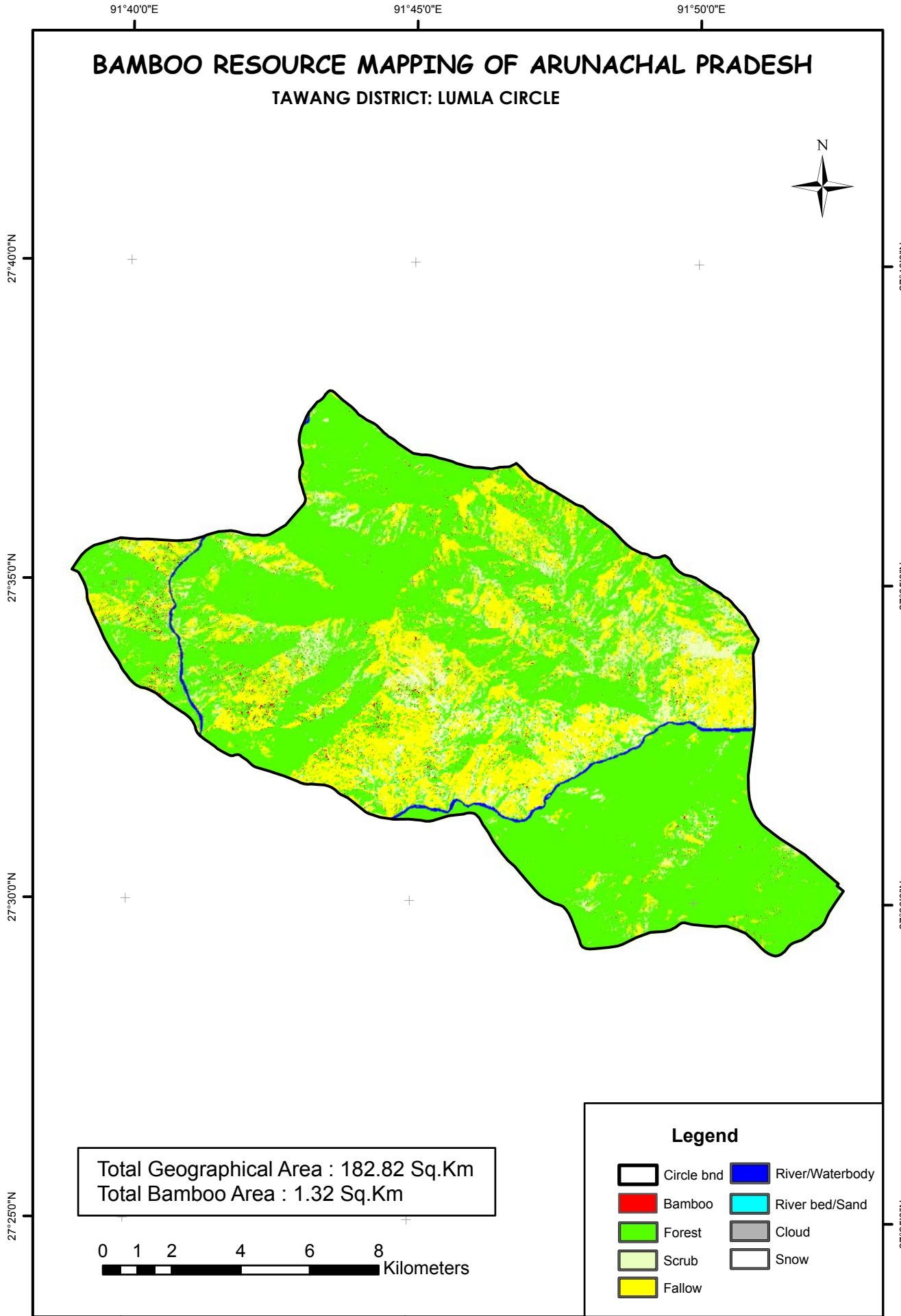
### Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

91°50'0"E

91°55'0"E





91°55'0"E

92°0'0"E

92°5'0"E

92°10'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## TAWANG DISTRICT: JANG CIRCLE

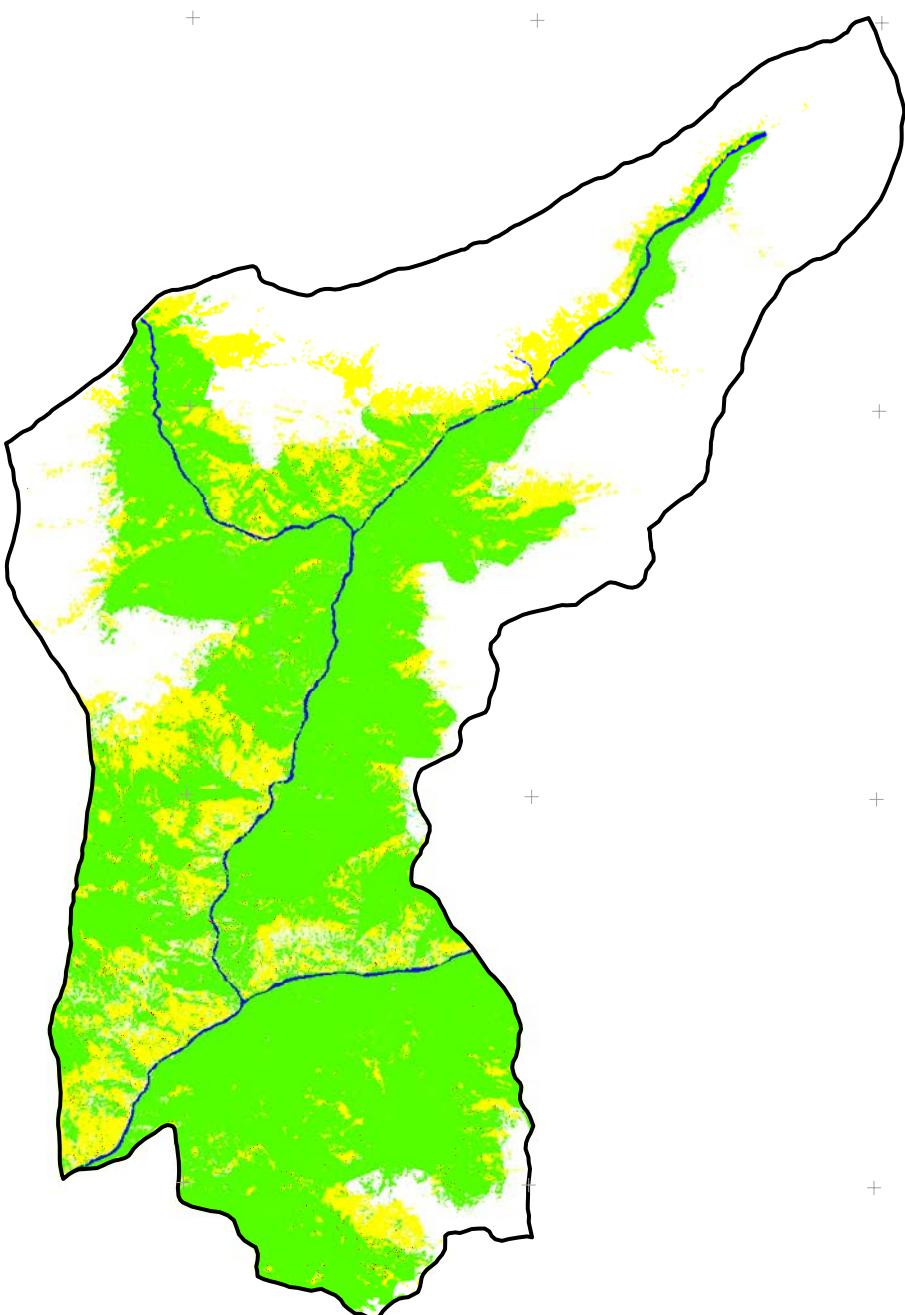
27°50'0"N

27°45'0"N

27°40'0"N

27°35'0"N

27°30'0"N

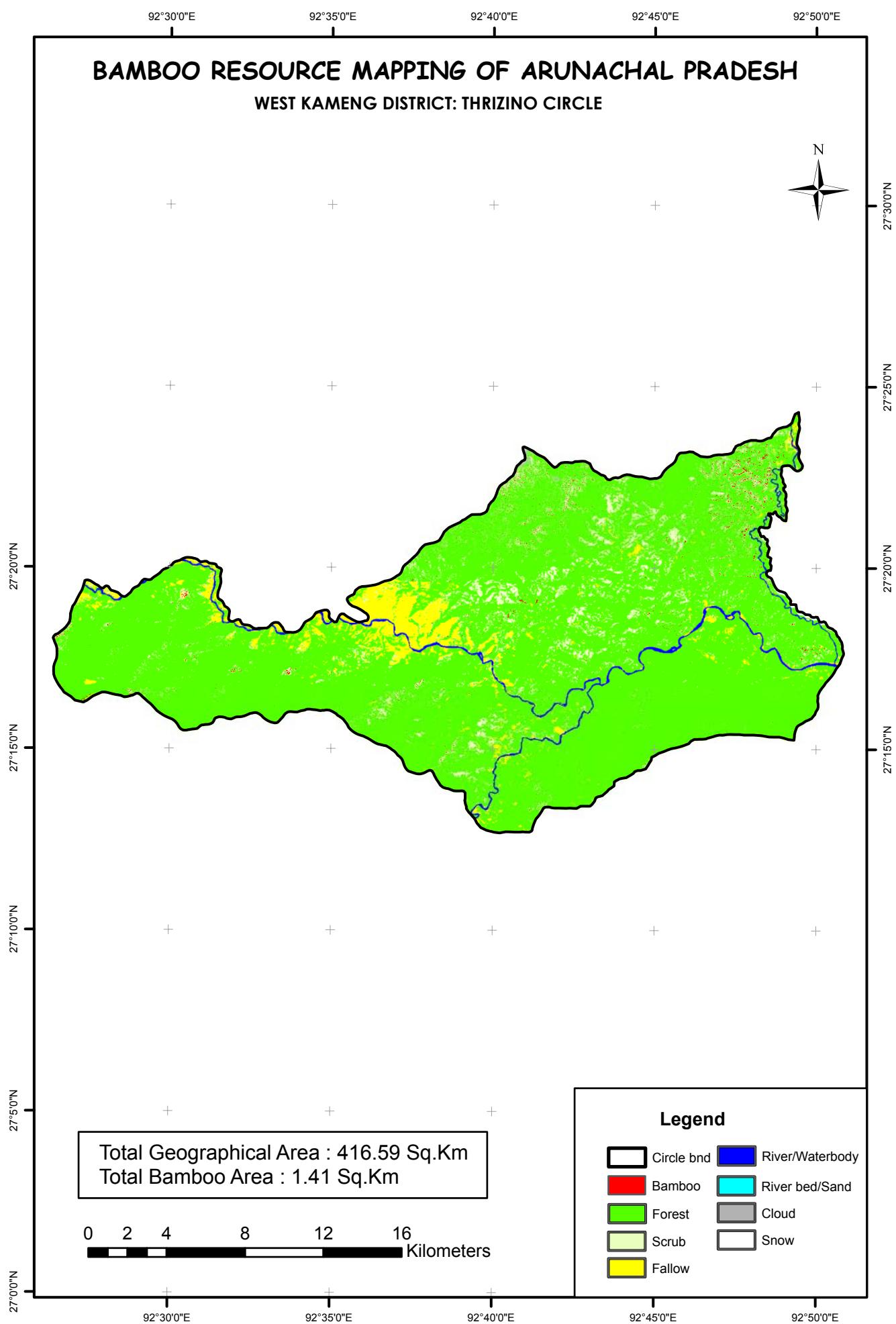


Total Geographical Area : 302.33 Sq.Km  
 Total Bamboo Area : 0.40 Sq.Km

0 1.25 2.5 5 7.5 10 Kilometers

### Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	



92°10'0"E

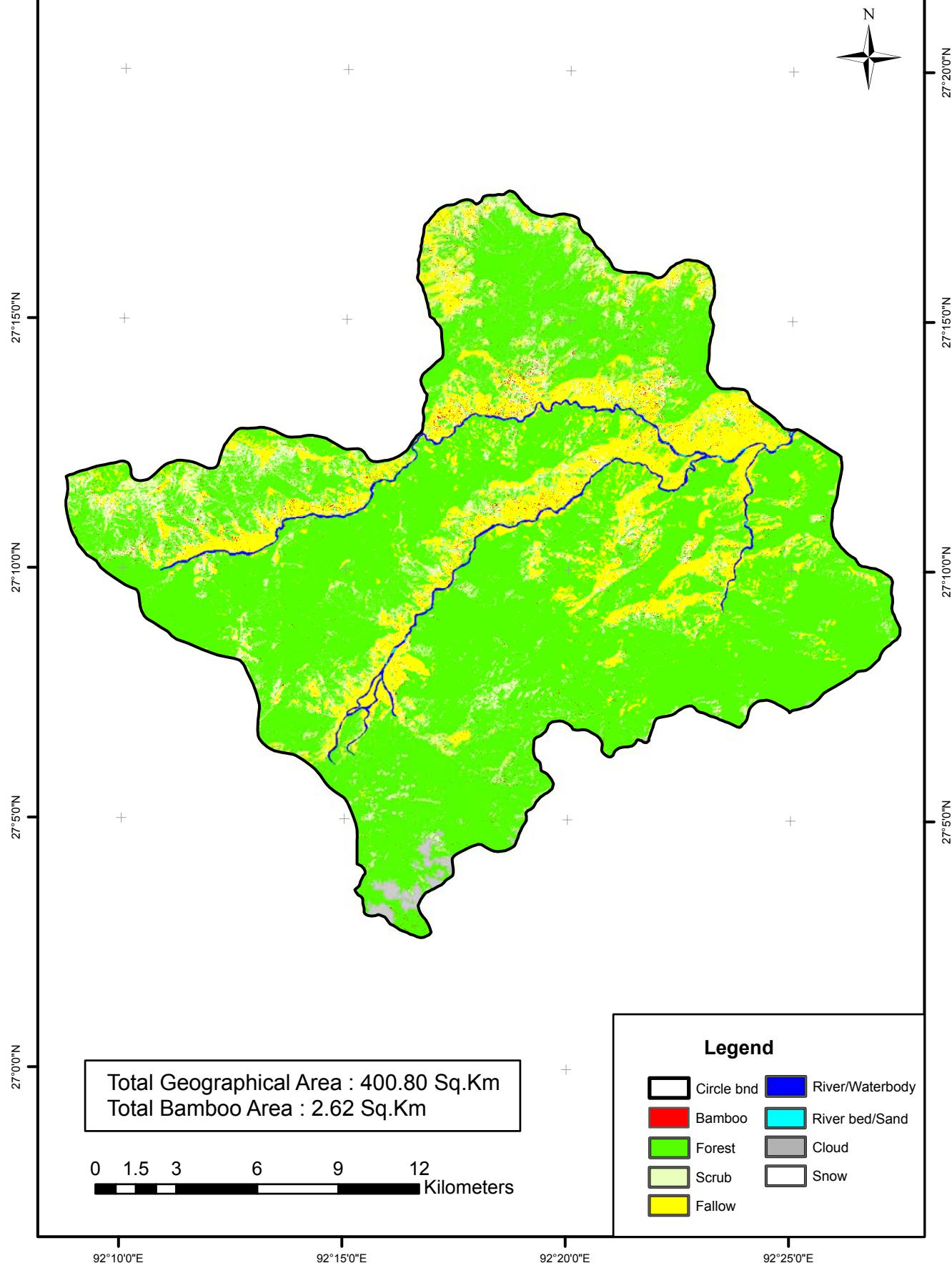
92°15'0"E

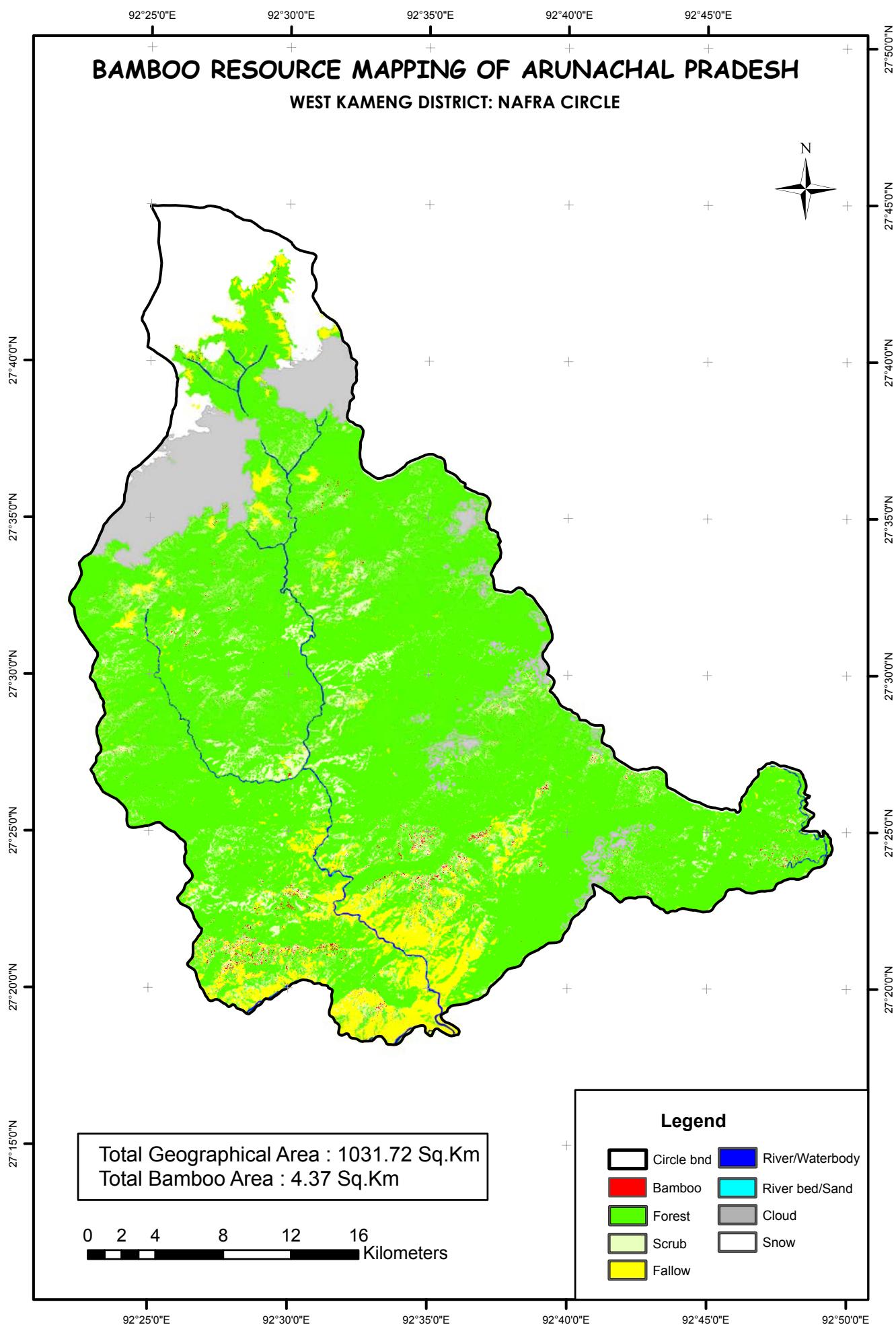
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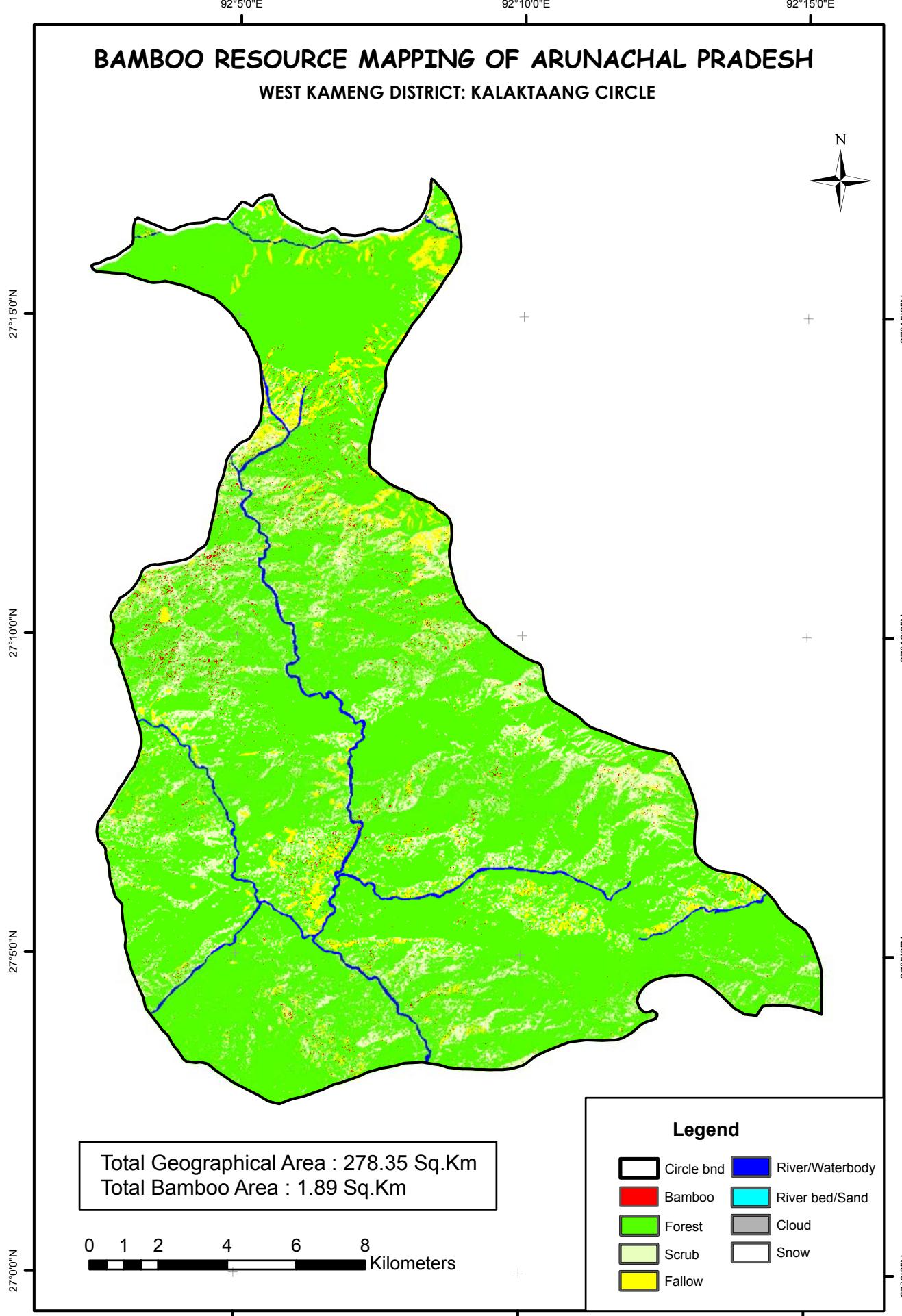
92°25'0"E

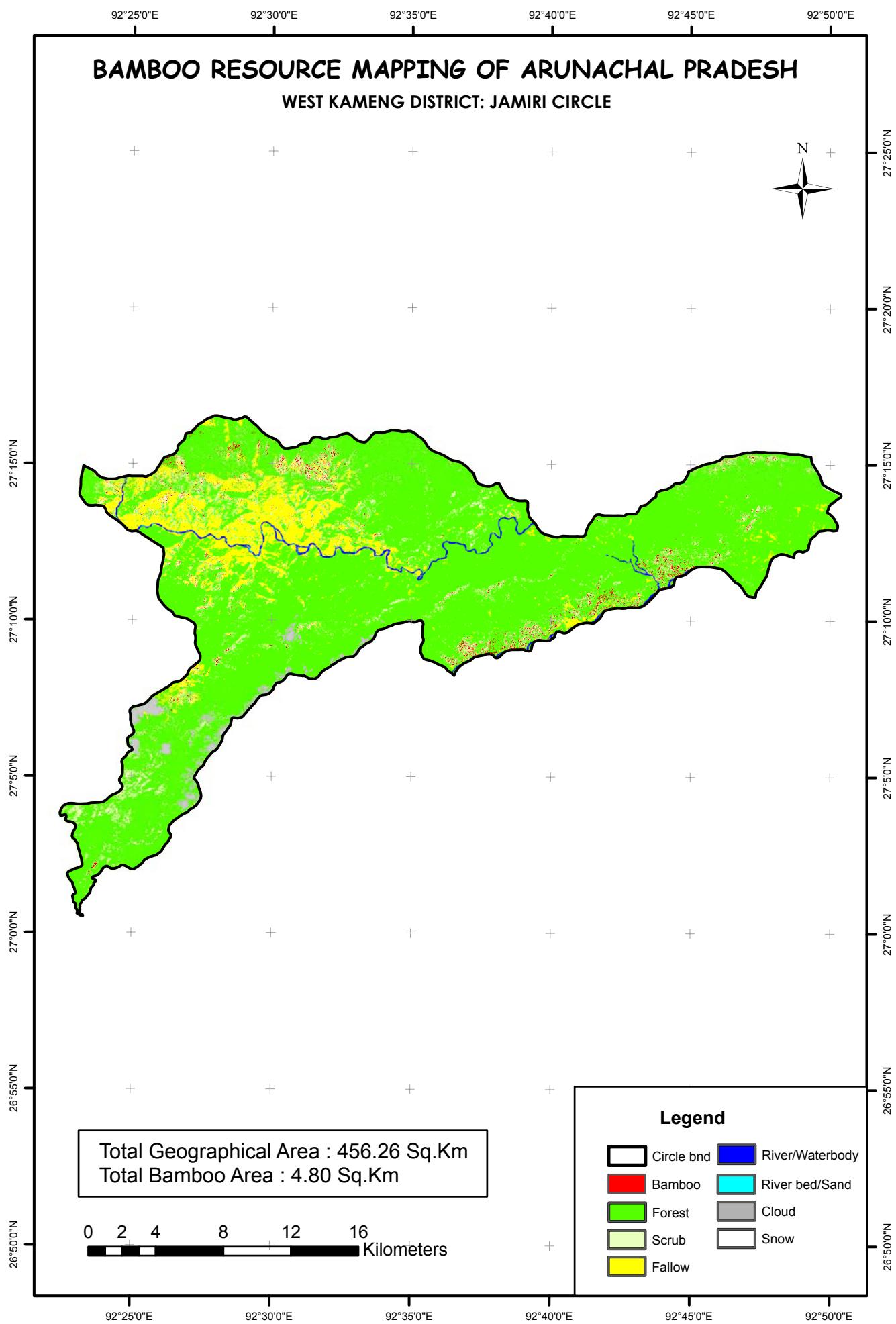
# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

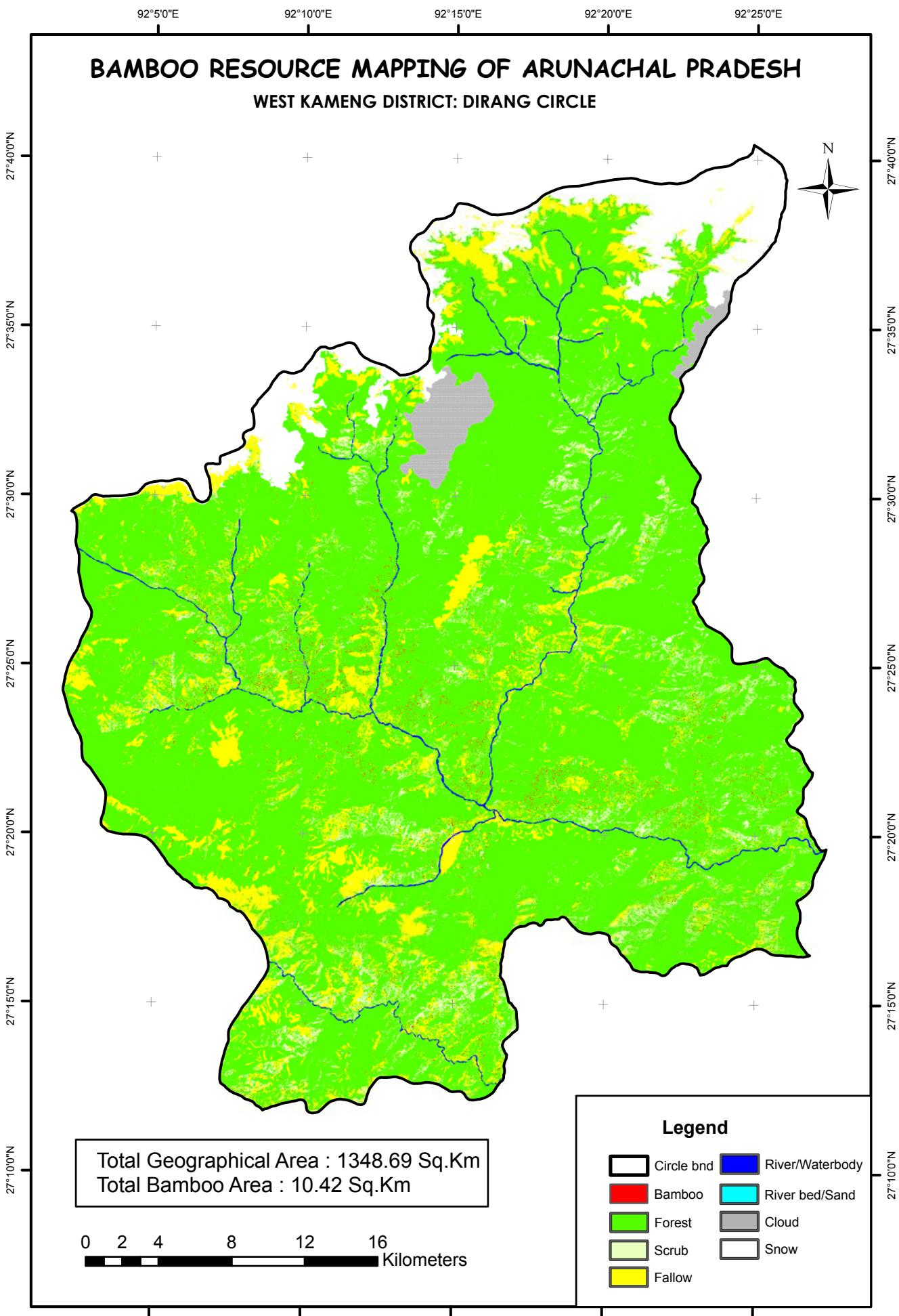
## WEST KAMENG DISTRICT: RUPA CIRCLE







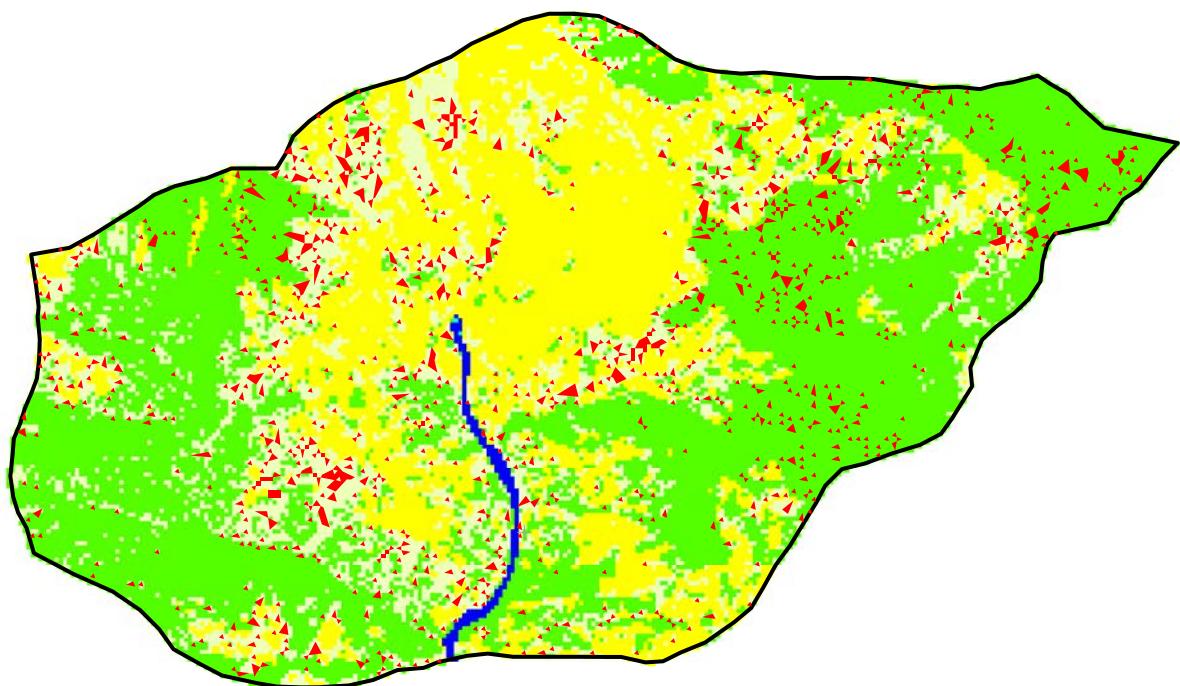




92°25'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## WEST KAMENG DISTRICT: BOMDILA CIRCLE



27°15'0"N

27°45'0"N

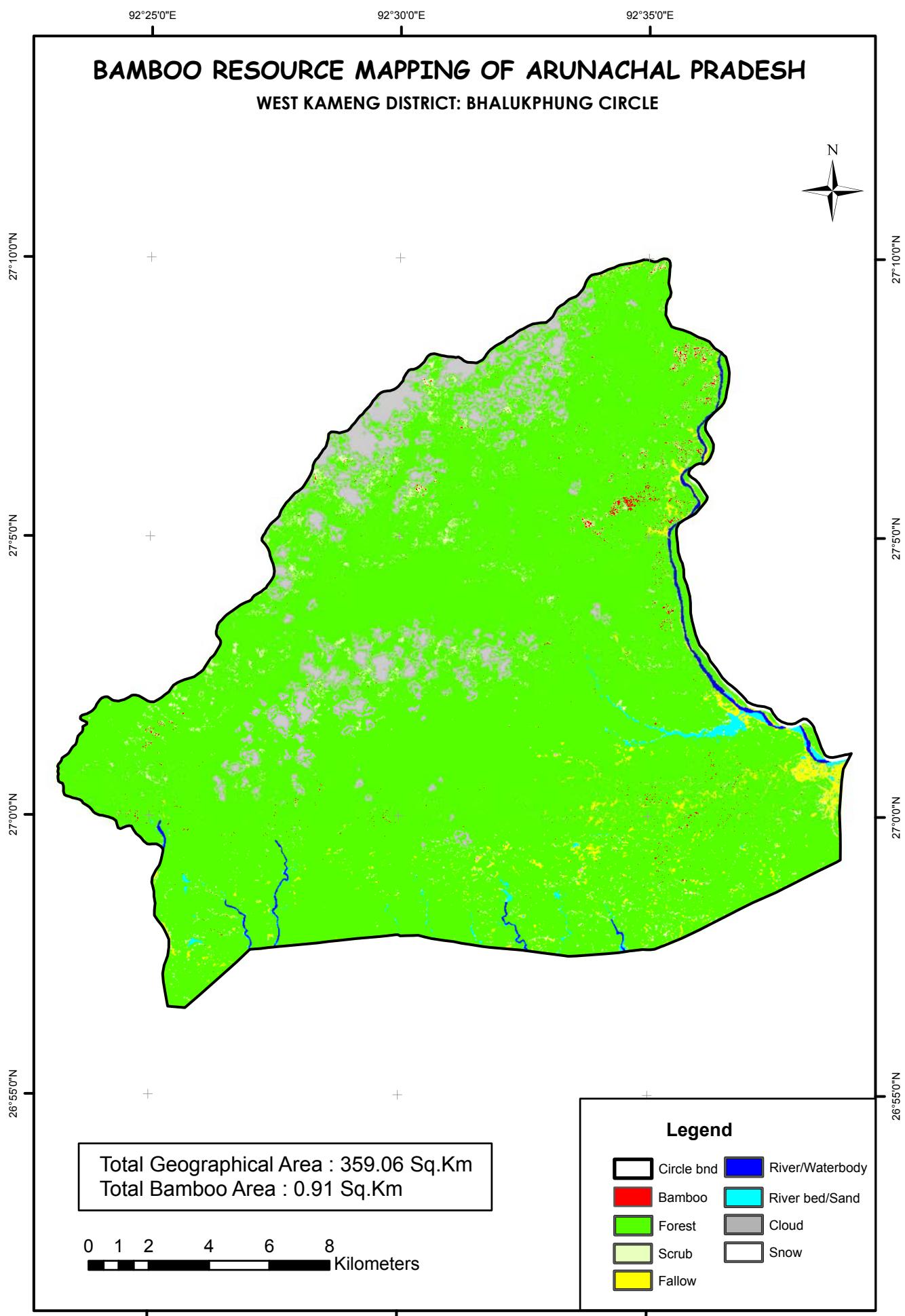
Total Geographical Area : 17.93 Sq.Km  
Total Bamboo Area : 0.76 Sq.Km

0 0.3 0.6 1.2 1.8 2.4 Kilometers

### Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

92°25'0"E



92°10'0"E

92°15'0"E

92°20'0"E

92°25'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## WEST KAMENG DISTRICT: BALIMAU CIRCLE



27°50'N

27°00'N

26°55'N

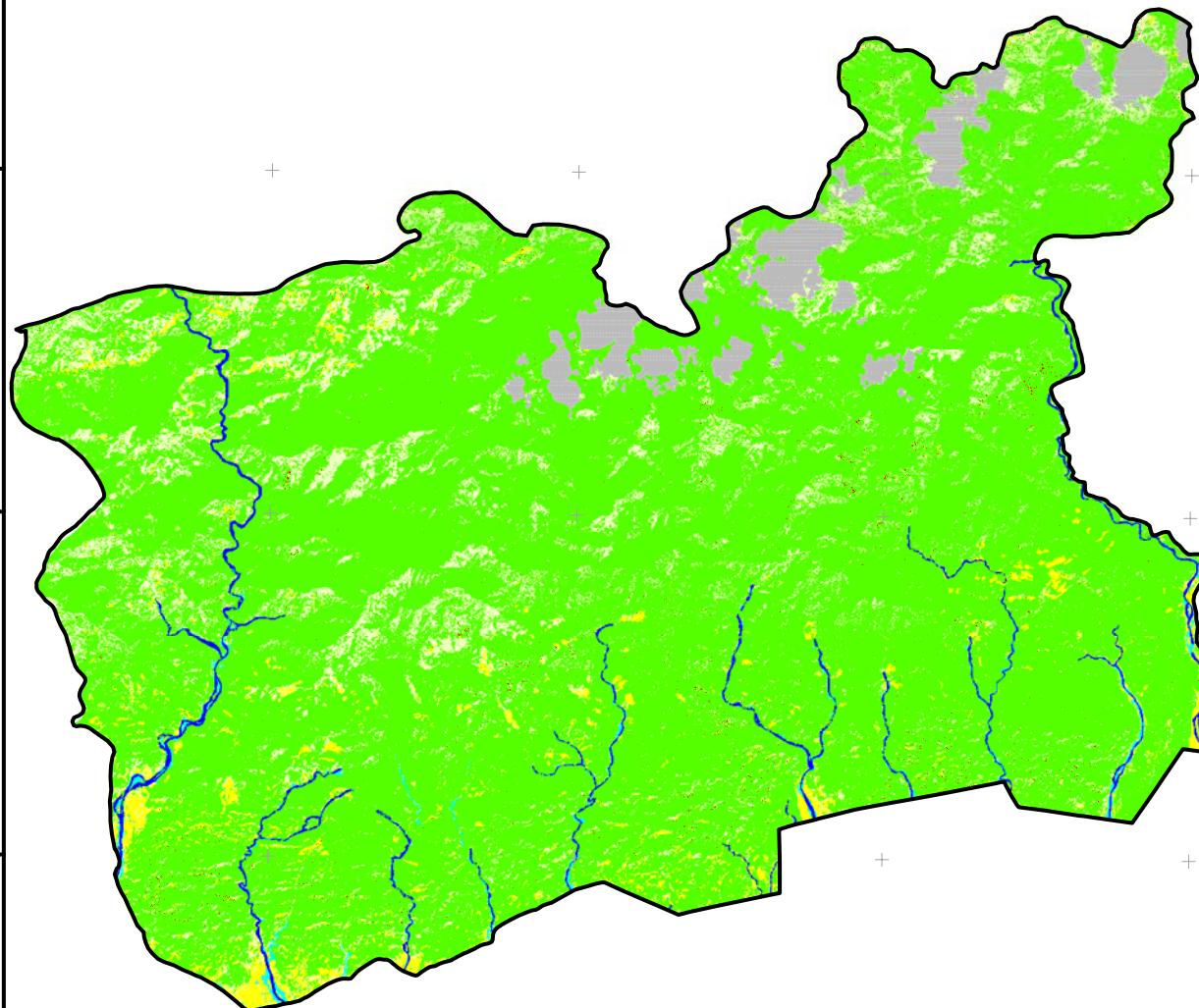
26°50'N

27°50'N

27°00'N

26°55'N

26°50'N



Total Geographical Area : 541.19 Sq.Km  
 Total Bamboo Area : 0.64 Sq.Km

0 1.5 3 6 9 12 Kilometers

### Legend

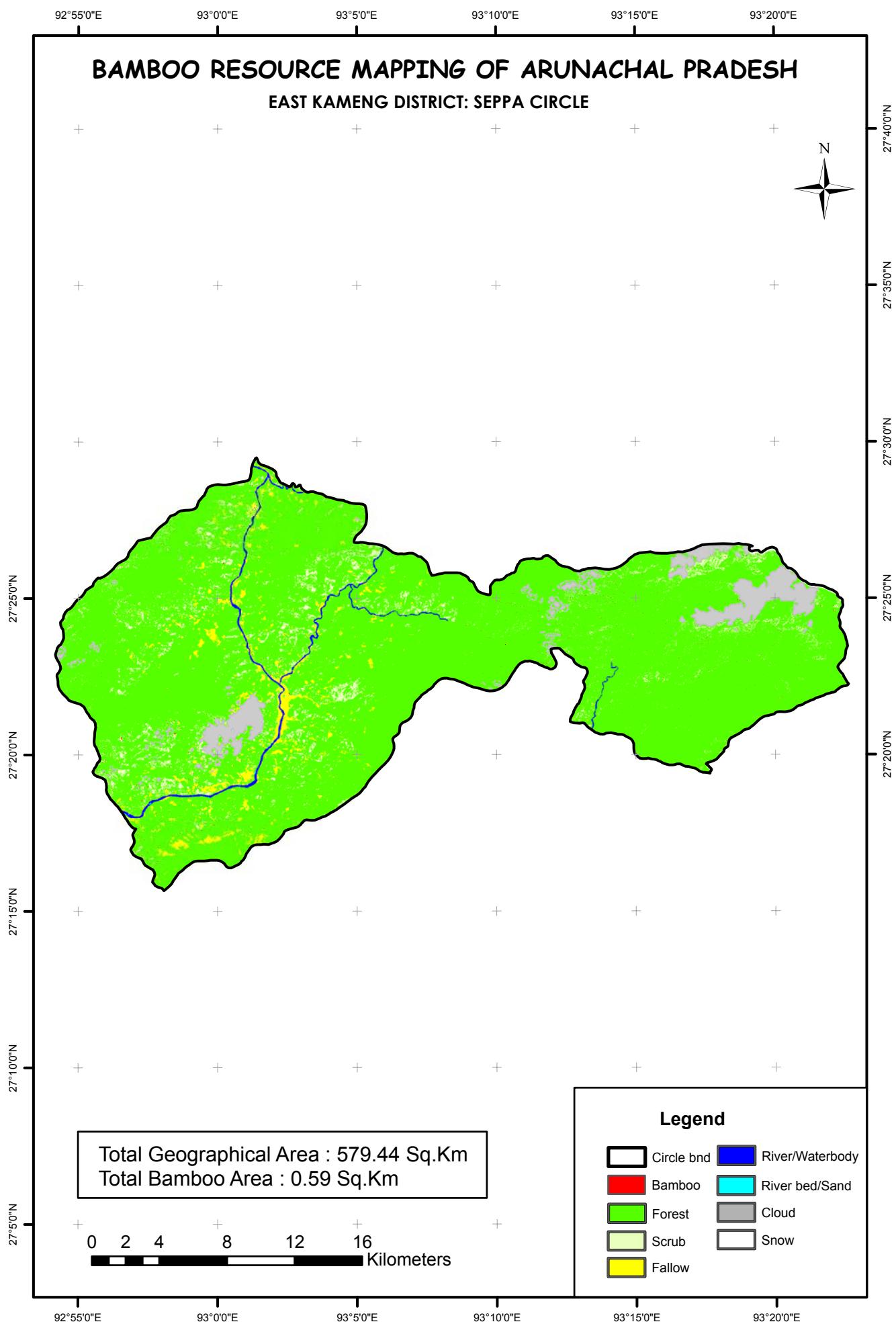
Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

92°10'0"E

92°15'0"E

92°20'0"E

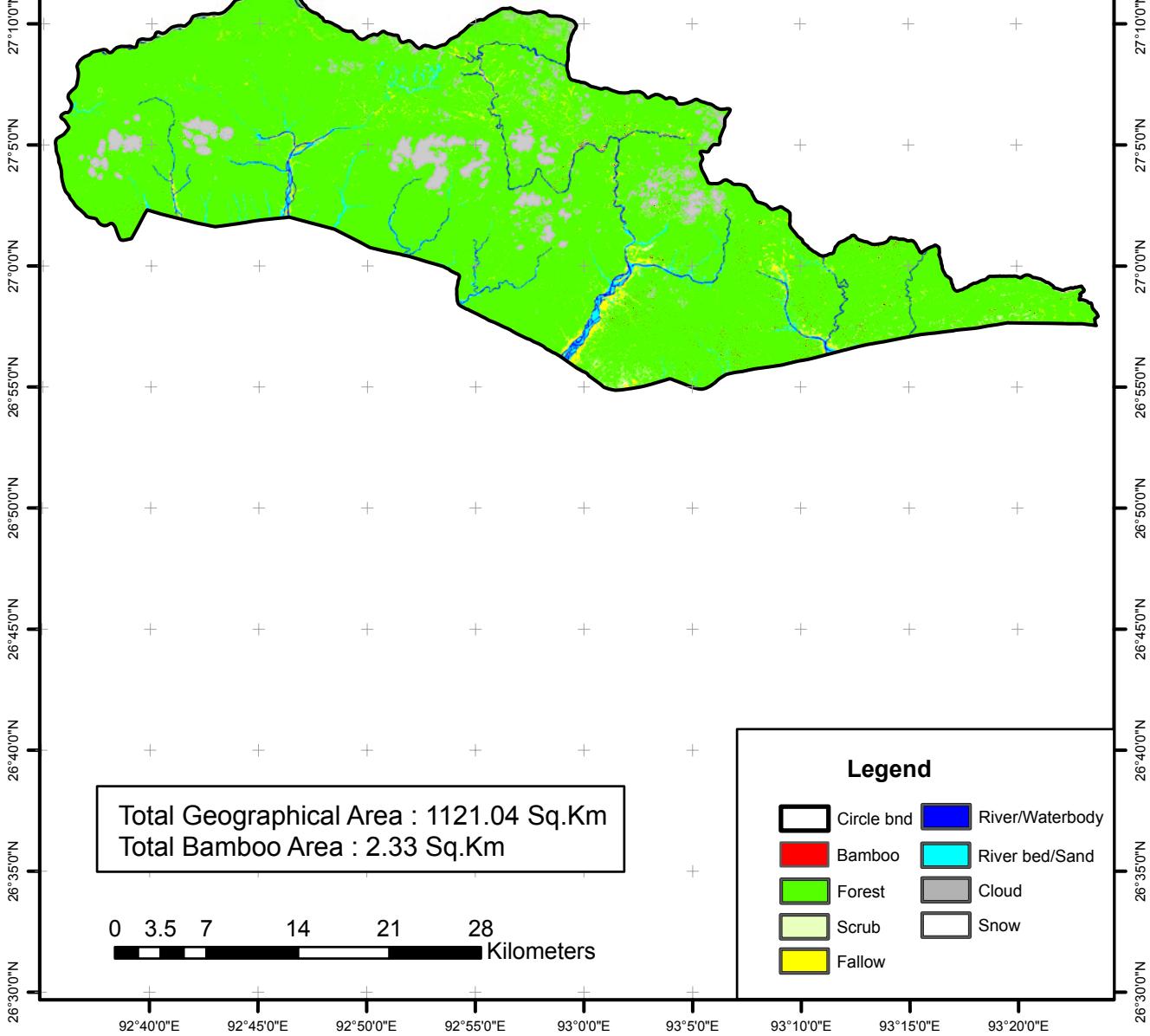
92°25'0"E



92°35'0"E 92°40'0"E 92°45'0"E 92°50'0"E 92°55'0"E 93°0'0"E 93°5'0"E 93°10'0"E 93°15'0"E 93°20'0"E

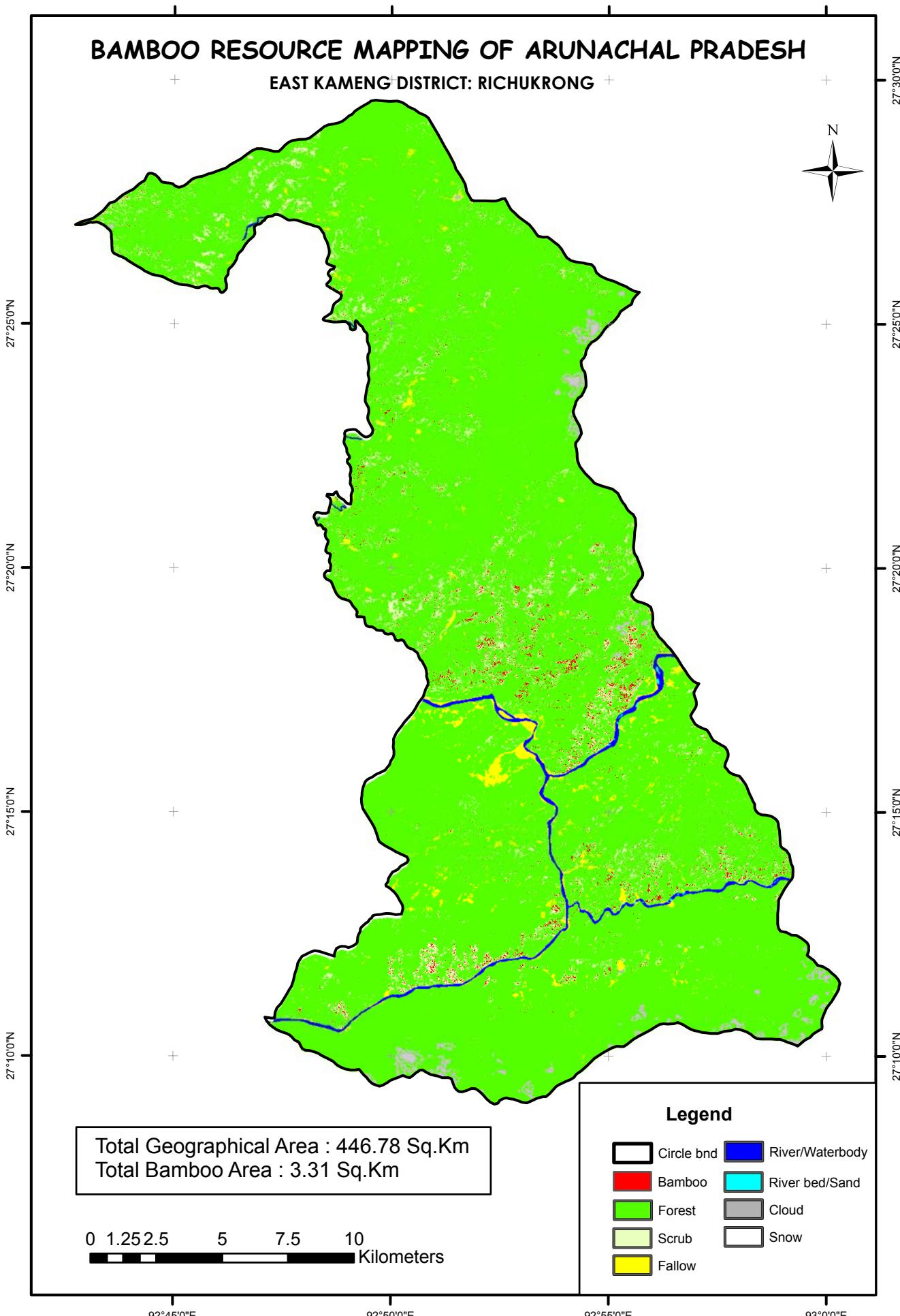
# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## EAST KAMENG DISTRICT: SEIJOSA CIRCLE



# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## **EAST KAMENG DISTRICT: RICHUKRONG**

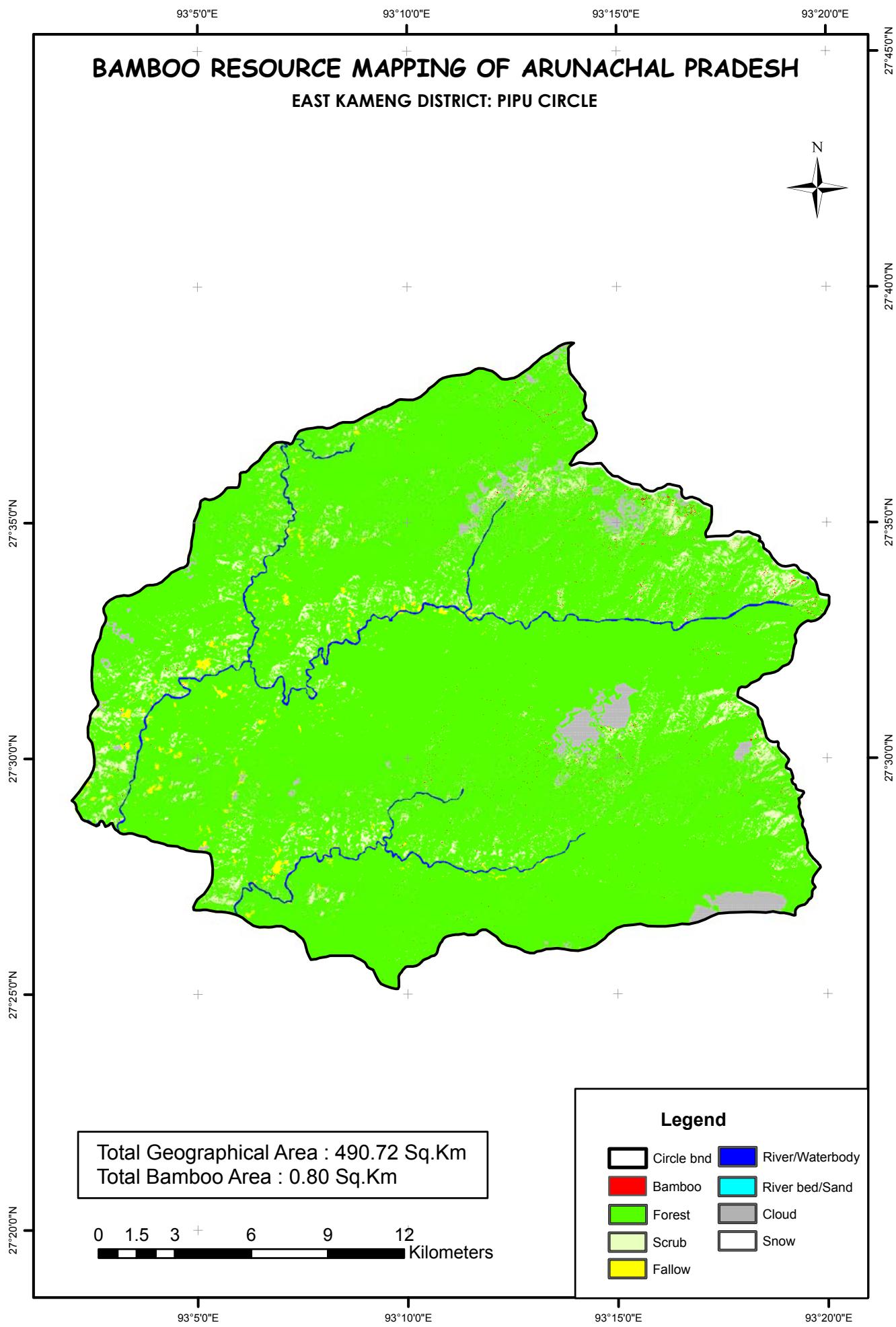


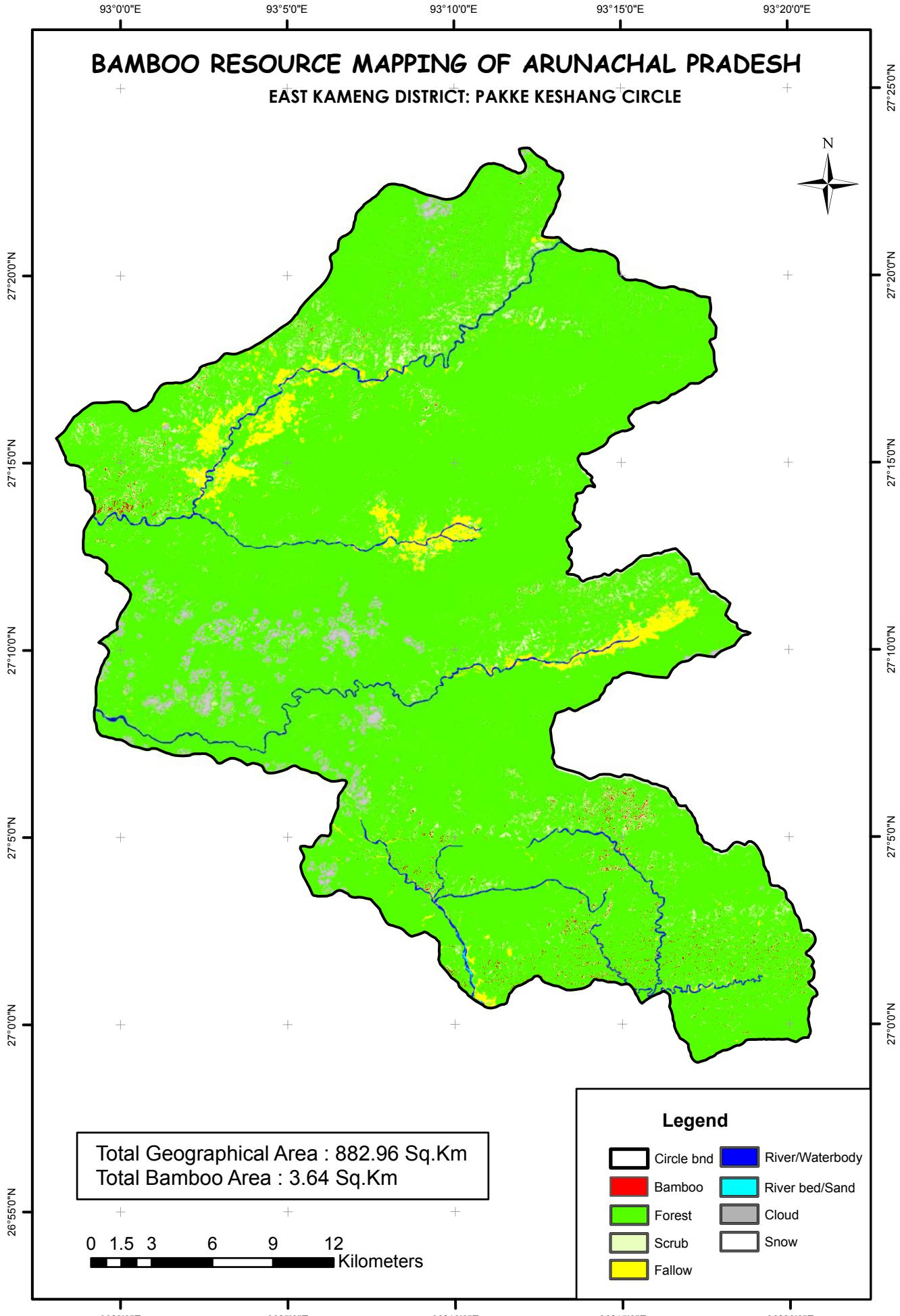
Total Geographical Area : 446.78 Sq.Km  
Total Bamboo Area : 3.31 Sq.Km

A scale bar at the bottom of the map, consisting of a horizontal line with tick marks and numerical labels. The labels are 0, 1.25, 2.5, 5, 7.5, and 10, representing Kilometers. A legend to the right of the scale bar identifies the unit as "Kilometers".

## Legend

- A legend box containing six entries, each with a colored square followed by a label. The entries are: Circle bnd (black), Bamboo (red), Forest (green), Scrub (light green), Fallow (yellow), River/Waterbody (blue), River bed/Sand (cyan), Cloud (gray), and Snow (white).





92°35'0"E

92°40'0"E

92°45'0"E

92°50'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## EAST KAMENG DISTRICT: LADA CIRCLE



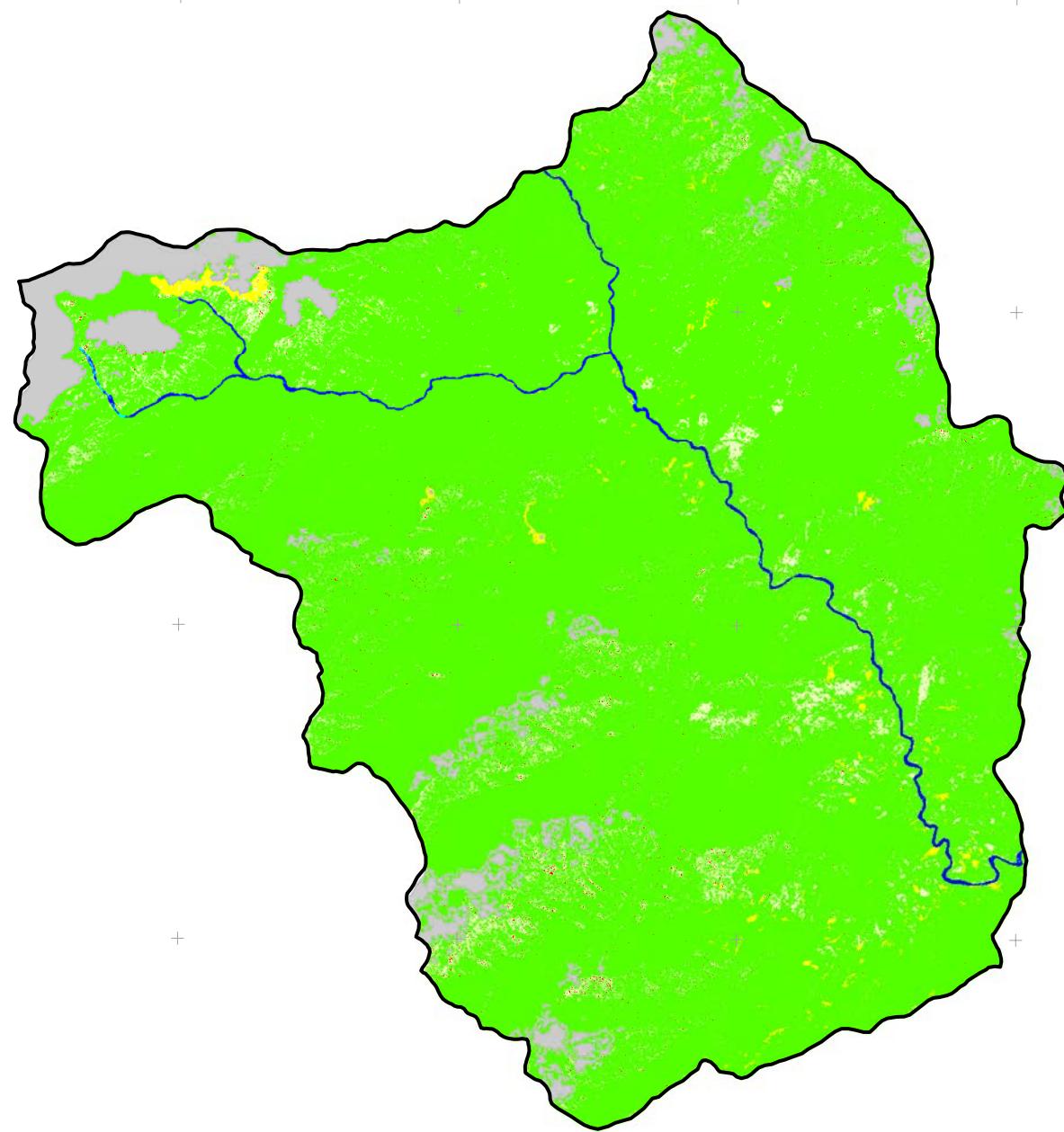
27°45'0"N

27°40'0"N

27°35'0"N

27°30'0"N

27°25'0"N



Total Geographical Area : 574.81 Sq.Km  
 Total Bamboo Area : 0.65 Sq.Km

0 1.25 2.5 5 7.5 10 Kilometers

### Legend

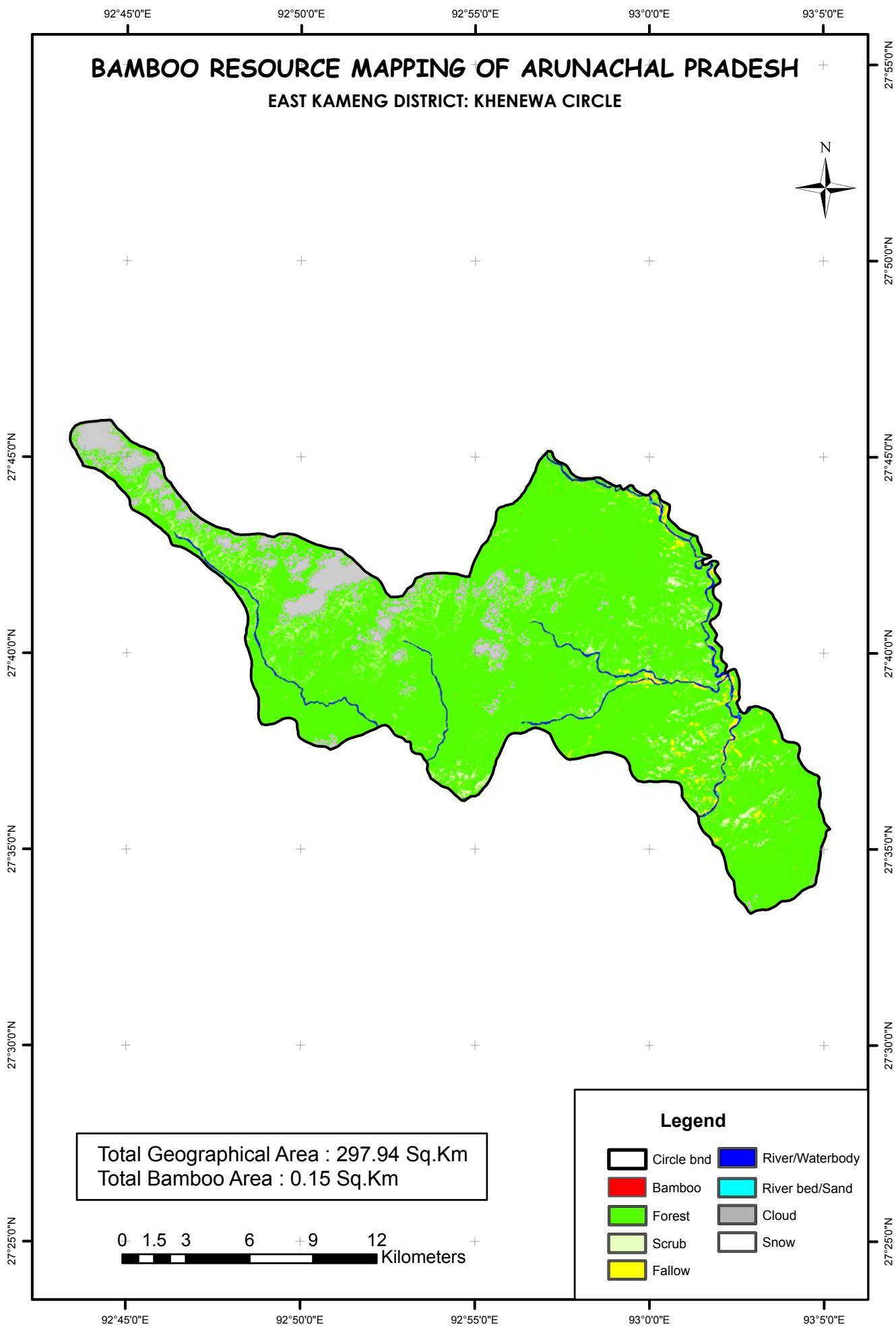
Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

92°35'0"E

92°40'0"E

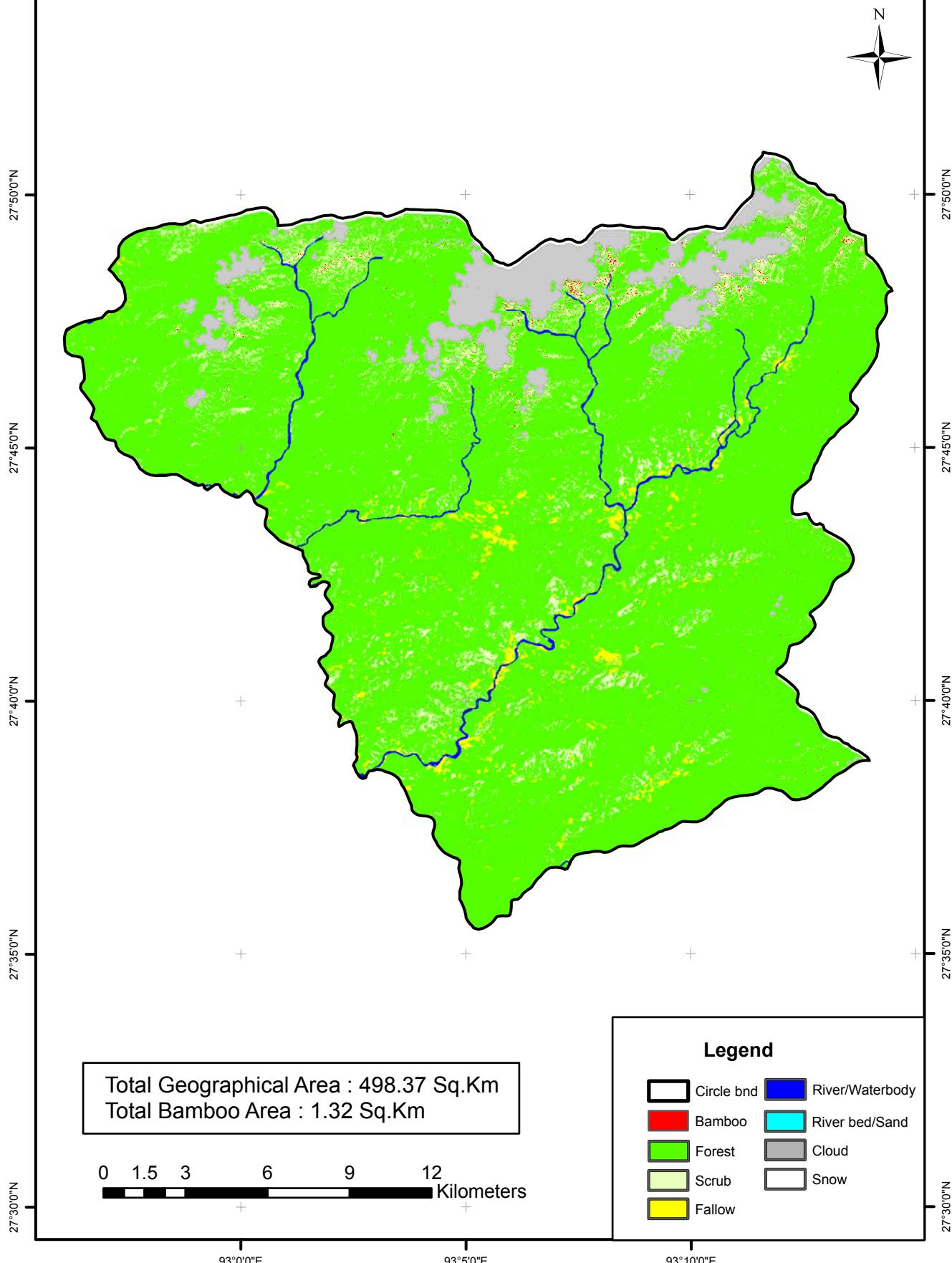
92°45'0"E

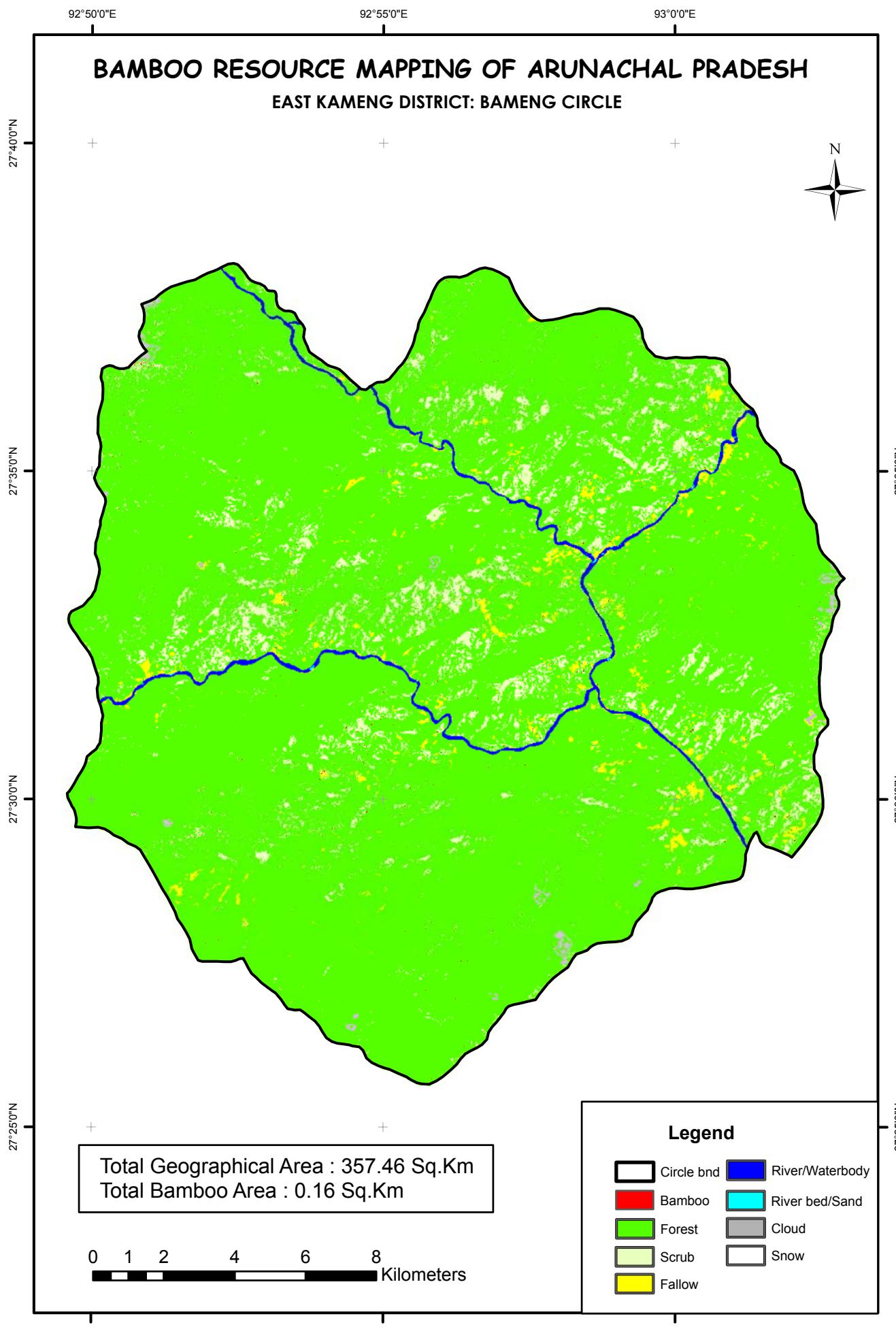
92°50'0"E



# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## EAST KAMENG DISTRICT: CHAYANGTAJO CIRCLE





92°50'0"E

92°55'0"E

93°0'0"E

93°35'0"E

93°40'0"E

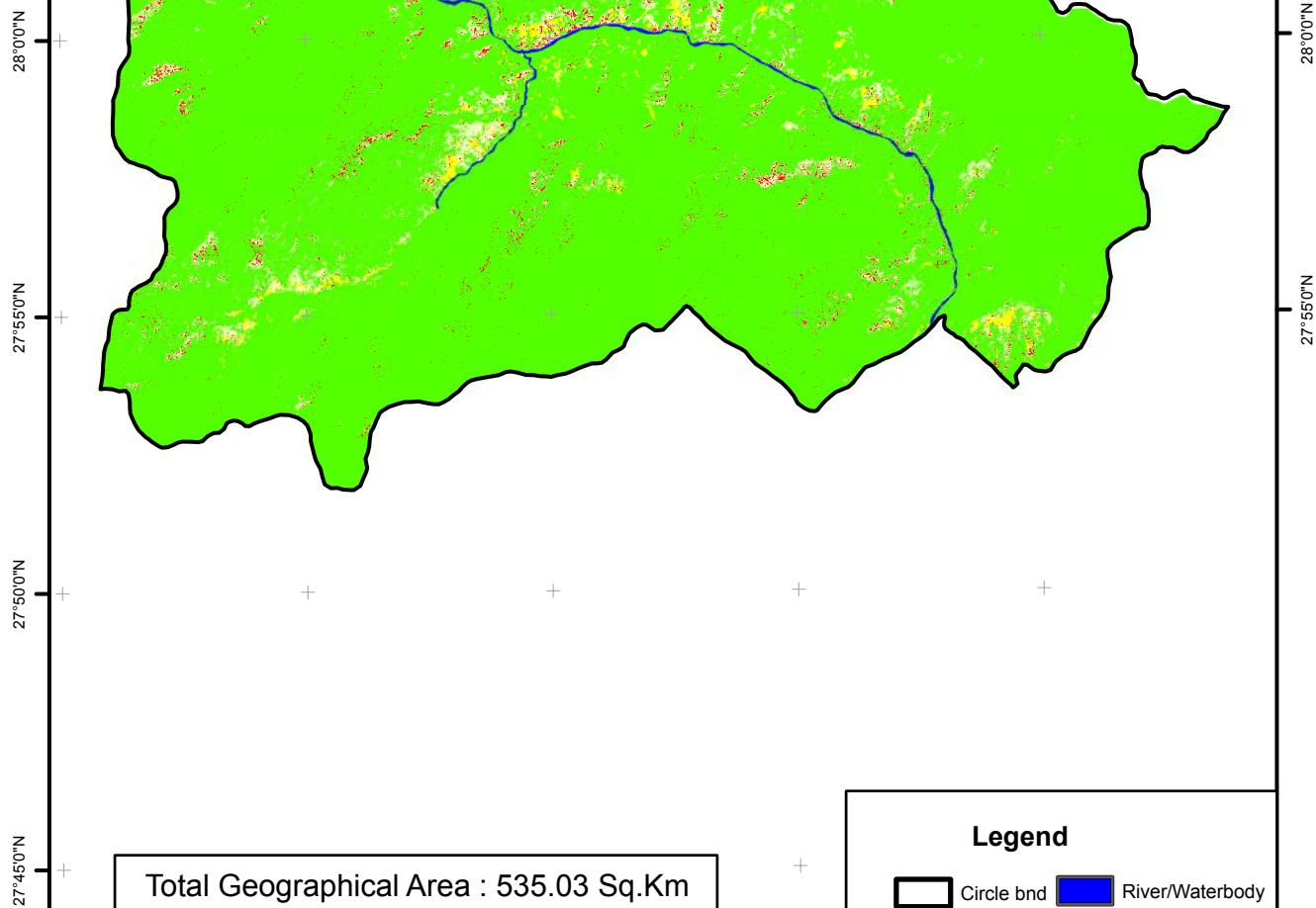
93°45'0"E

93°50'0"E

93°55'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## KURUNG KUMEY DISTRICT: TALI CIRCLE



0 2 4 8 12 16 Kilometers

### Legend

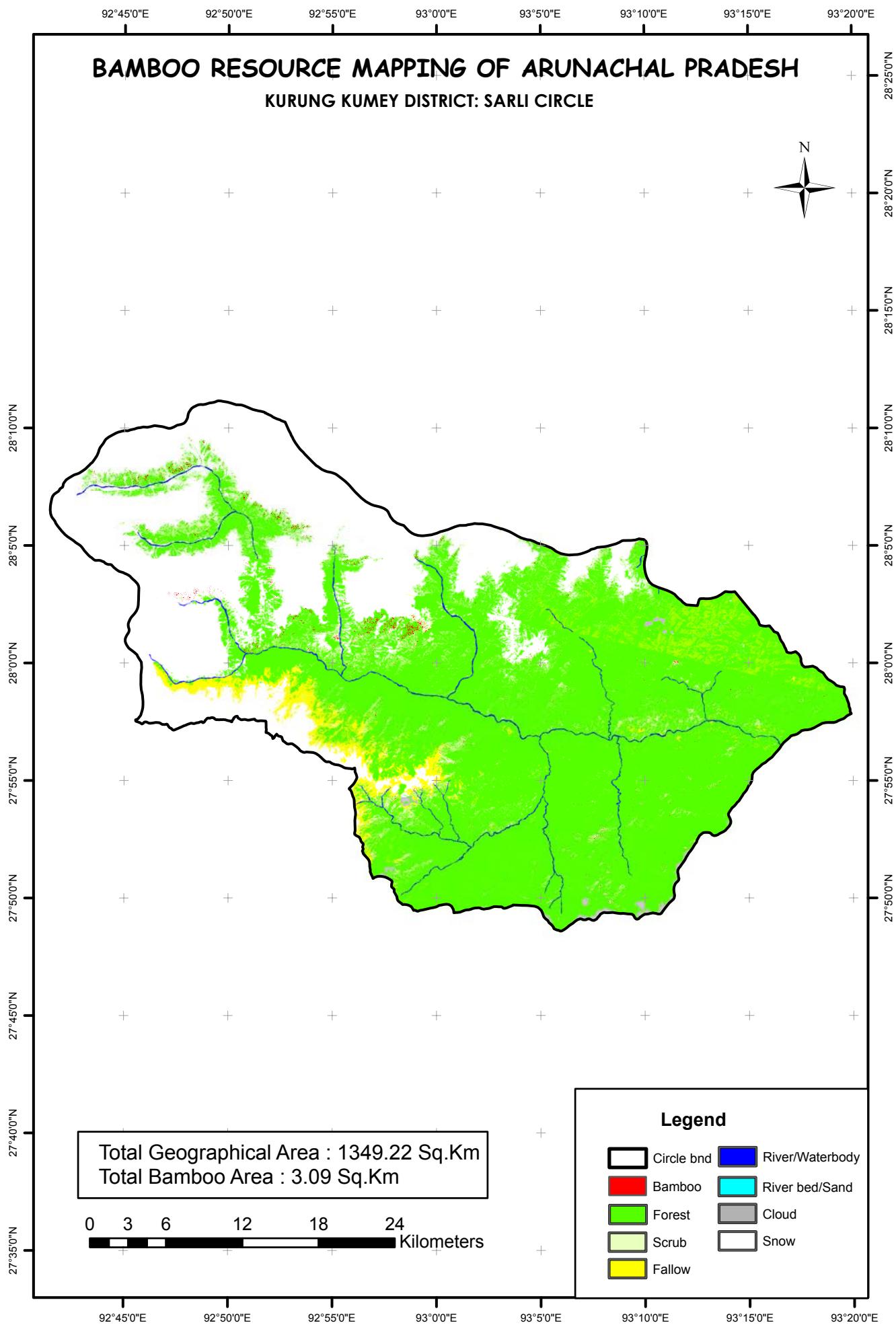
Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

93°40'0"E

93°45'0"E

93°50'0"E

93°55'0"E



93°25'0"E

93°30'0"E

93°35'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

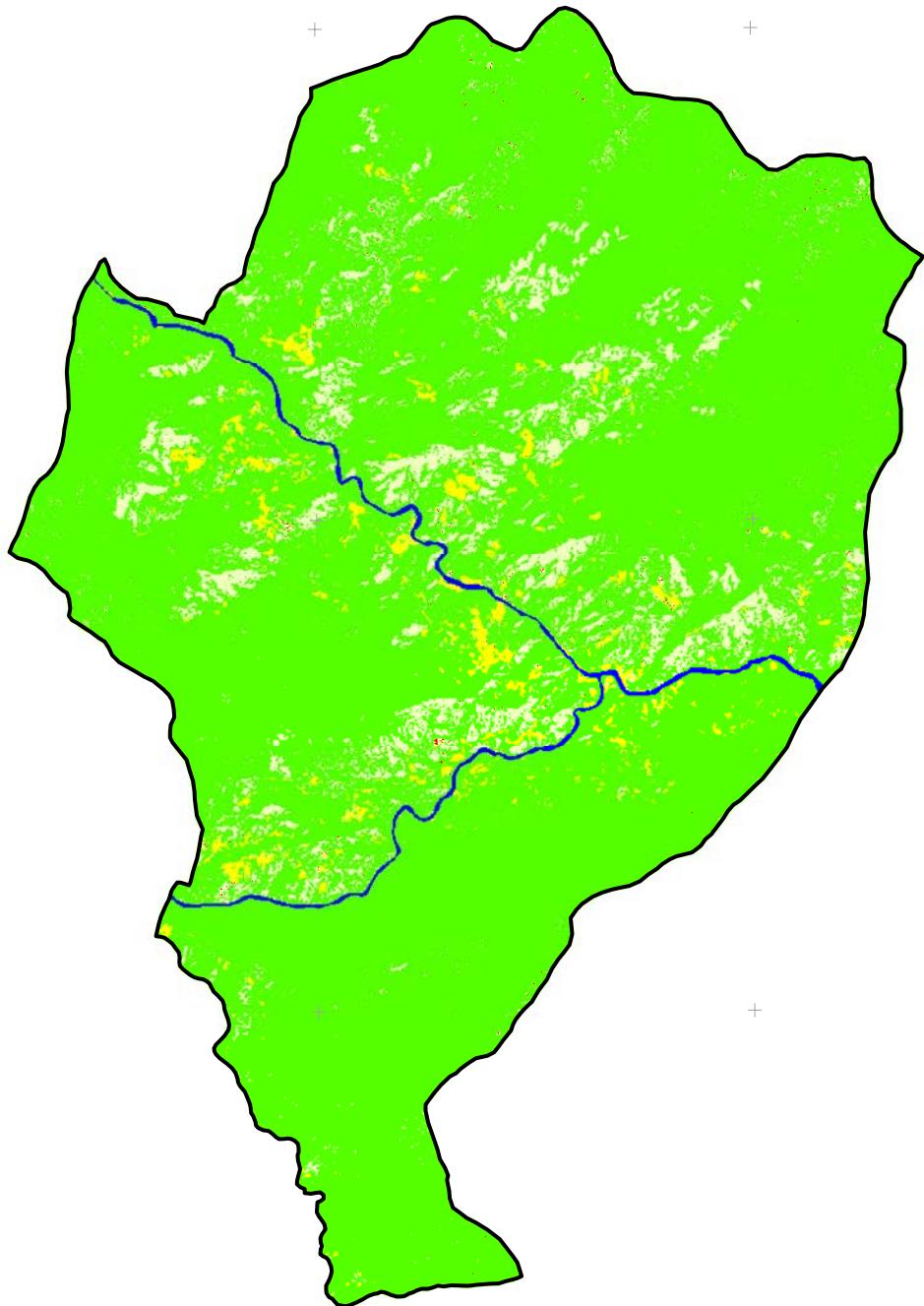
## KURUNG KUMEY DISTRICT: SANGRAM CIRCLE

27°55'0"N

27°50'0"N

27°45'0"N

27°40'0"N



Total Geographical Area : 233.34 Sq.Km  
 Total Bamboo Area : 0.10 Sq.Km

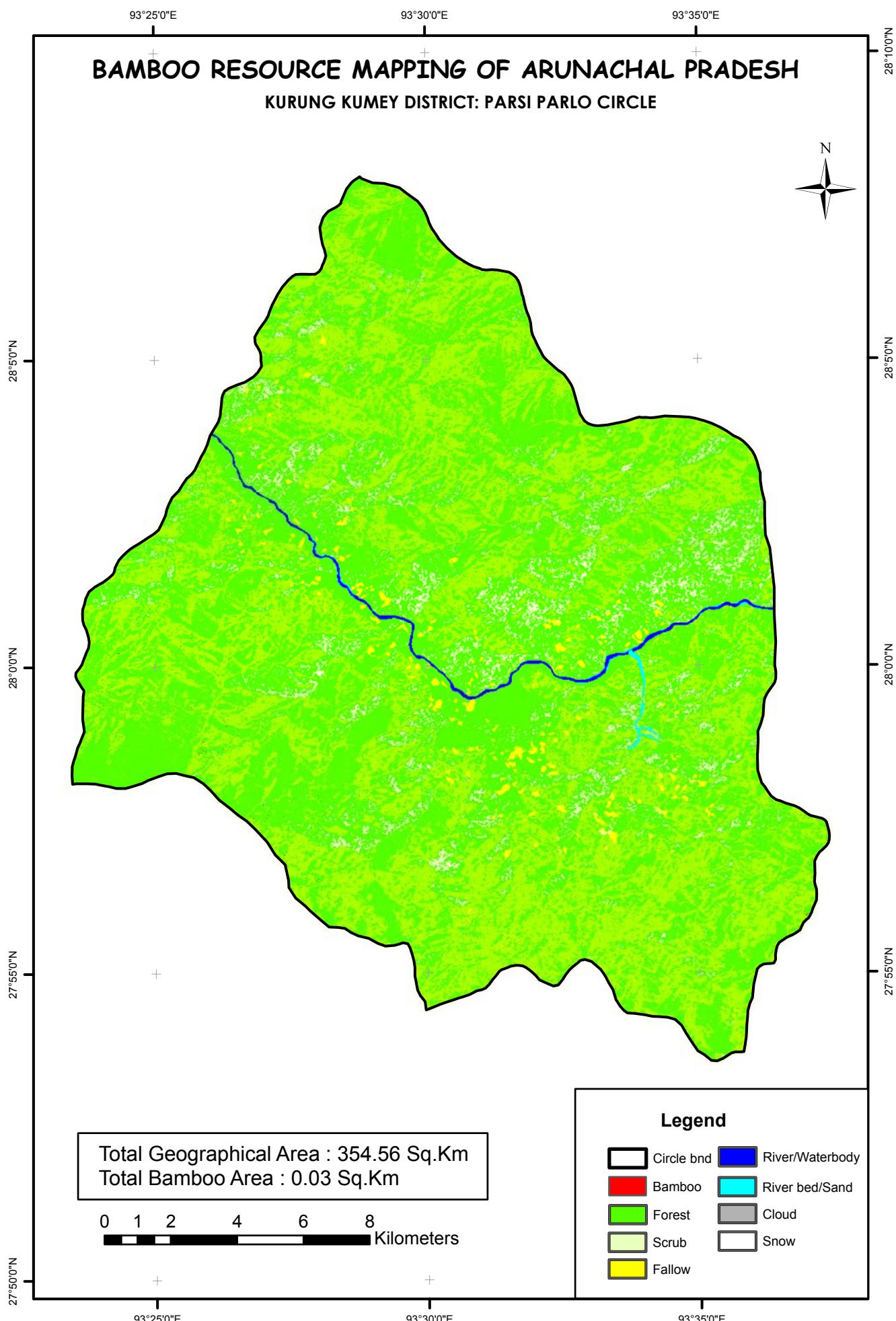
0 1 2 4 6 8 Kilometers

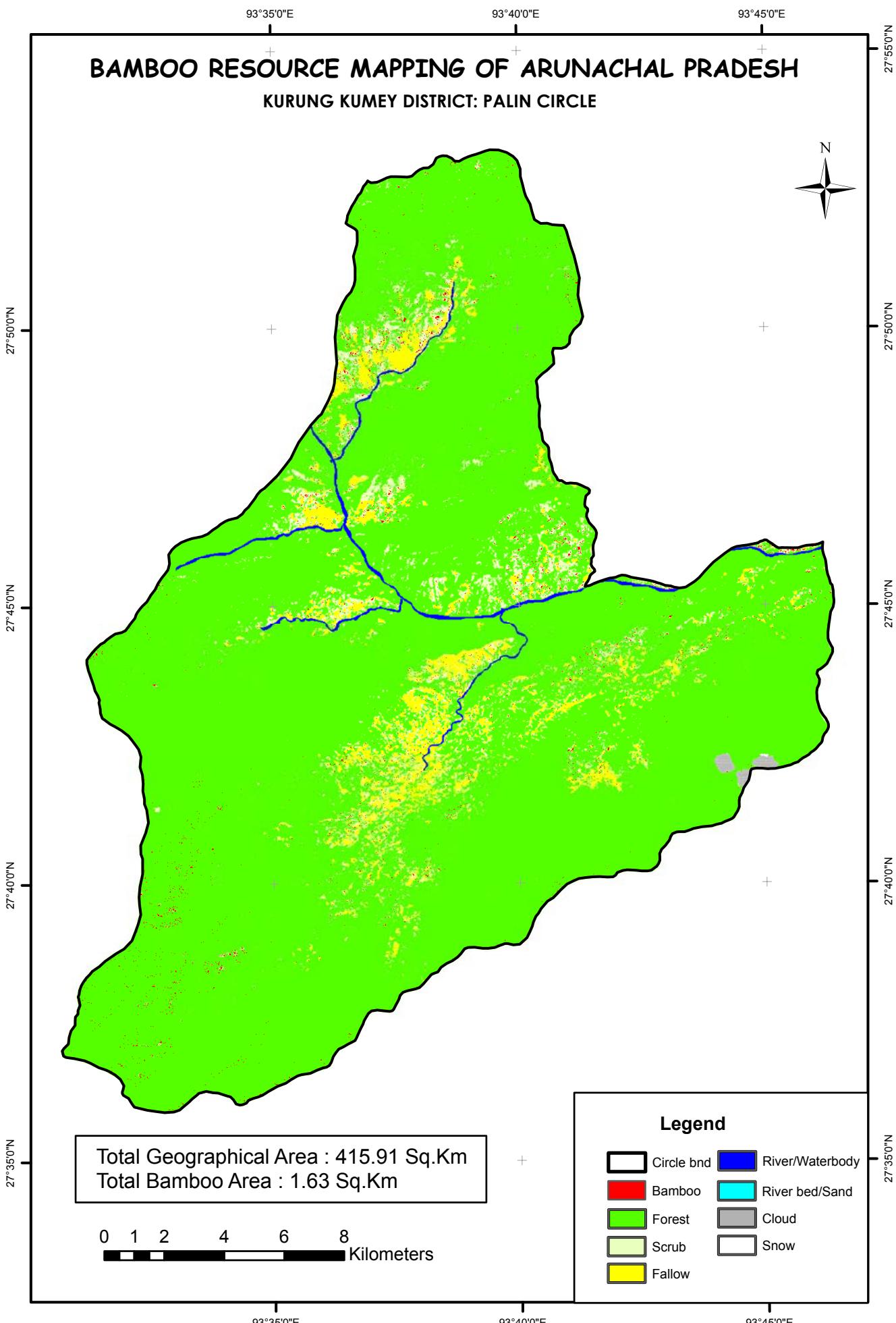
### Legend

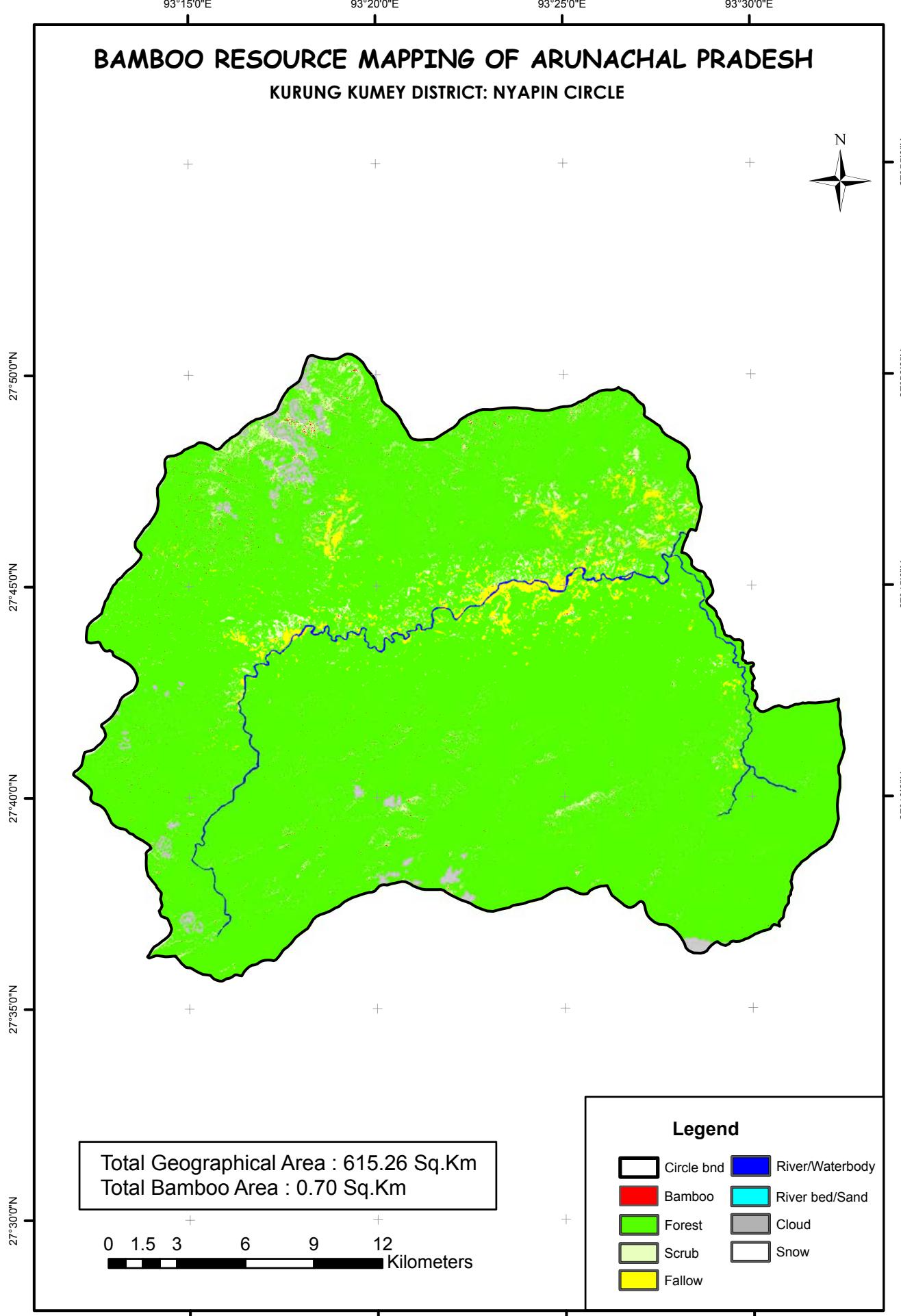
Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

93°30'0"E

93°35'0"E





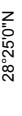


93°30'0"E      93°35'0"E      93°40'0"E      93°45'0"E      93°50'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## KURUNG KUMEY DISTRICT: LONGDING KOLING CIRCLE

N



28°25'0"N

28°20'0"N

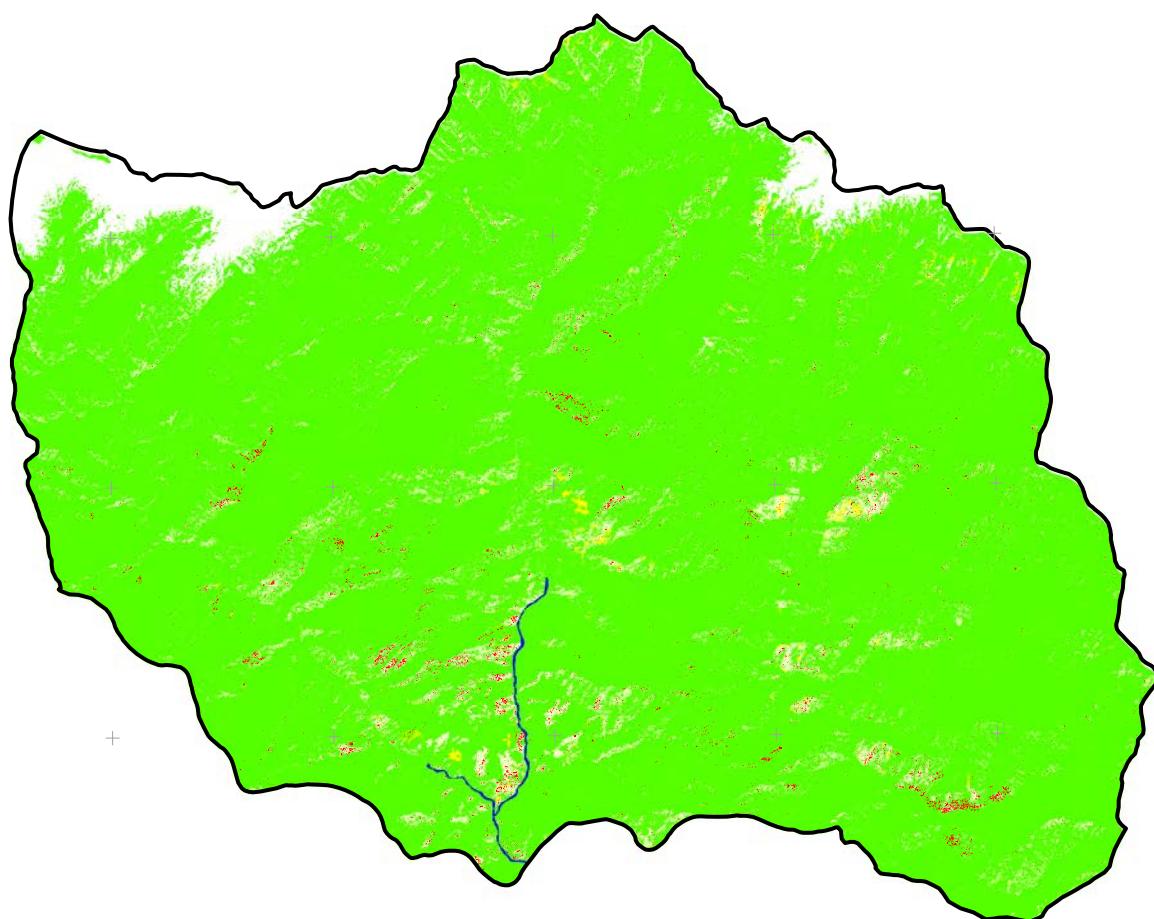
28°15'0"N

28°10'0"N

28°5'0"N

28°0'0"N

27°55'0"N



Total Geographical Area : 960.72 Sq.Km  
Total Bamboo Area : 4.22 Sq.Km

0 1.5 3 6 9 12 Kilometers

### Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

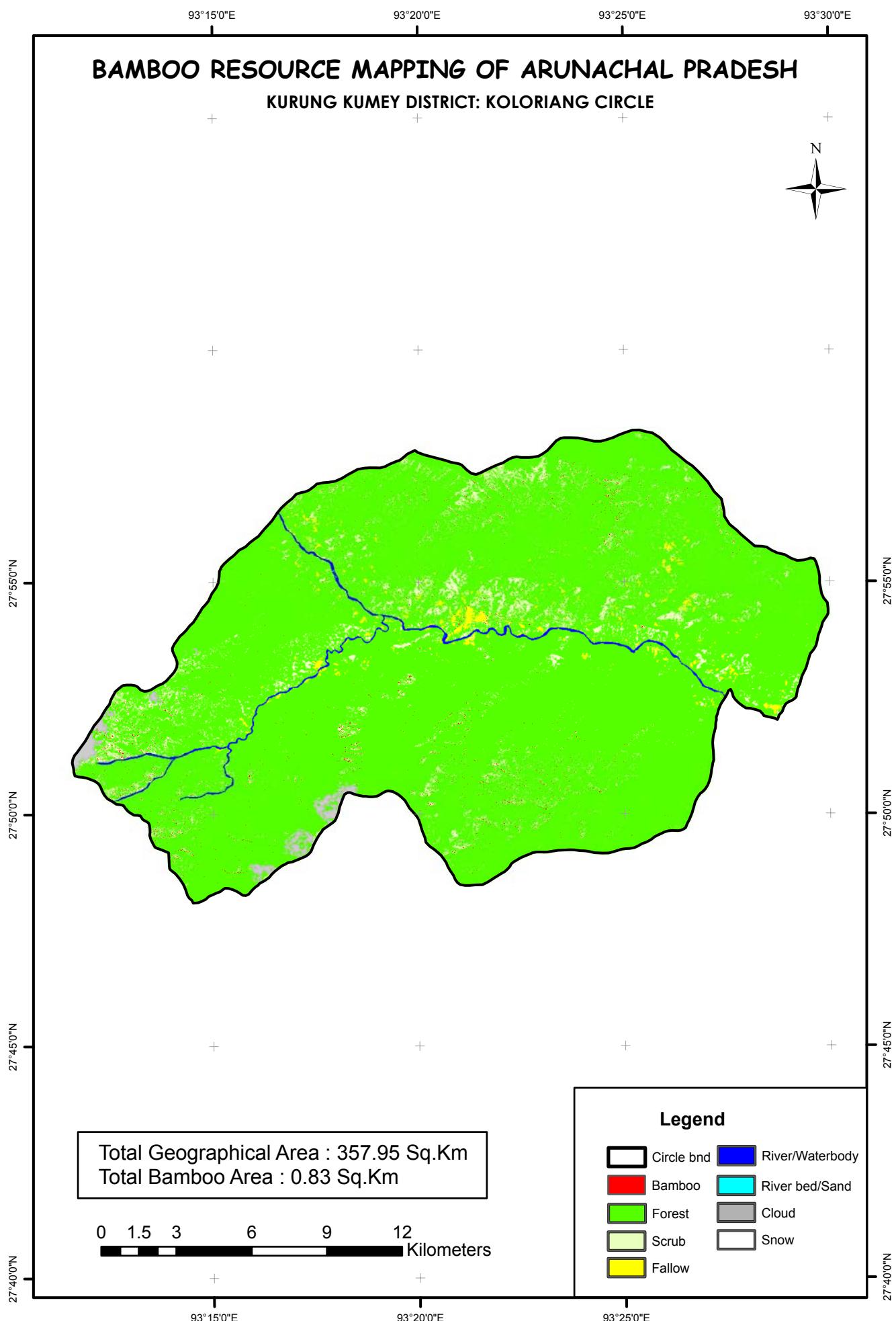
93°30'0"E

93°35'0"E

93°40'0"E

93°45'0"E

93°50'0"E



93°40'0"E

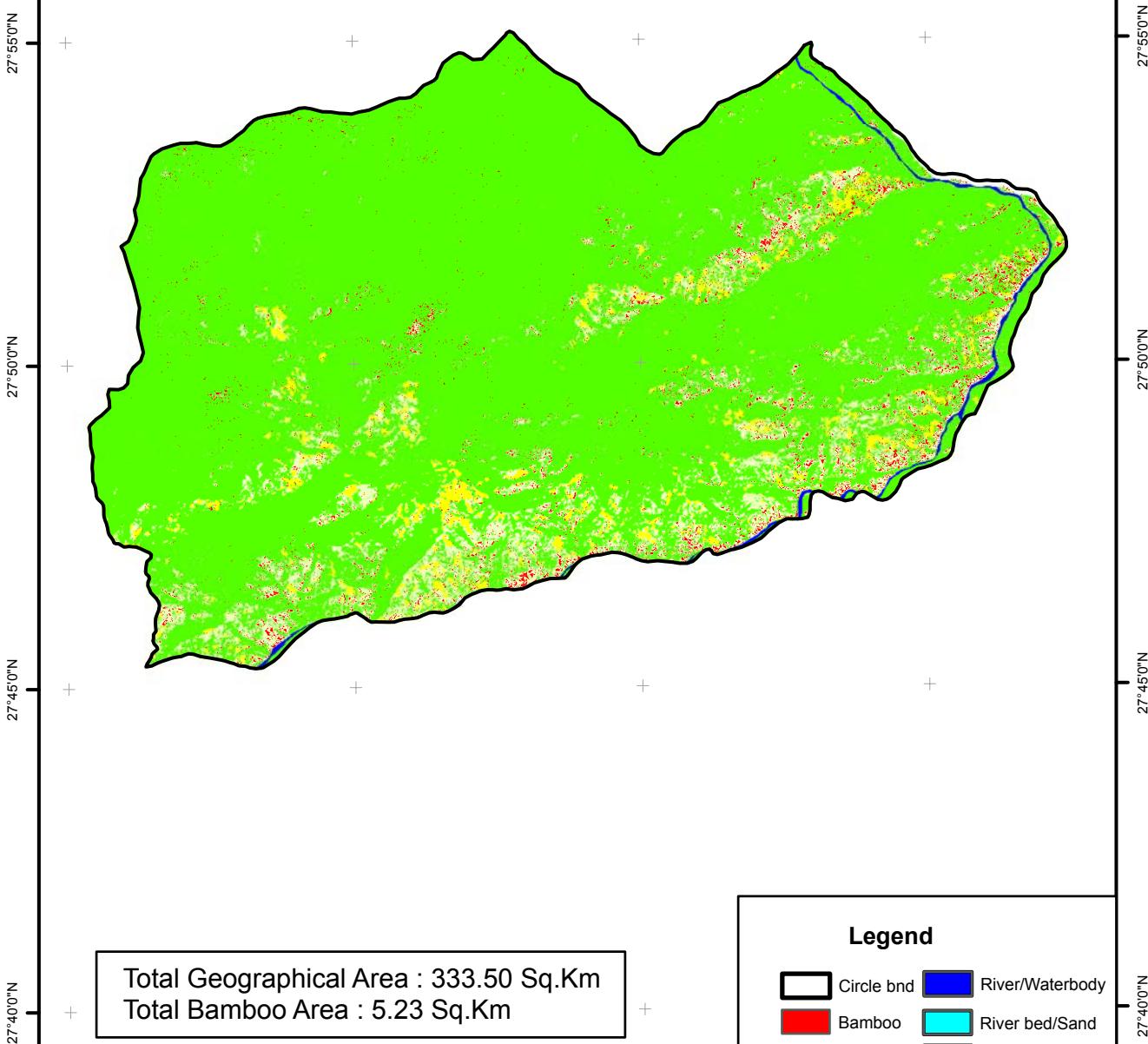
93°45'0"E

93°50'0"E

93°55'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

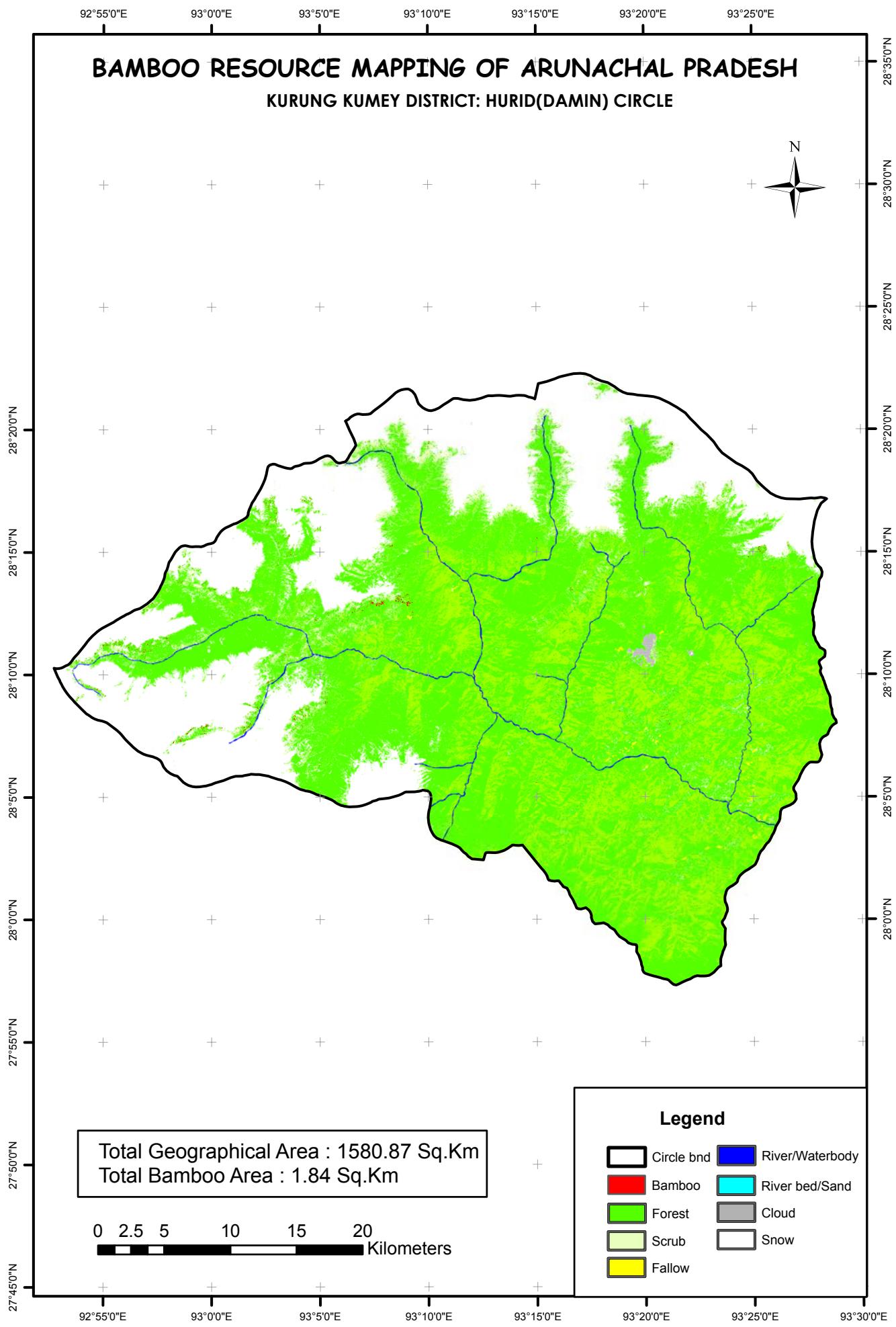
## KURUNG KUMEY DISTRICT: CHAMBANG CIRCLE



93°45'0"E

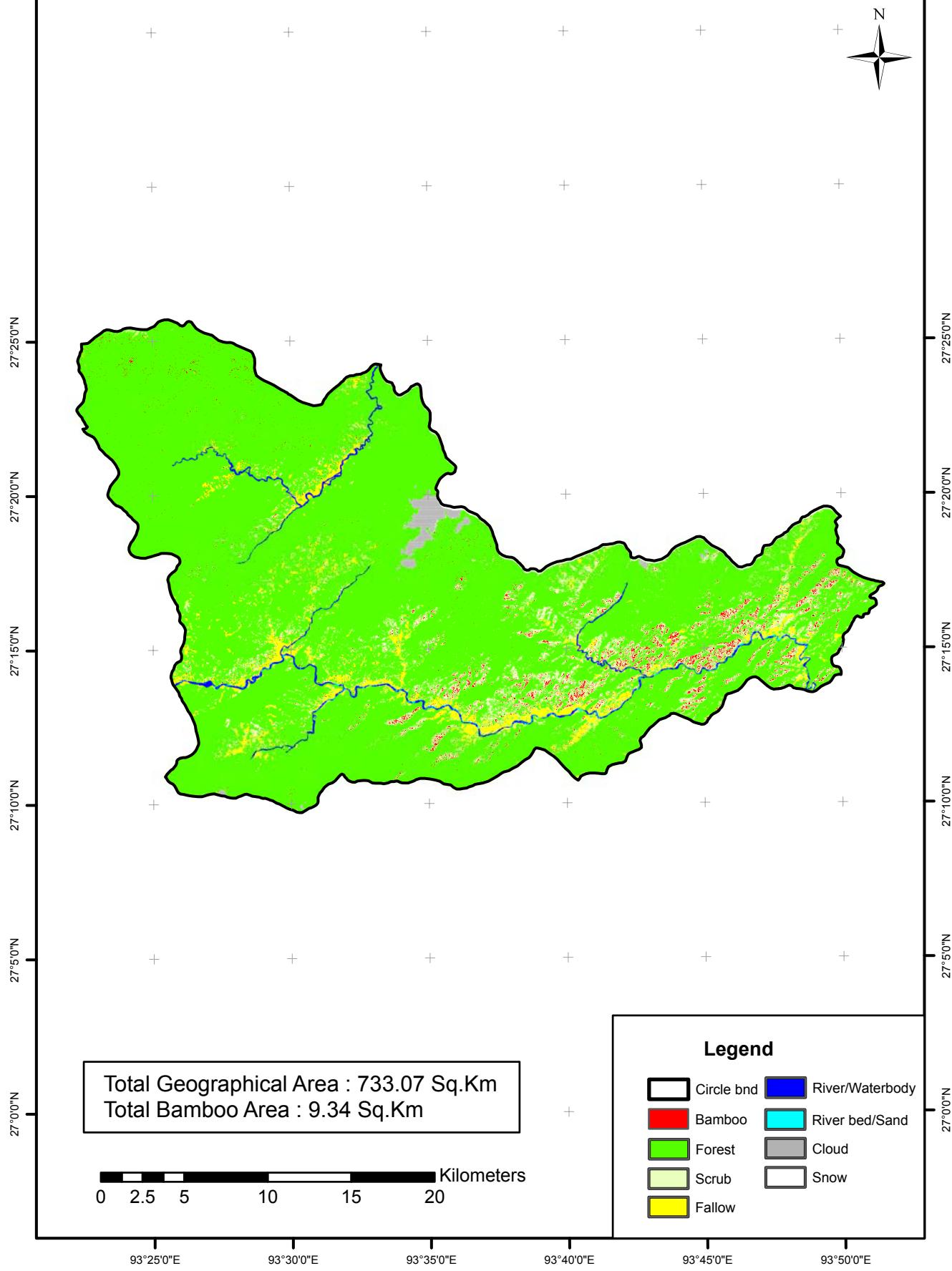
93°50'0"E

93°55'0"E



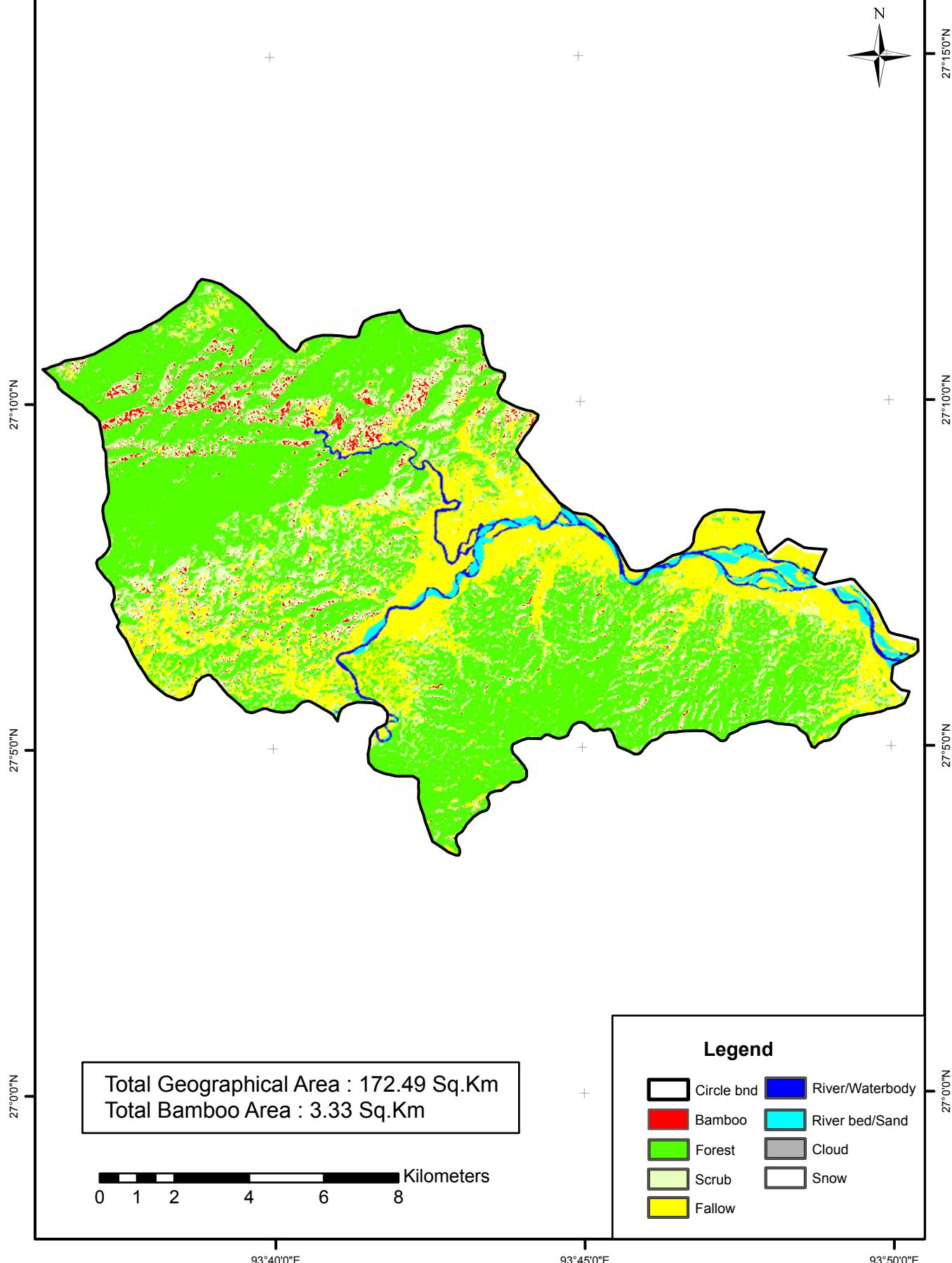
# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

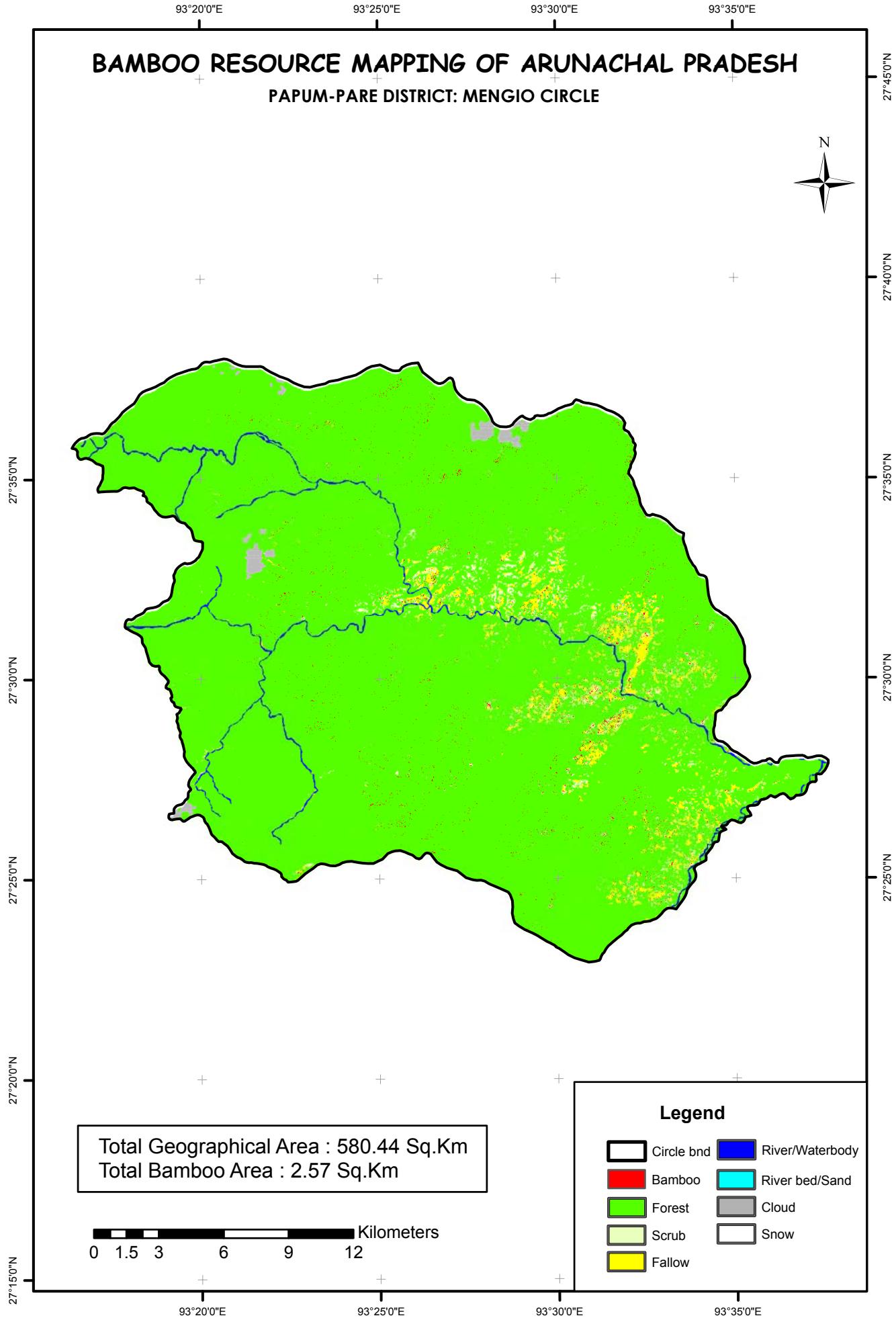
## PAPUM-PARE DISTRICT: SAGALEE CIRCLE

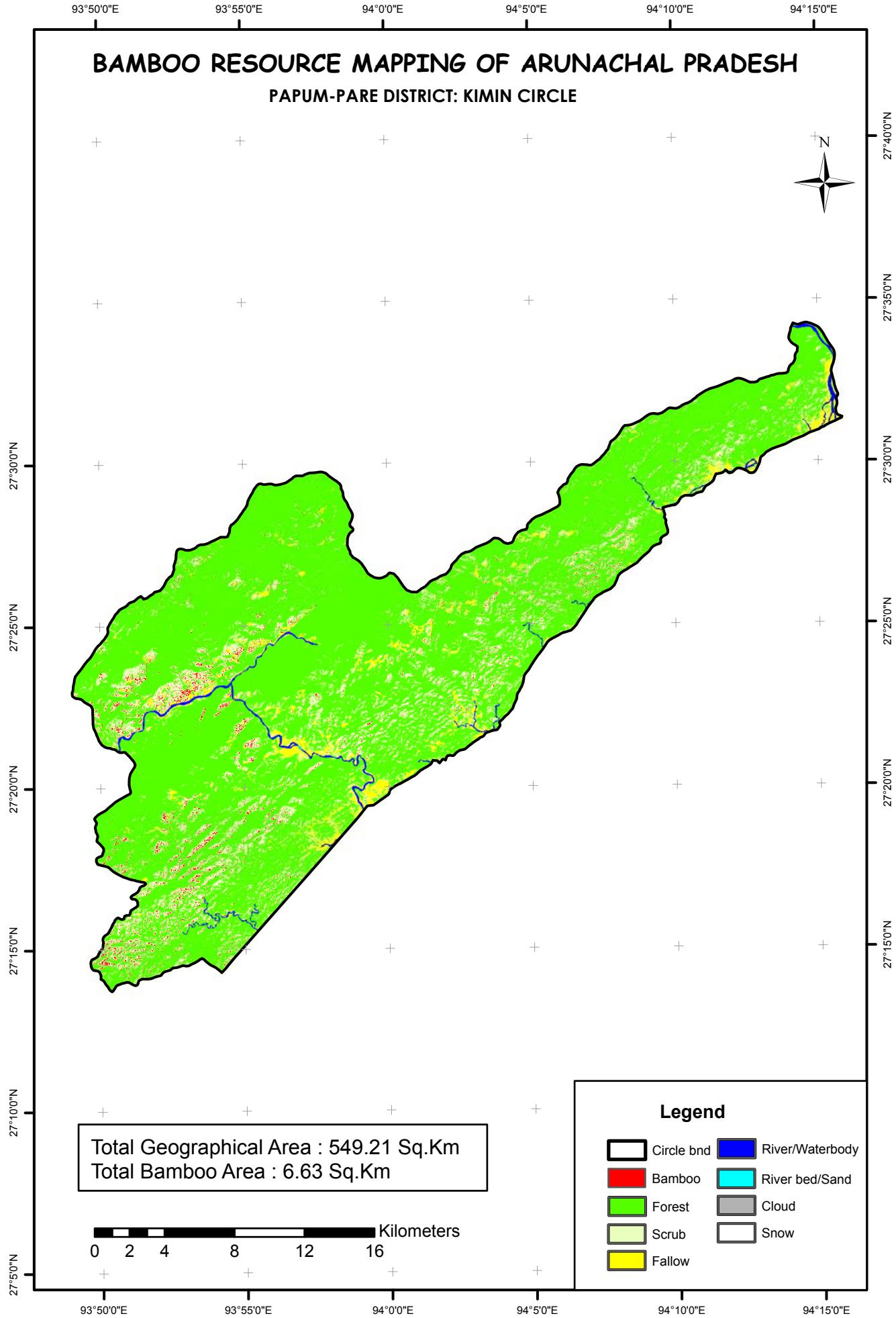


# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

PAPUM-PARE DISTRICT: NAHARLAGUN CIRCLE







93°30'0"E

93°35'0"E

93°40'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## PAPUM-PARE DISTRICT: ITANAGAR CIRCLE



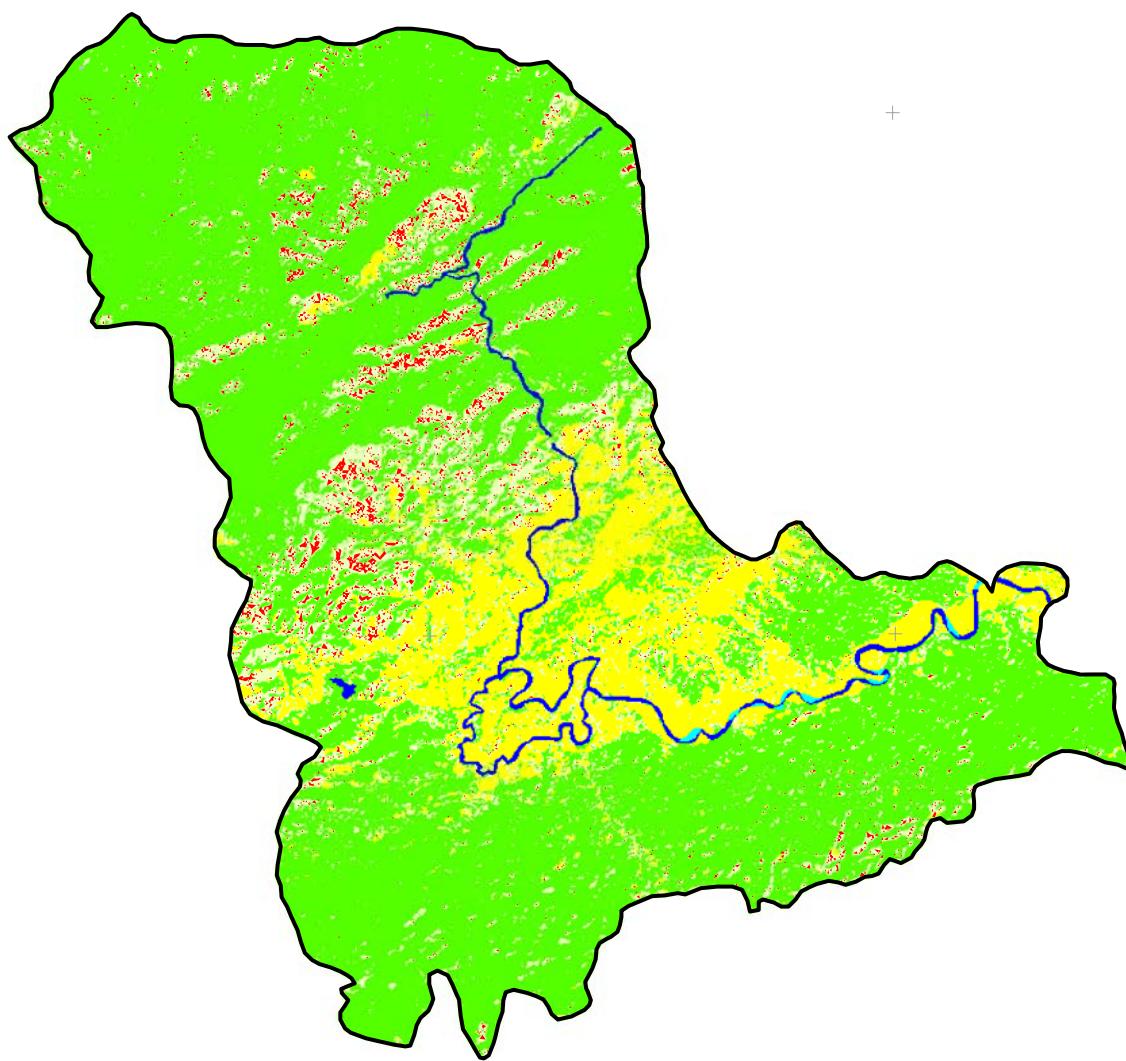
27°10'0"N

27°10'0"N

27°5'0"N

27°5'0"N

27°0'0"N



Total Geographical Area : 175.23 Sq.Km  
Total Bamboo Area : 3.02 Sq.Km

0 1 2 4 6 8 Kilometers

### Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

93°35'0"E

93°40'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

PAPUM-PARE DISTRICT: DOIMUKH CIRCLE

27°20'0"N

27°15'0"N

27°10'0"N

93°45'0"E

93°50'0"E



Total Geographical Area : 124.72 Sq.Km  
Total Bamboo Area : 3.52 Sq.Km

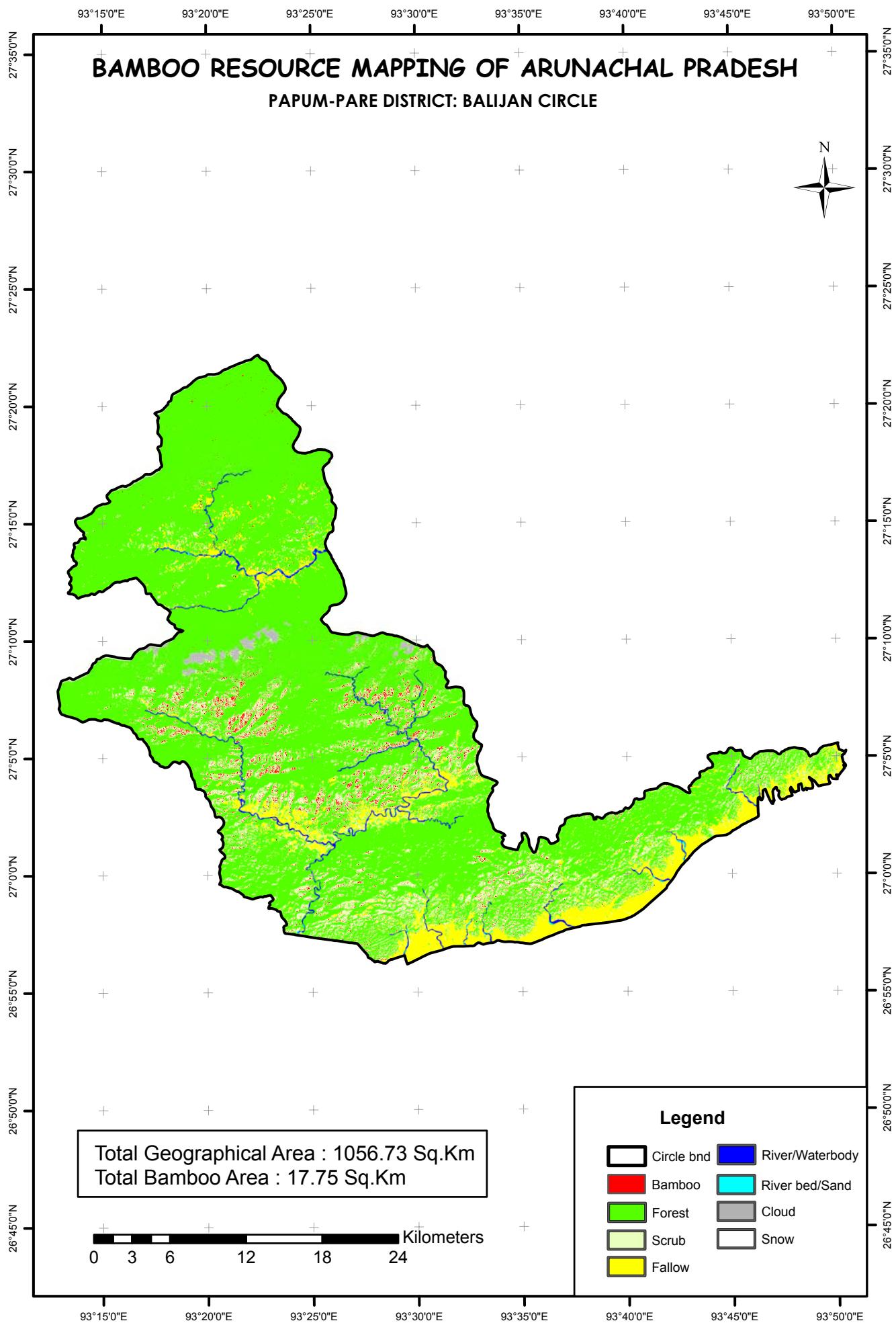
0 1 2 4 6 8 Kilometers

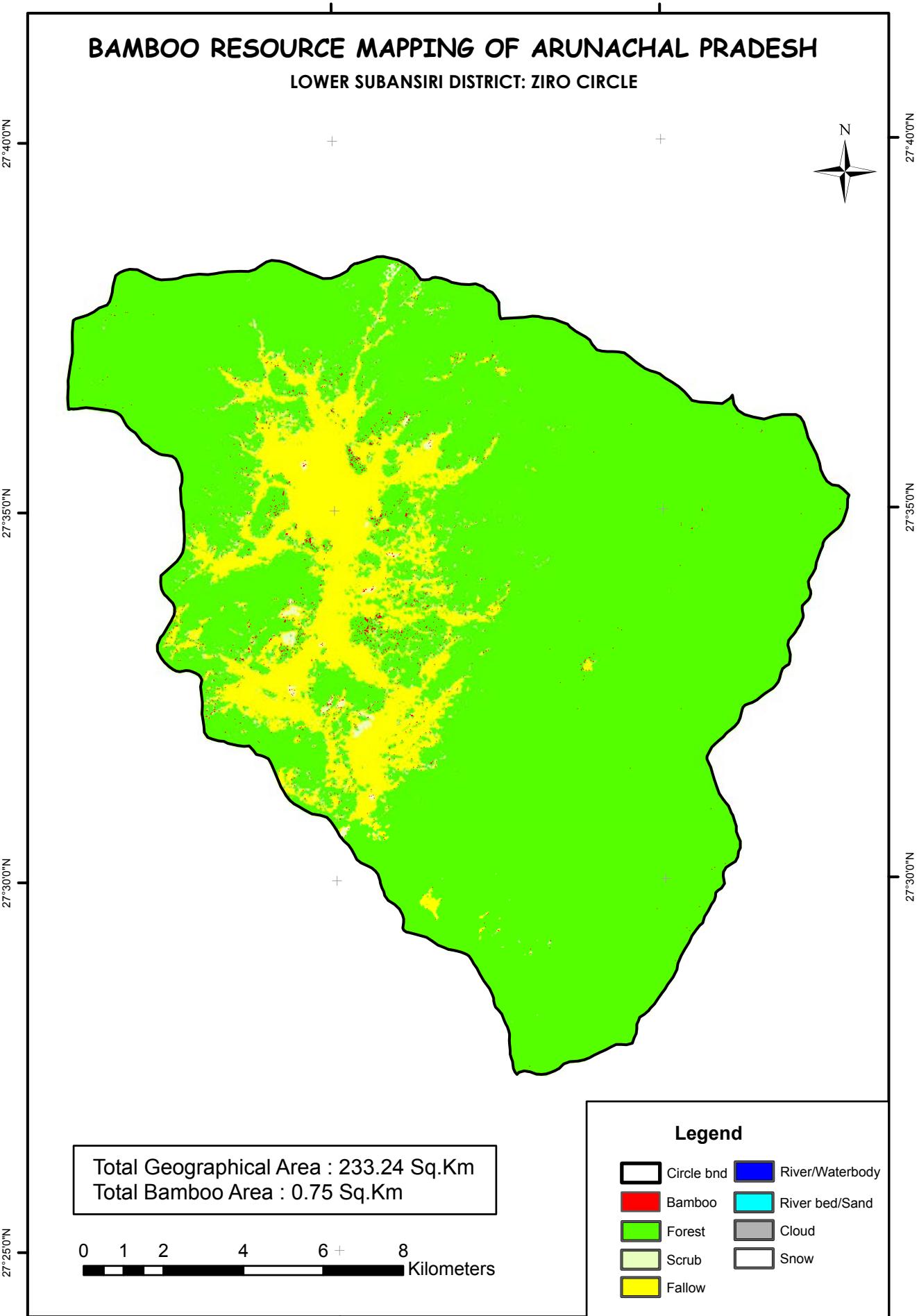
## Legend

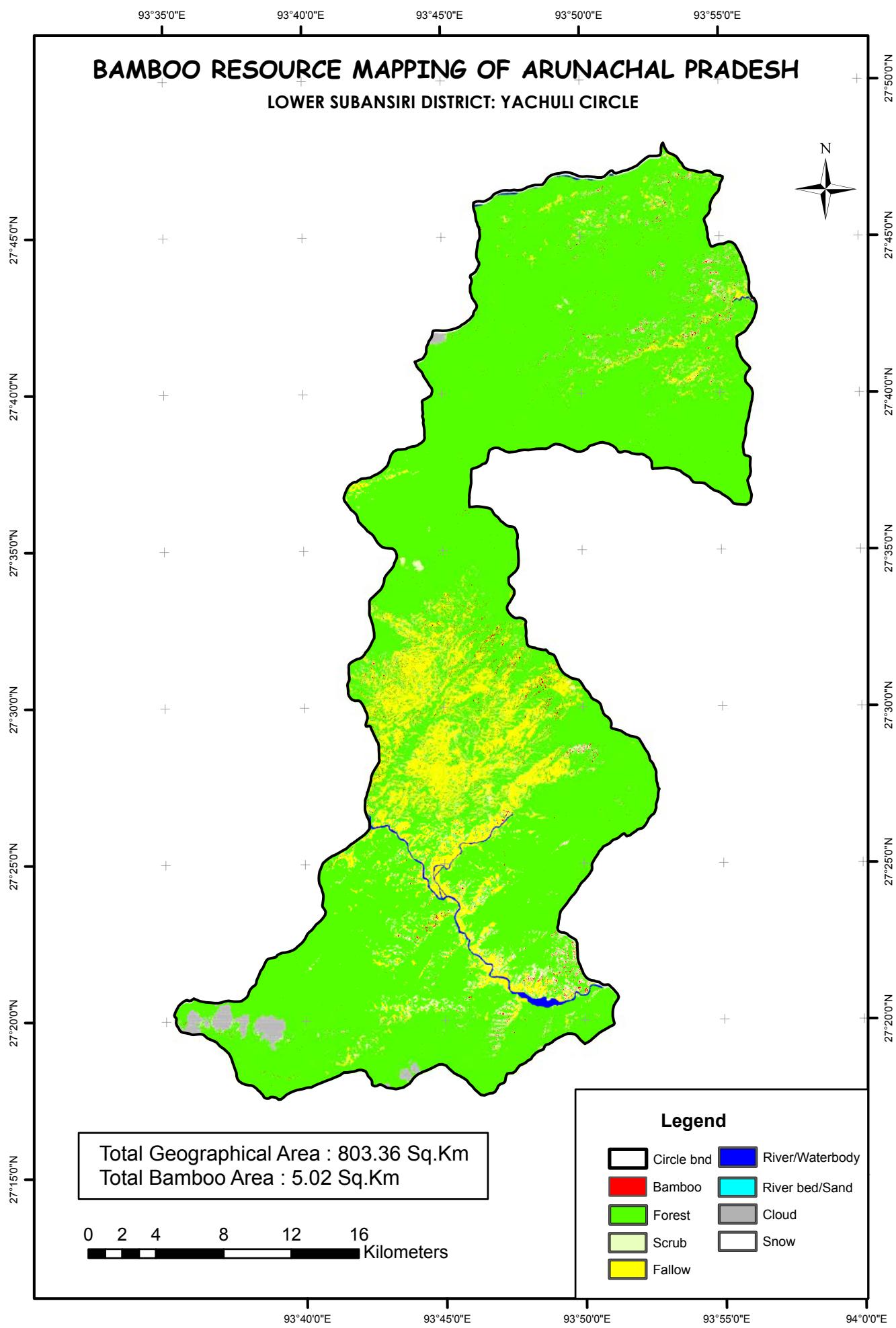
Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

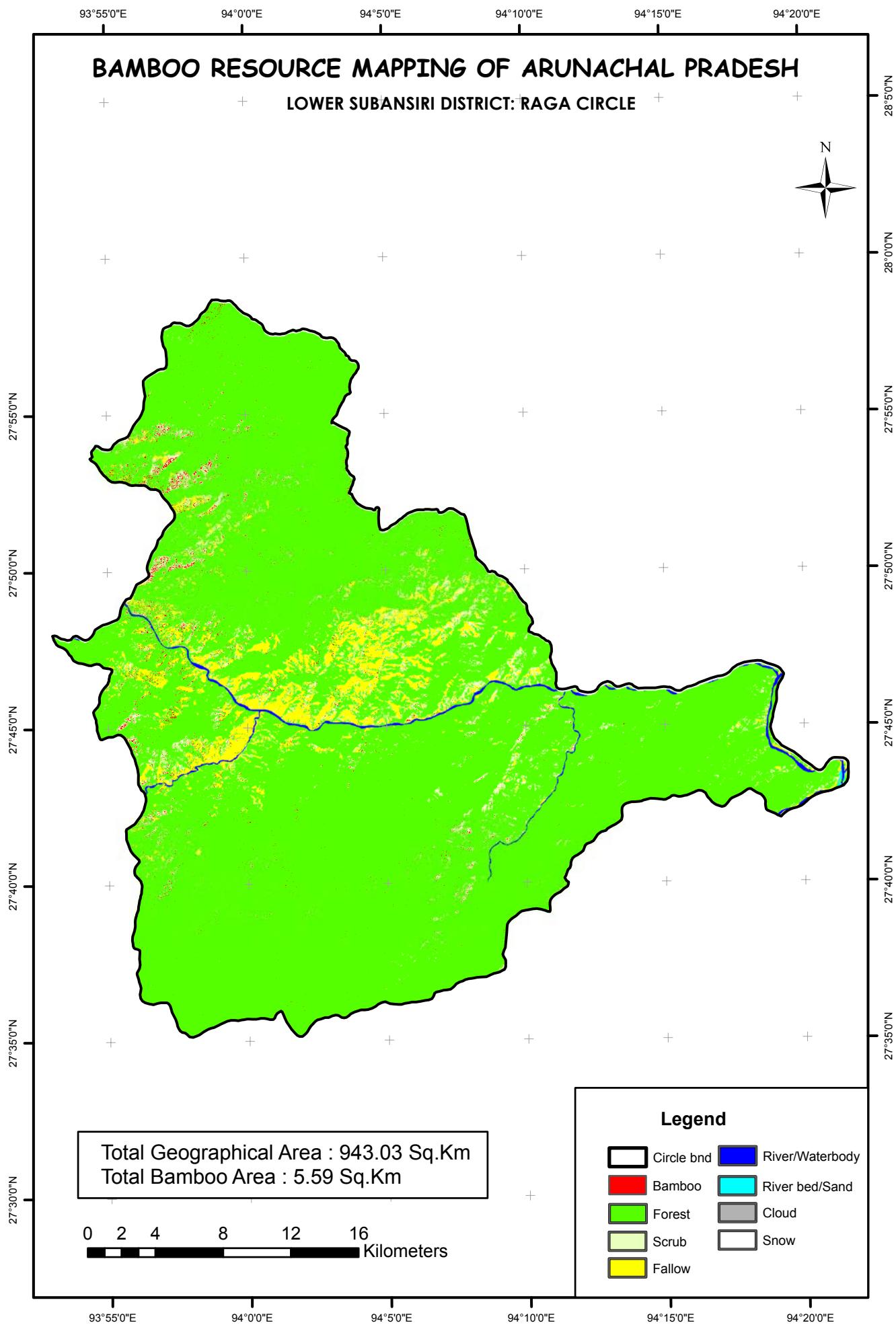
93°45'0"E

93°50'0"E









93°55'0"E

94°0'0"E

94°5'0"E

94°10'0"E

94°15'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## LOWER SUBANSIRI DISTRICT: DULLUNG MUKH CIRCLE



27°40'0"N

27°35'0"N

27°30'0"N

27°25'0"N

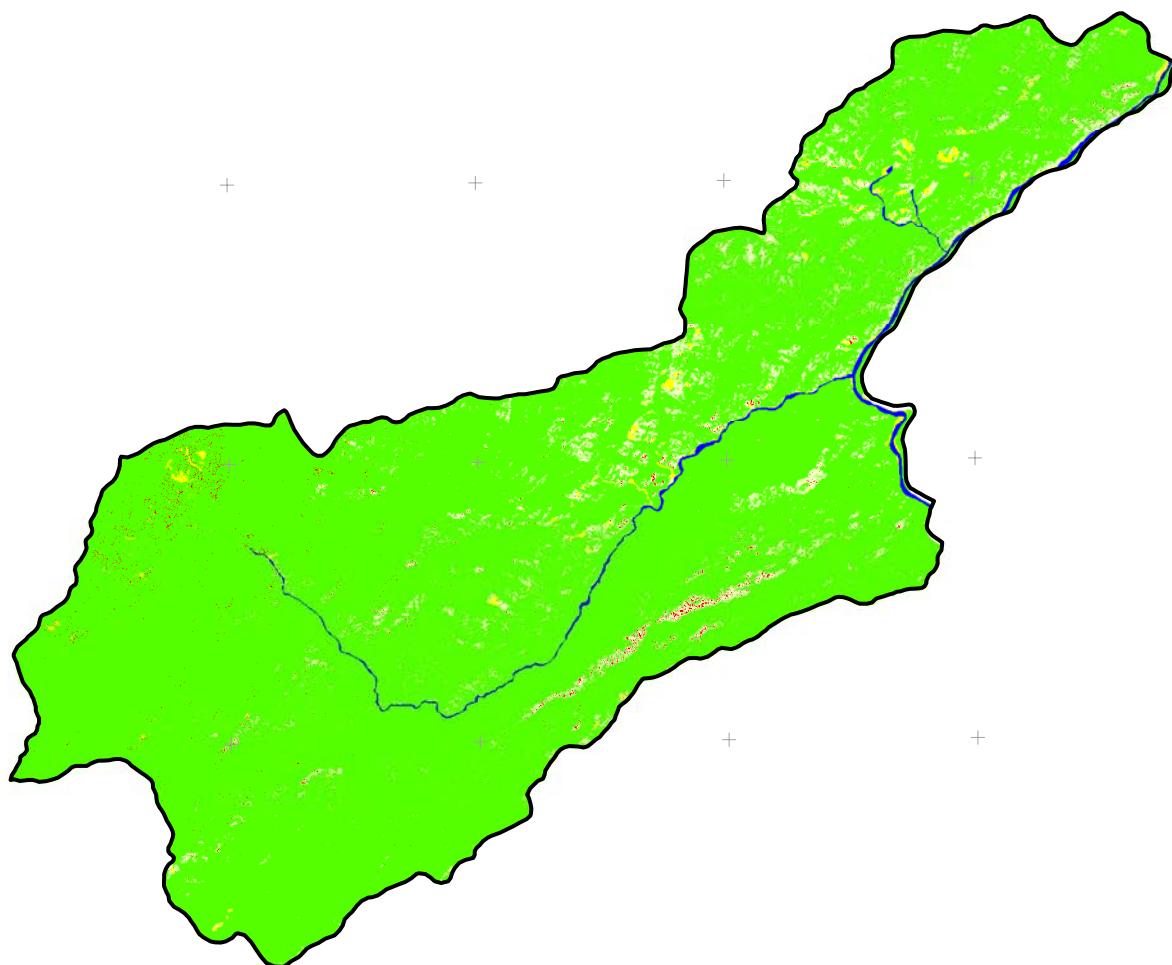
27°20'0"N

27°40'0"N

27°35'0"N

27°30'0"N

27°25'0"N

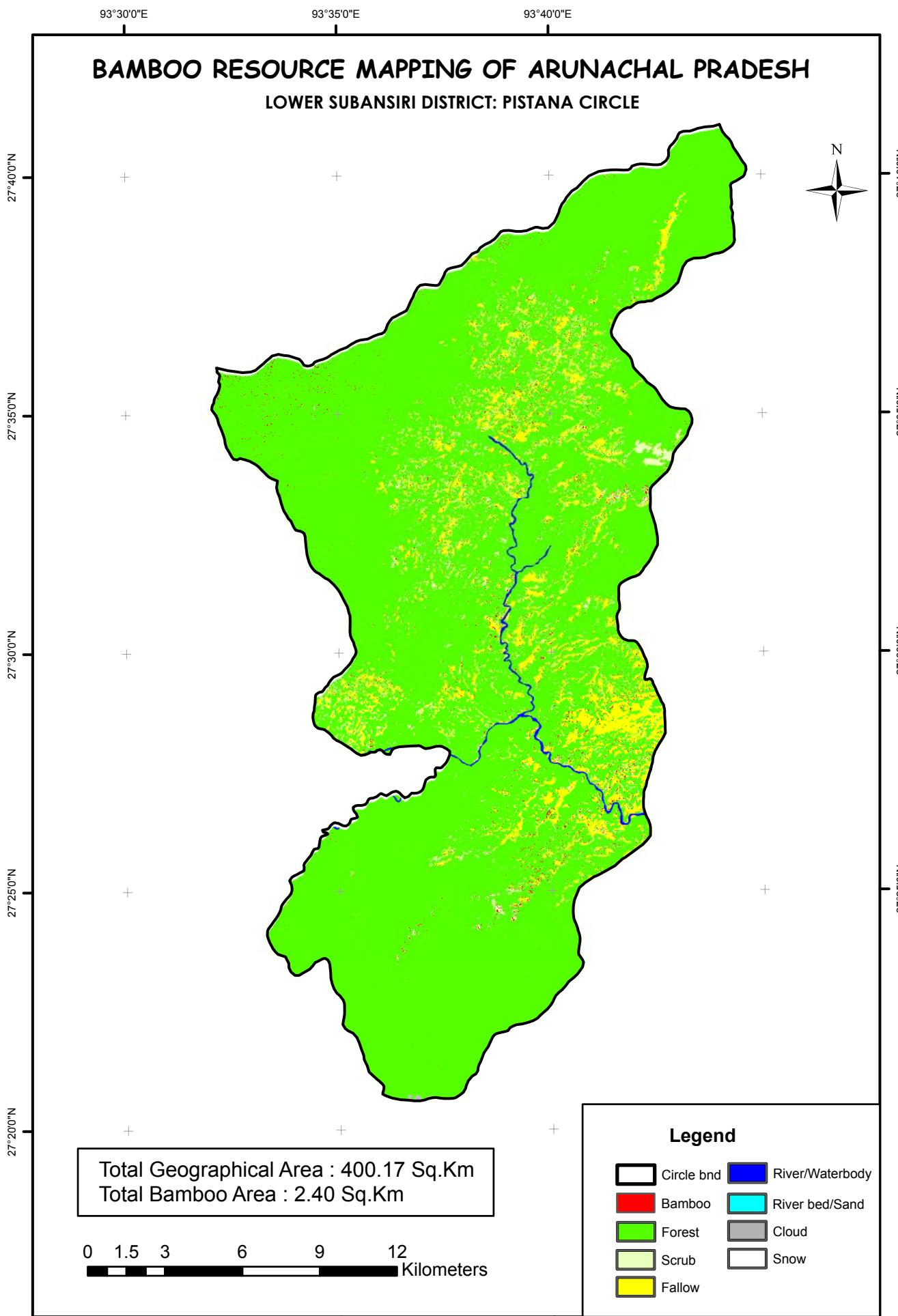


Total Geographical Area : 446.31 Sq.Km  
 Total Bamboo Area : 1.52 Sq.Km

0 2 4 8 12 16 Kilometers

### Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	



94°0'0"E

94°5'0"E

94°10'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## UPPER SUBANSIRI DISTRICT: TALIHA CIRCLE



28°15'0"N

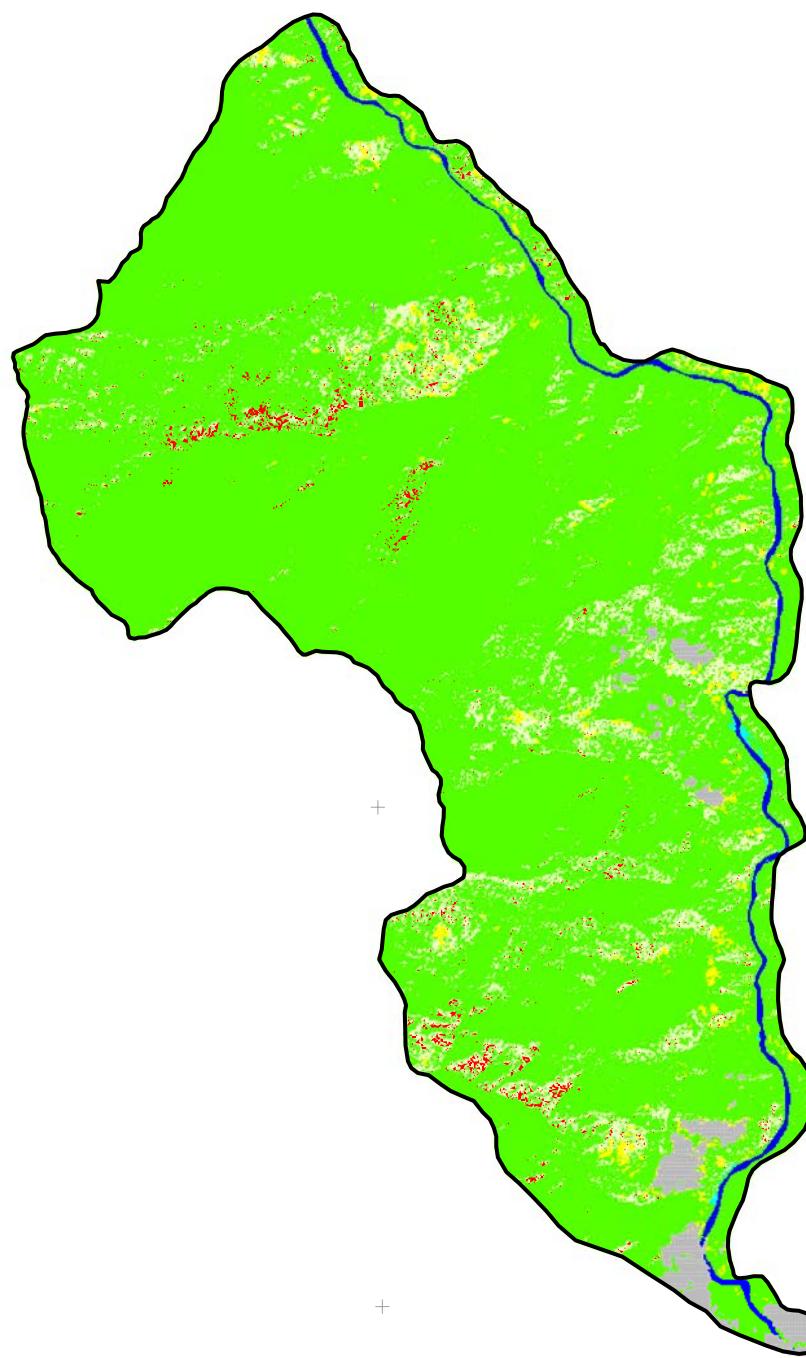
28°15'0"N

28°10'0"N

28°10'0"N

28°5'0"N

28°5'0"N



Total Geographical Area : 181.09 Sq.Km  
Total Bamboo Area : 1.39 Sq.Km

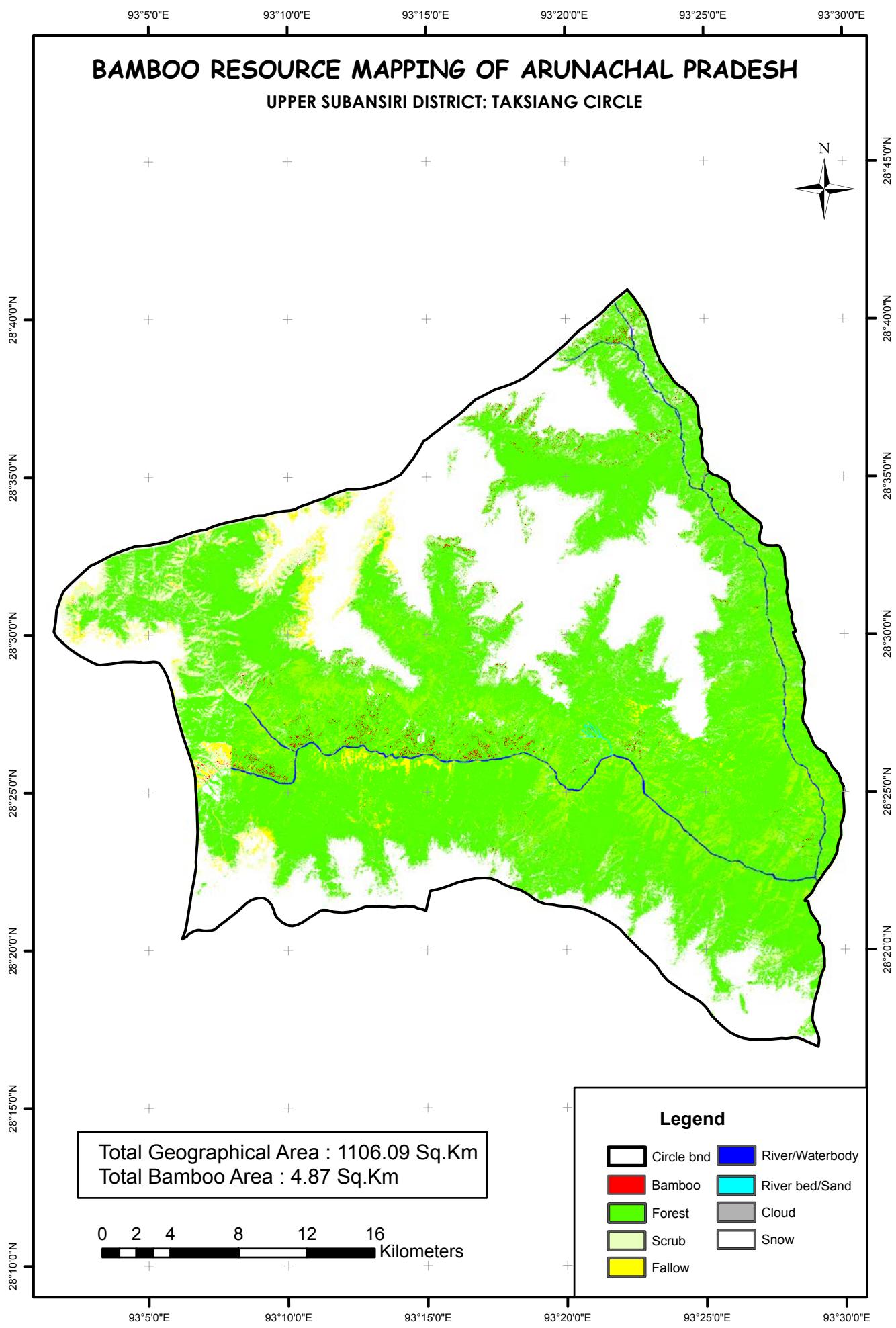
0 1 2 4 6 8 Kilometers

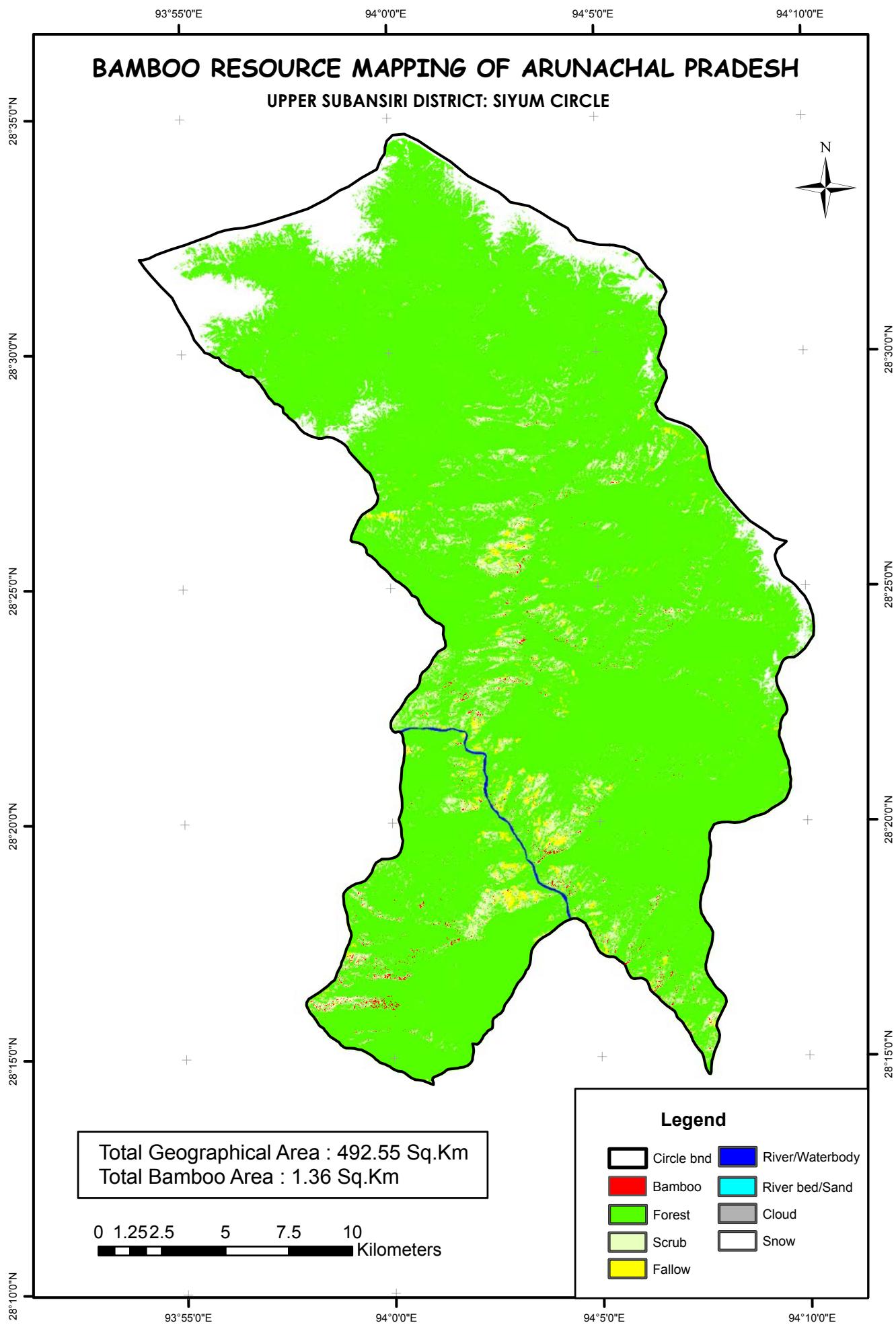
### Legend

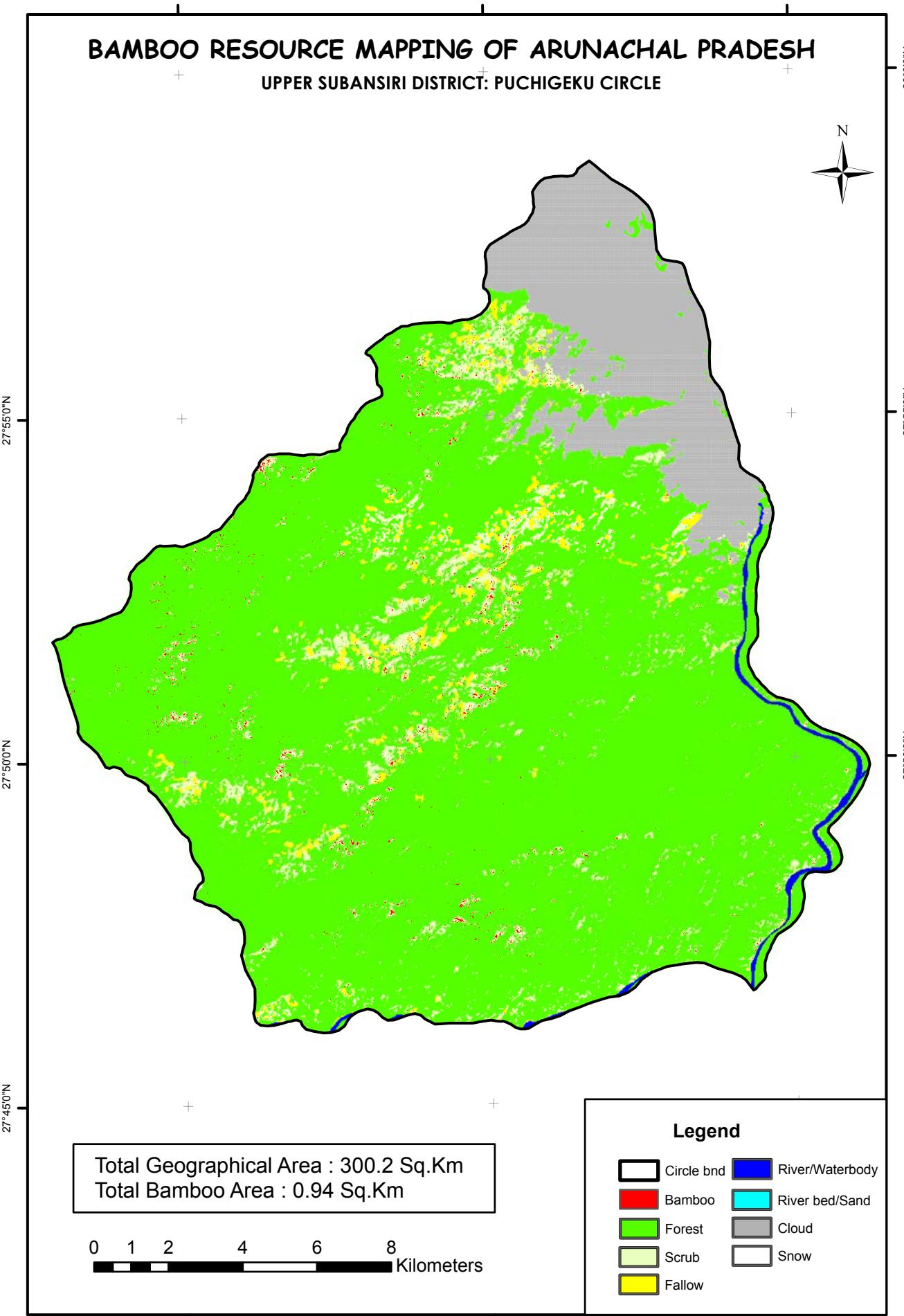
Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

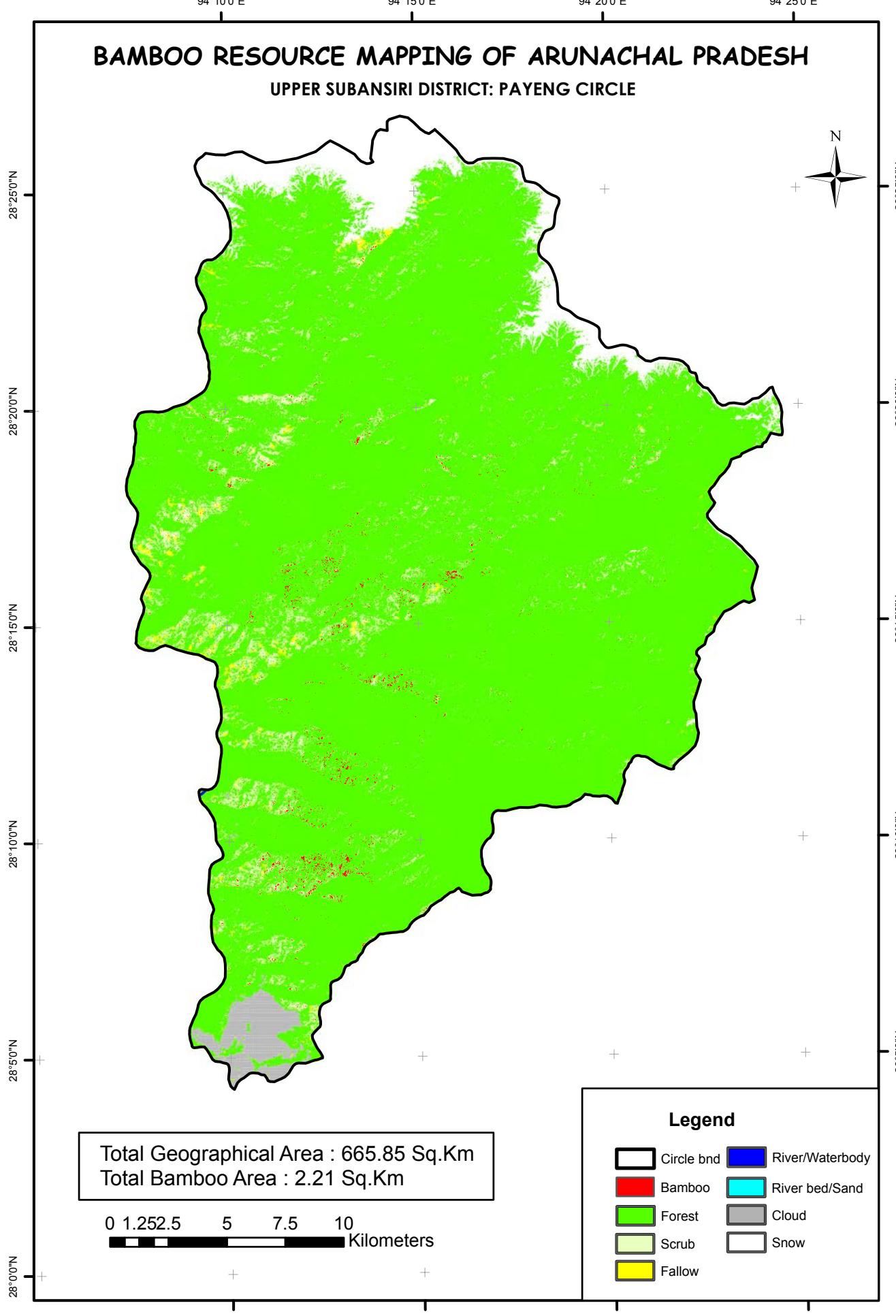
94°5'0"E

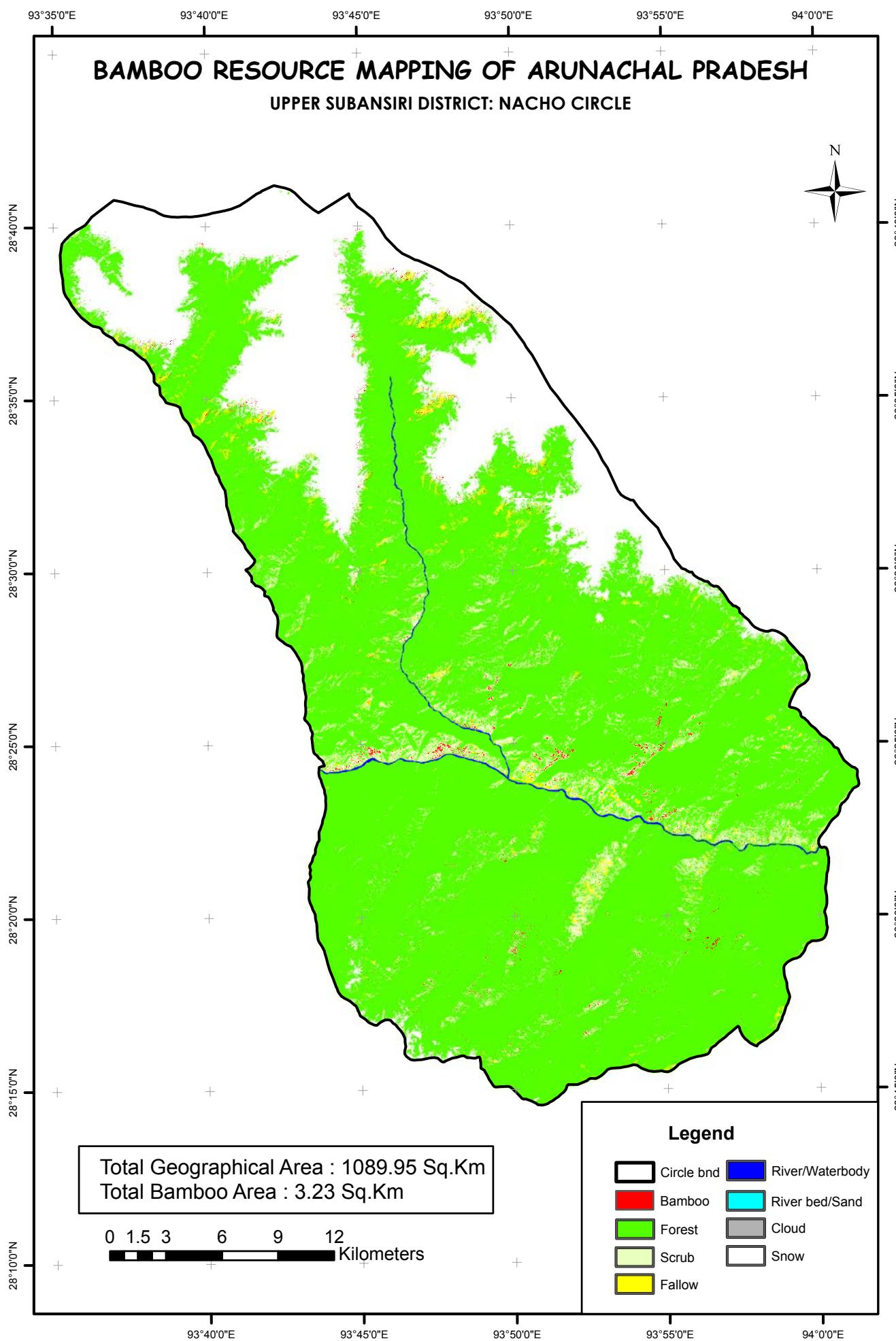
94°10'0"E

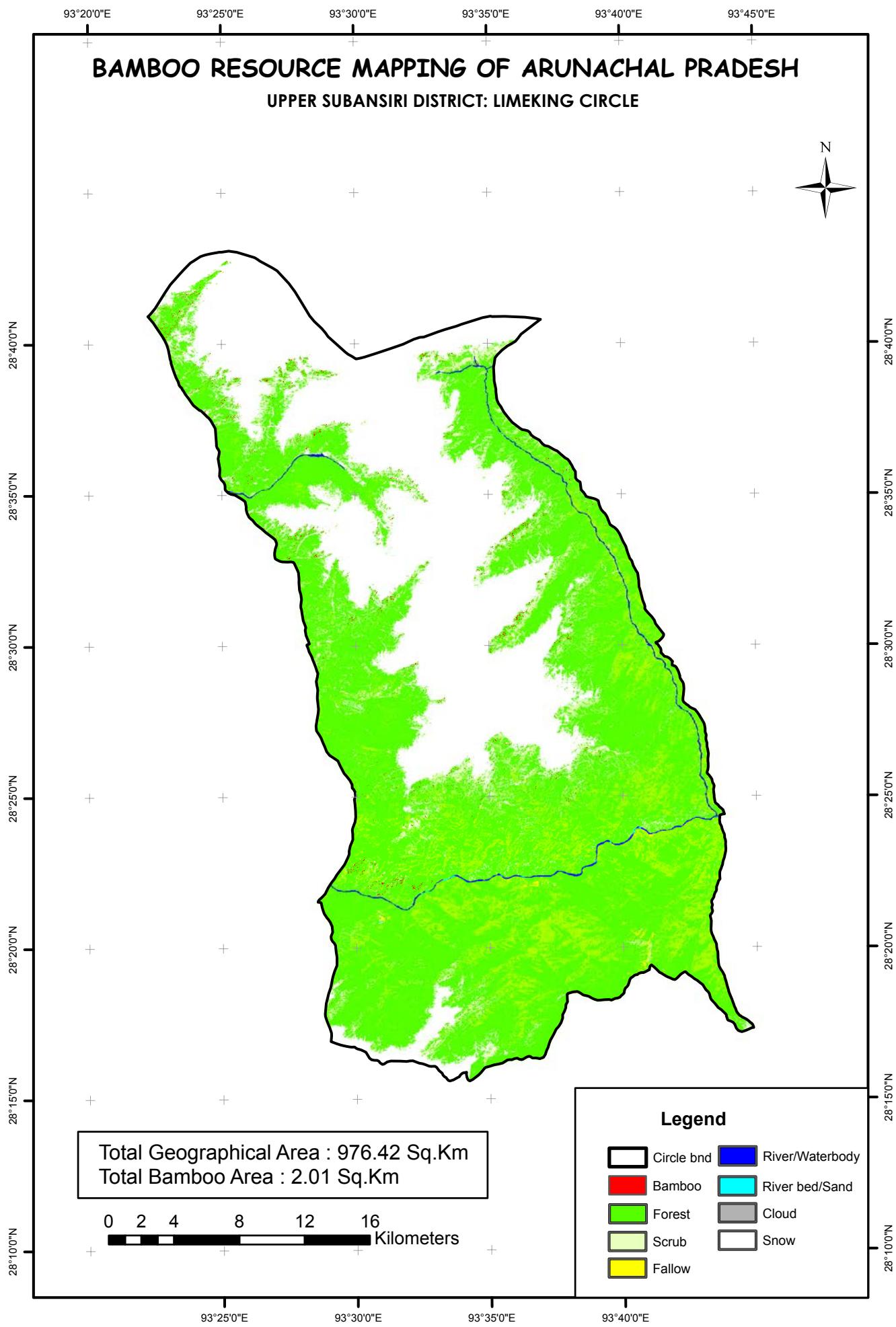


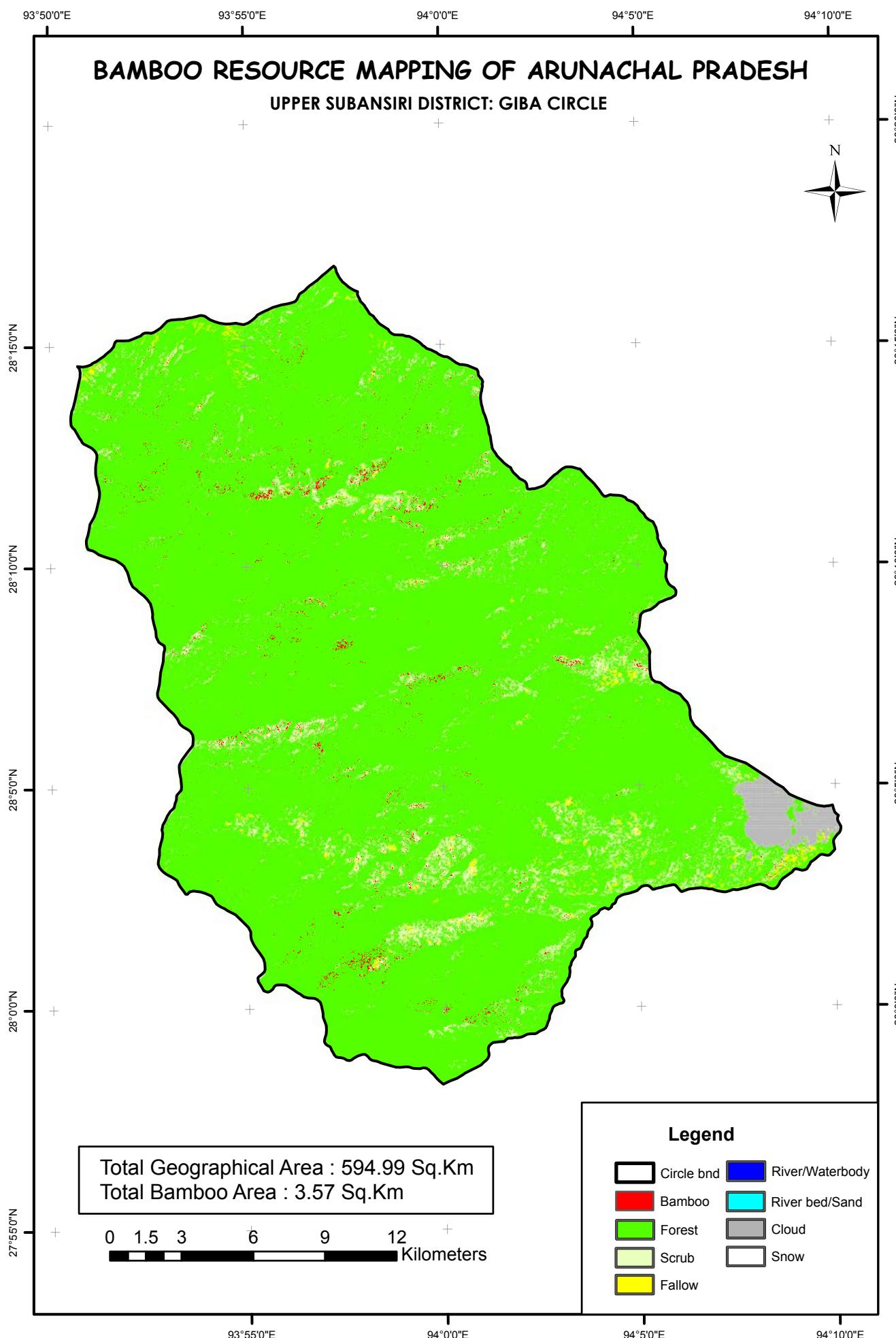


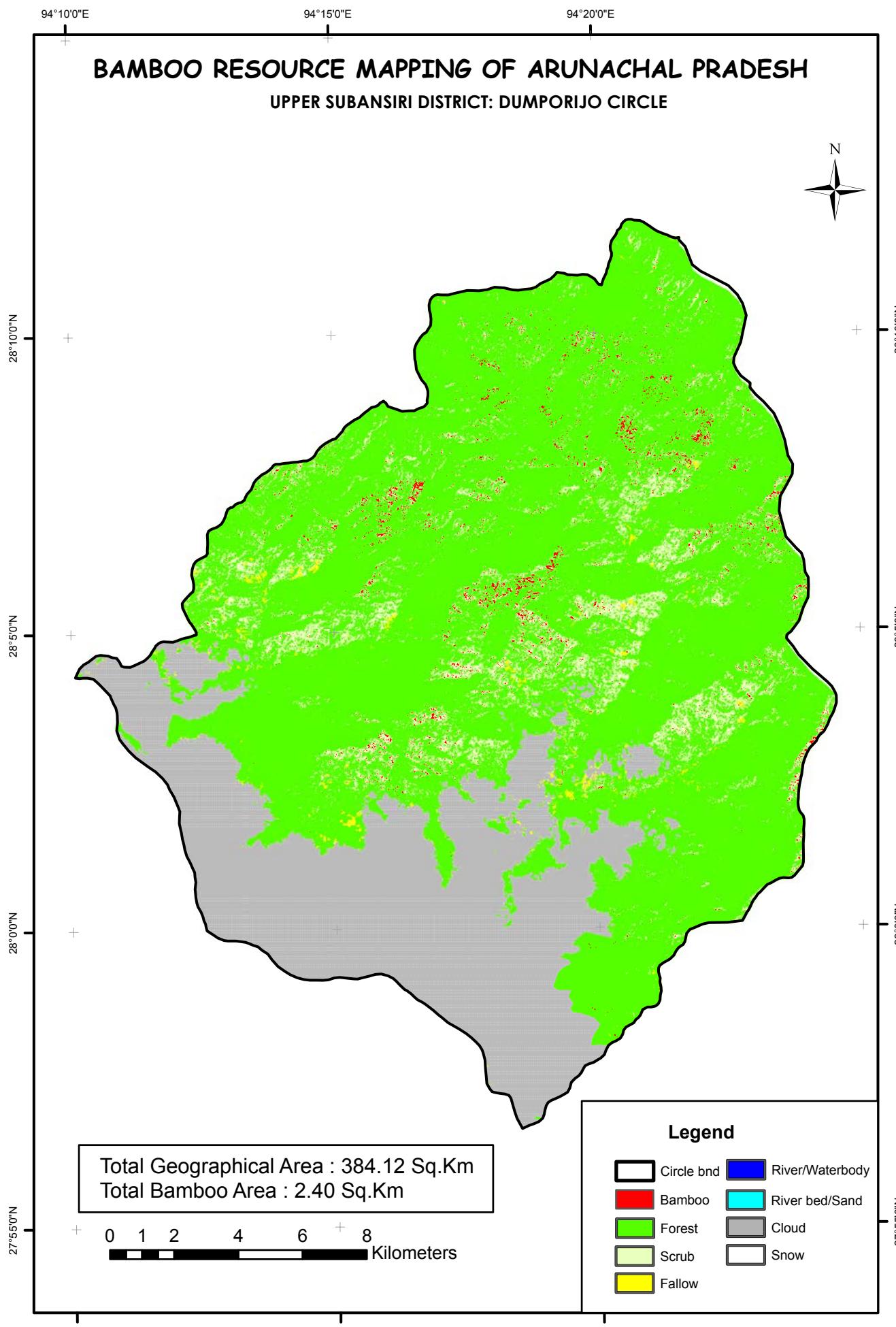


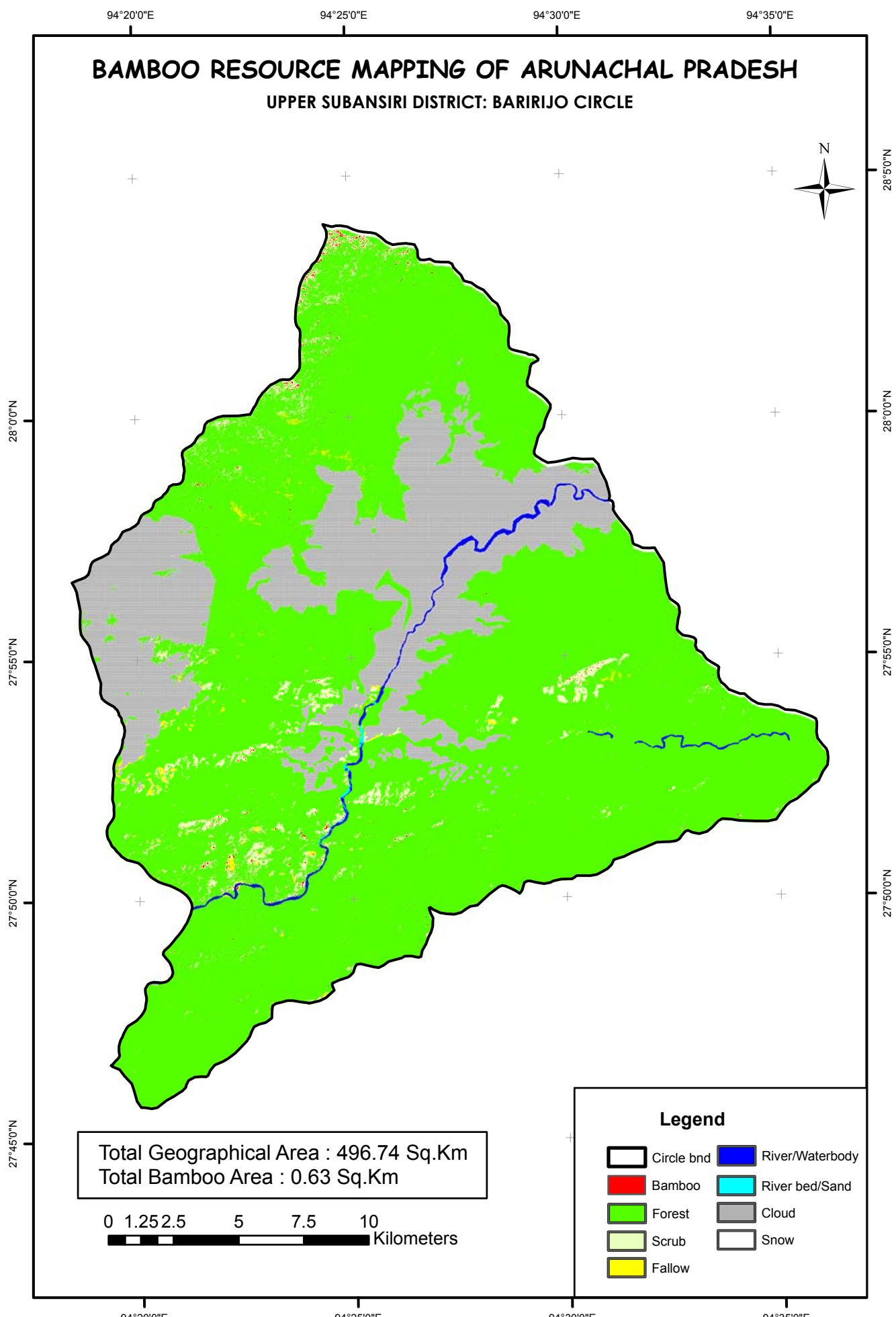


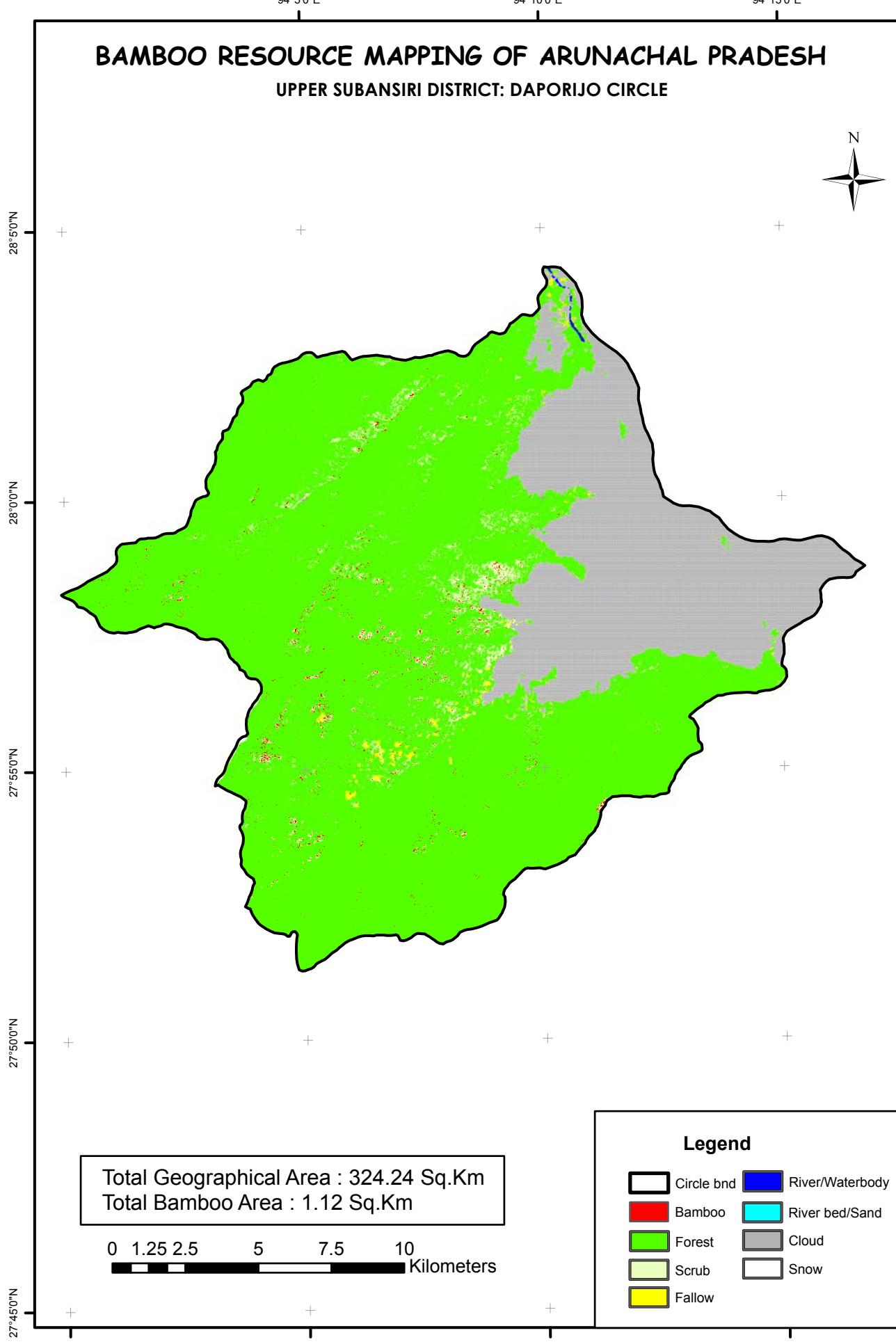












94°35'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## WEST SIANG DISTRICT: YOMCHA CIRCLE

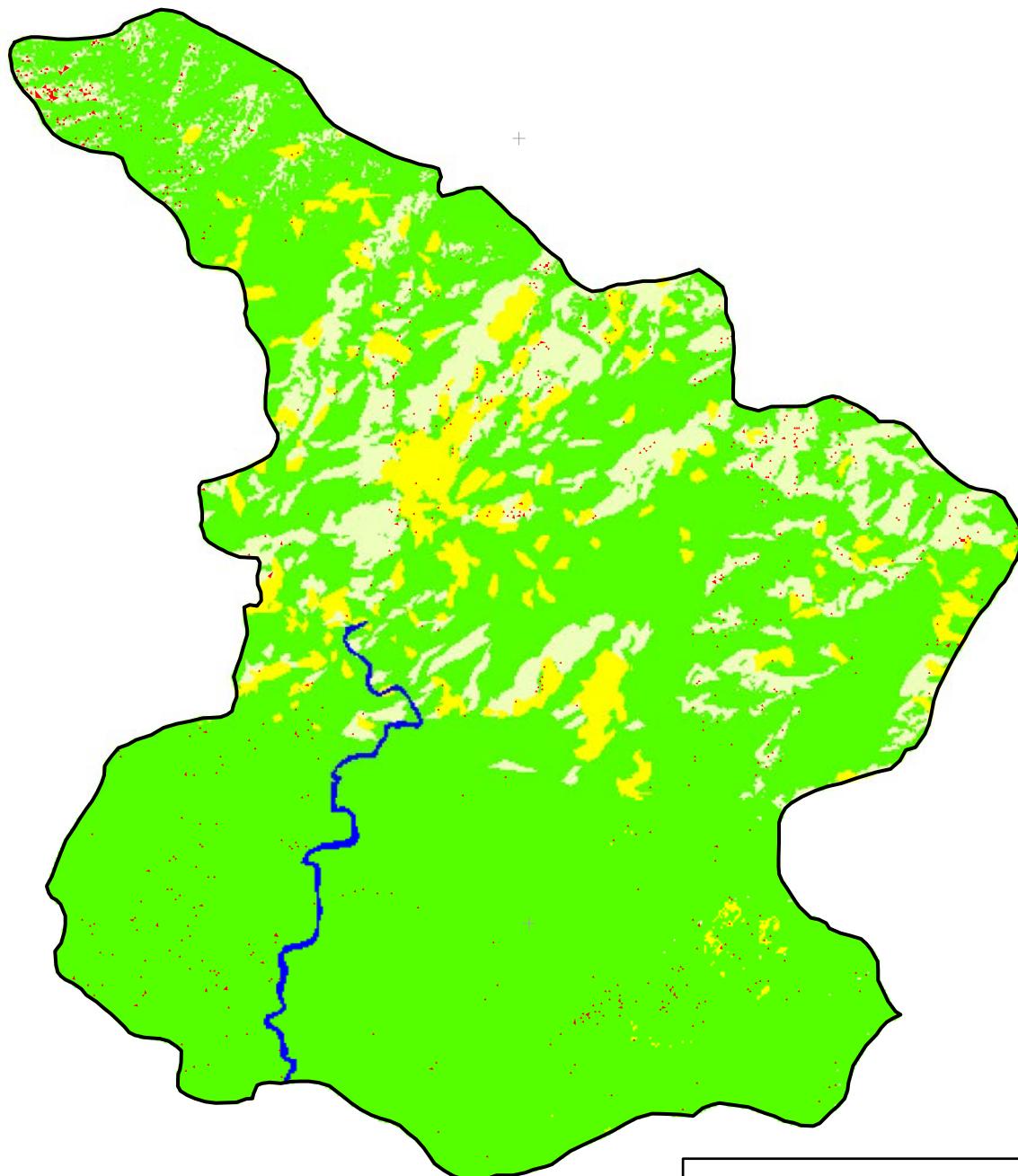


28°10'0"N

28°10'N

28°50'N

28°50'N



Total Geographical Area : 91.79 Sq.Km  
Total Bamboo Area : 0.33 Sq.Km

0 0.5 1 2 3 4 Kilometers

### Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

94°35'0"E

94°30'0"E

94°35'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

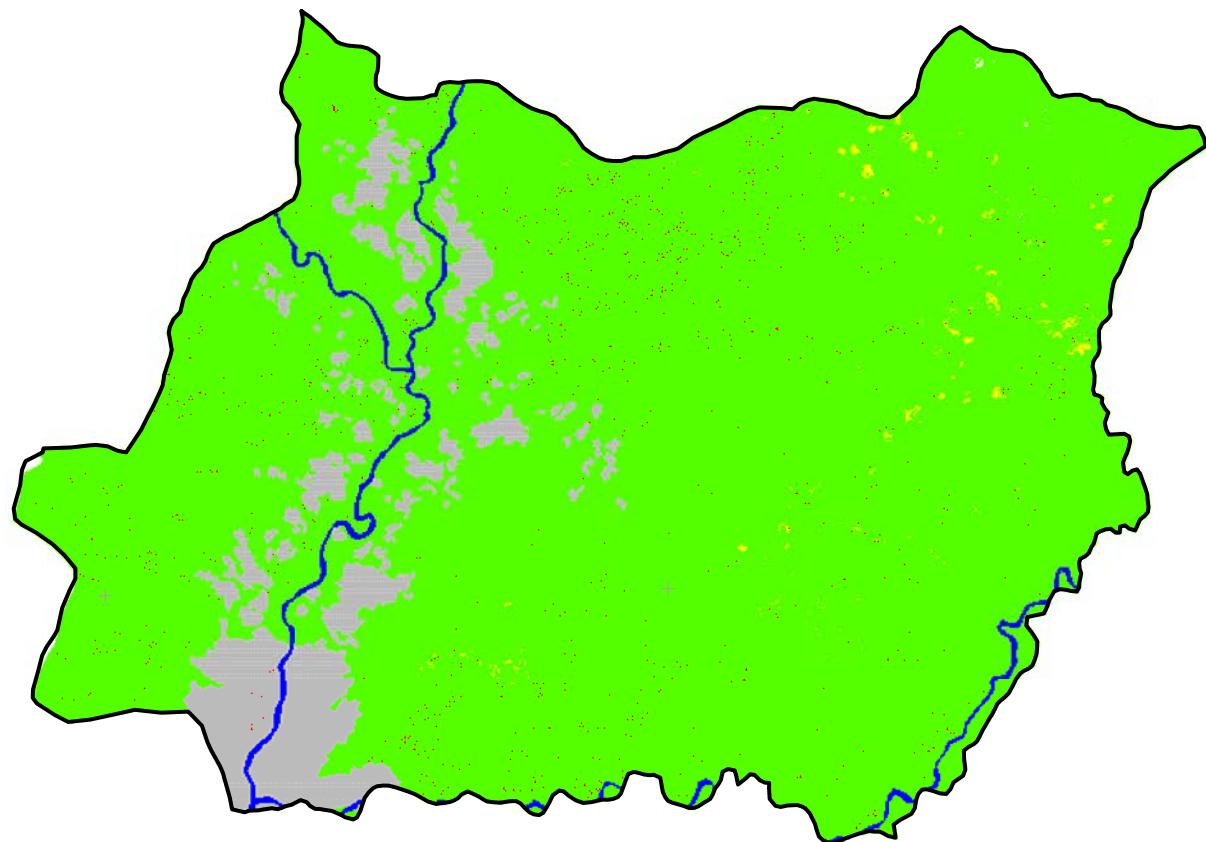
## WEST SIANG DISTRICT: TIRBIN CIRCLE



28°50'N

28°00'N

28°00'N



Total Geographical Area : 140.15 Sq.Km  
 Total Bamboo Area : 0.38 Sq.Km

0 0.5 1 2 3 4 Kilometers

### Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

27°55'N

94°30'0"E

94°35'0"E

94°15'0"E

94°20'0"E

94°25'0"E

94°30'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## WEST SIANG DISTRICT: TATO CIRCLE



28°40'0"N

28°35'0"N

28°30'0"N

28°25'0"N

28°20'0"N

28°35'0"N

28°30'0"N

28°25'0"N

28°20'0"N

Total Geographical Area : 525.47 Sq.Km  
 Total Bamboo Area : 1.07 Sq.Km

0 1 2 4 6 8 Kilometers

### Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

94°20'0"E

94°25'0"E

94°30'0"E

94°35'0"E

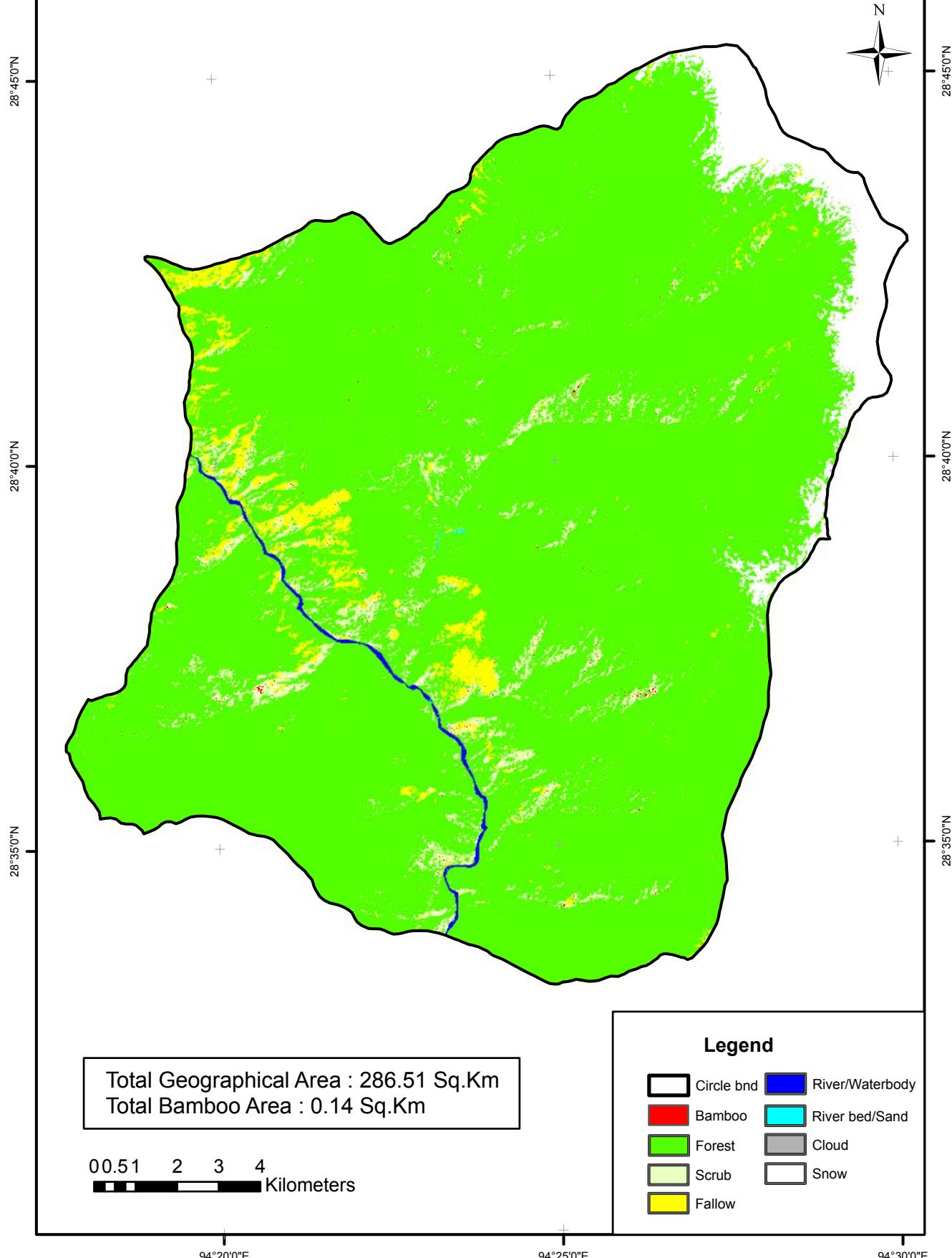
94°20'0"E

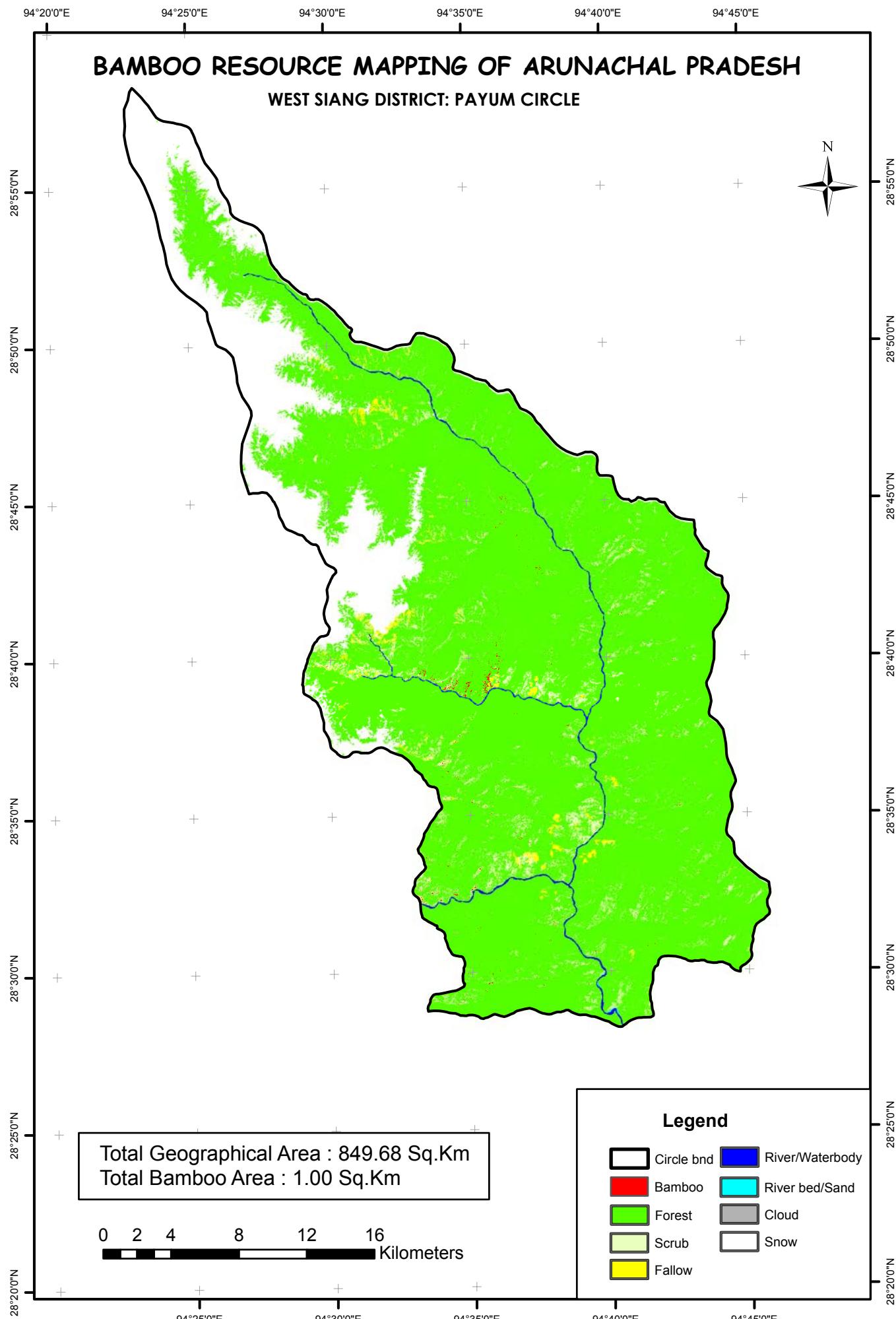
94°25'0"E

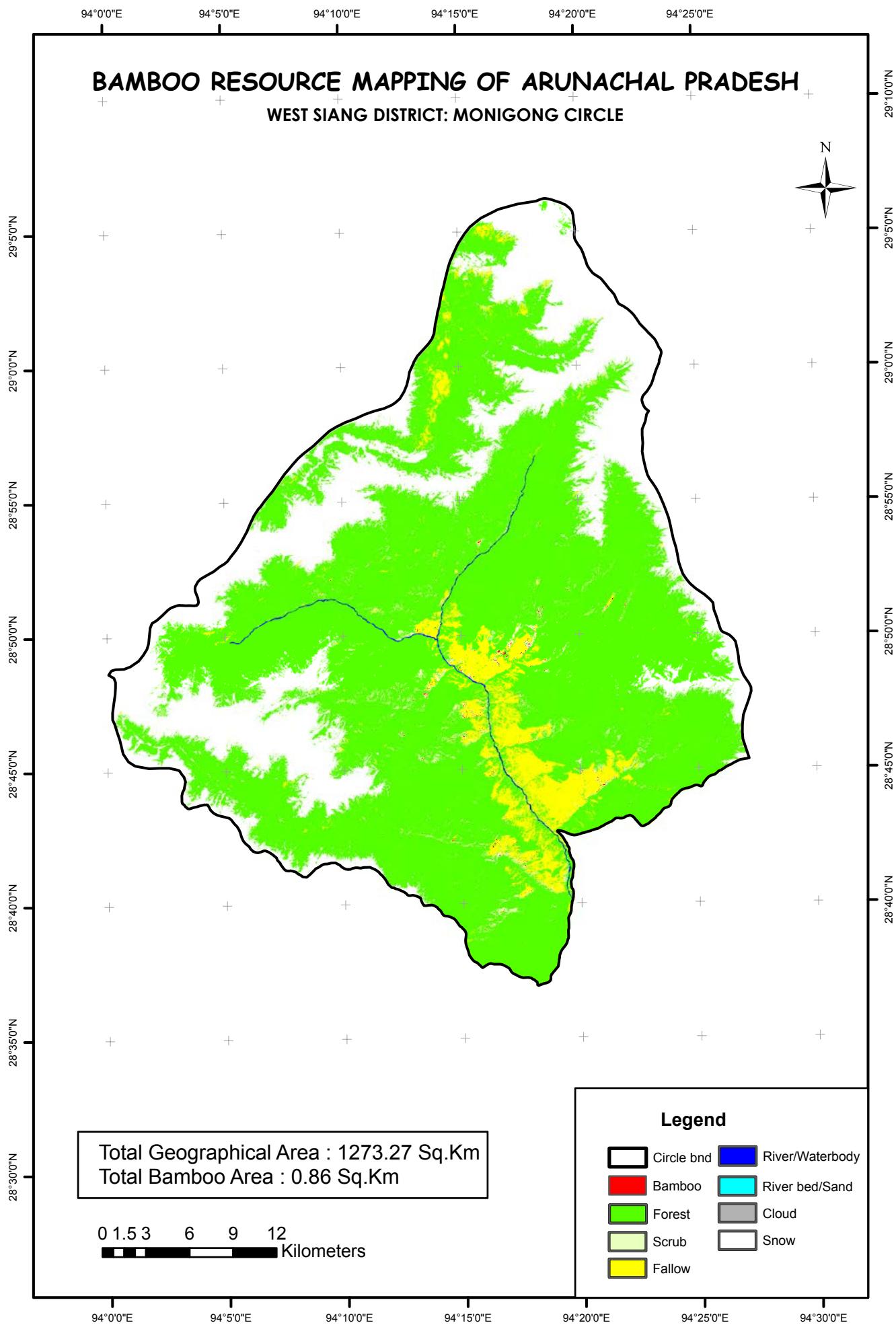
94°30'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## WEST SIANG DISTRICT: PIDI CIRCLE







94°45'0"E

94°50'0"E

94°55'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

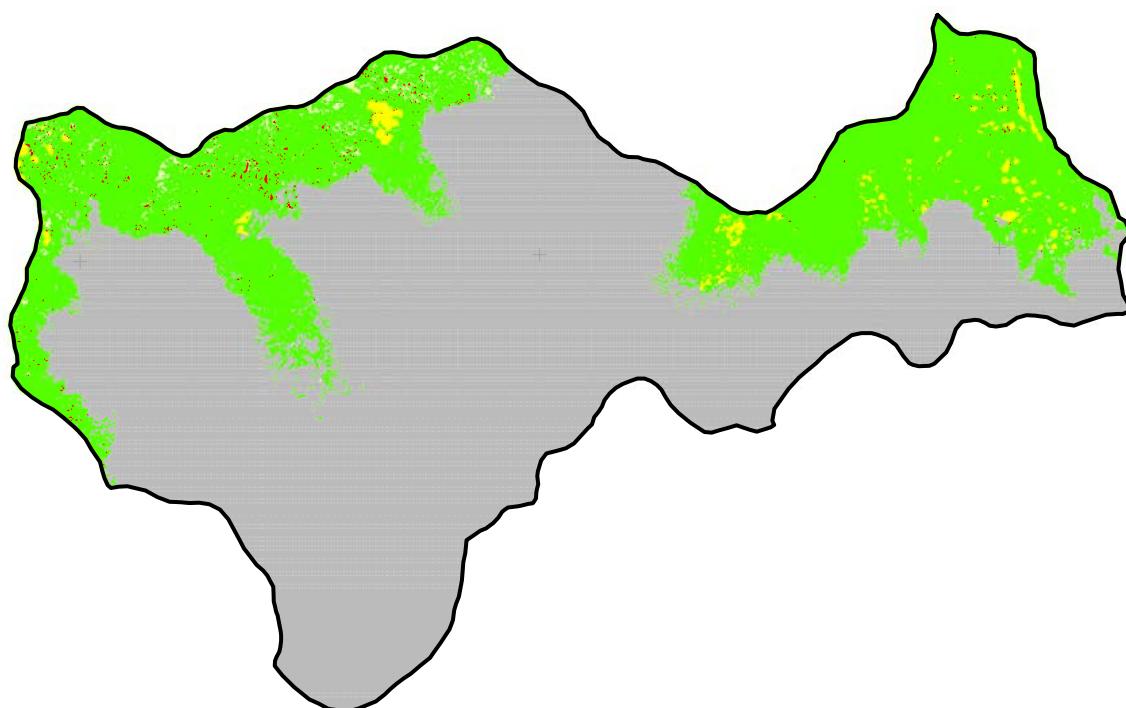
## WEST SIANG DISTRICT: MOBUK CIRCLE



28°20'0"N

28°15'0"N

28°15'0"N



Total Geographical Area : 119.26 Sq.Km  
Total Bamboo Area : 0.25 Sq.Km

0 1 2 4 6 8 Kilometers

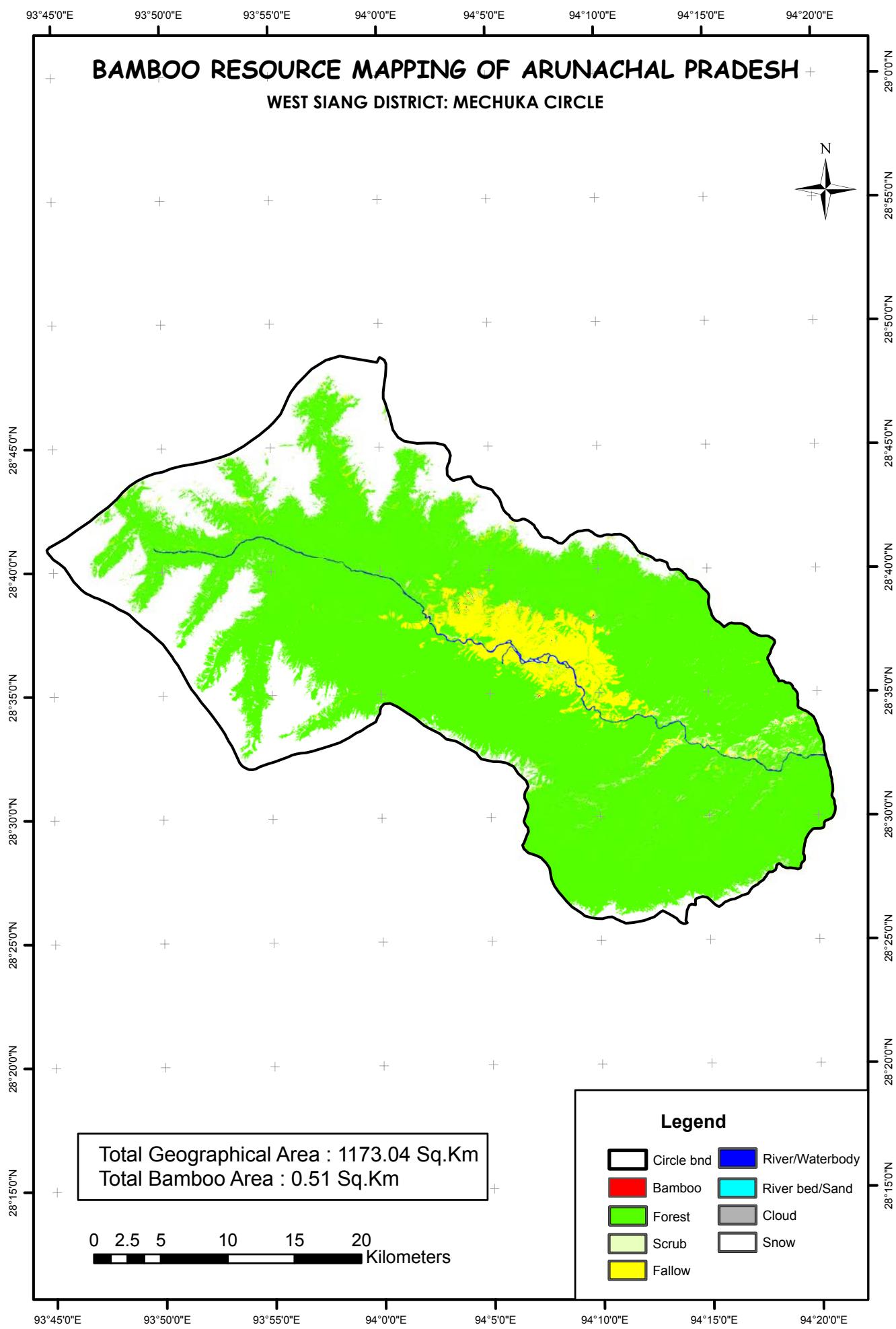
### Legend

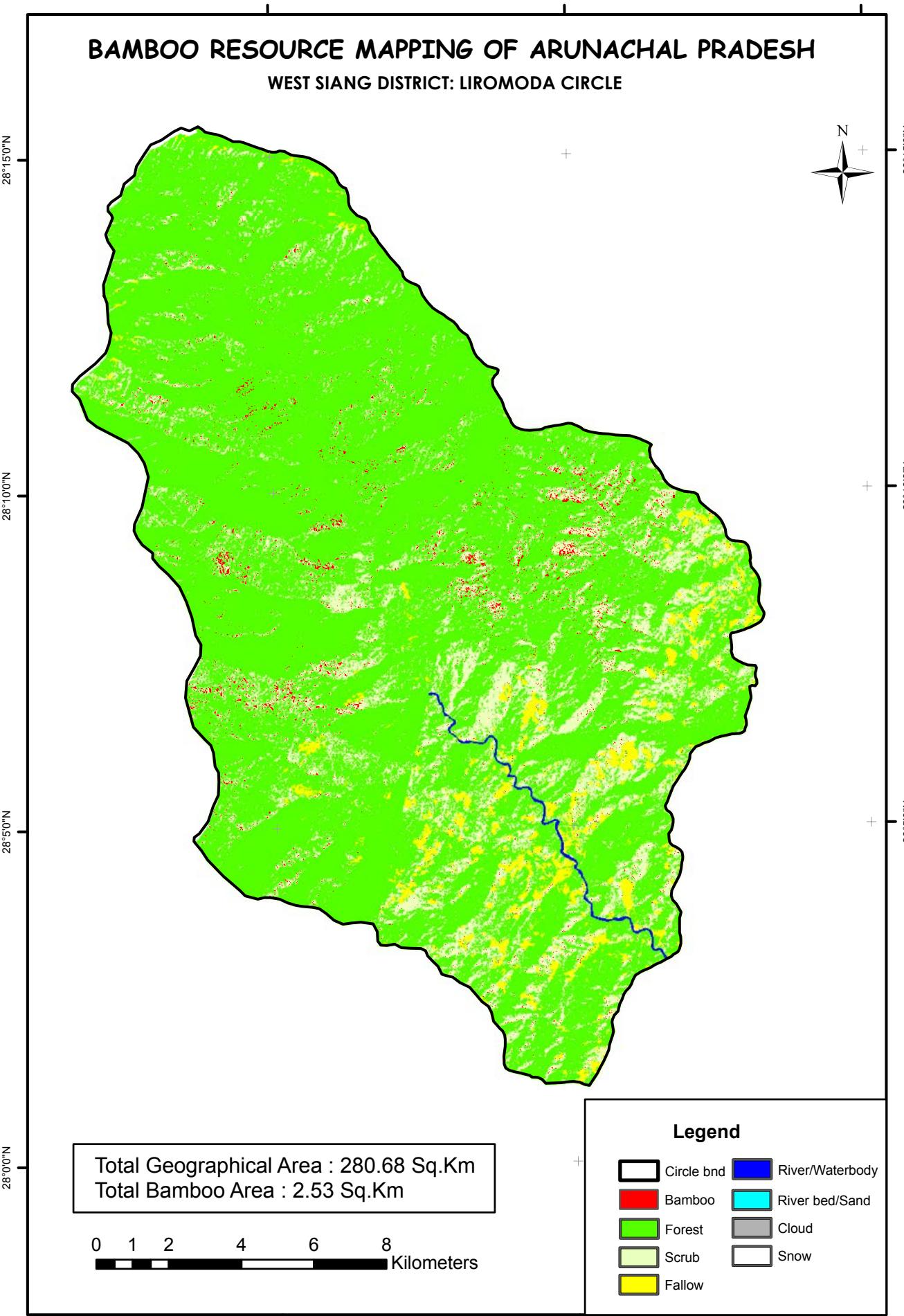
Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

94°45'0"E

94°50'0"E

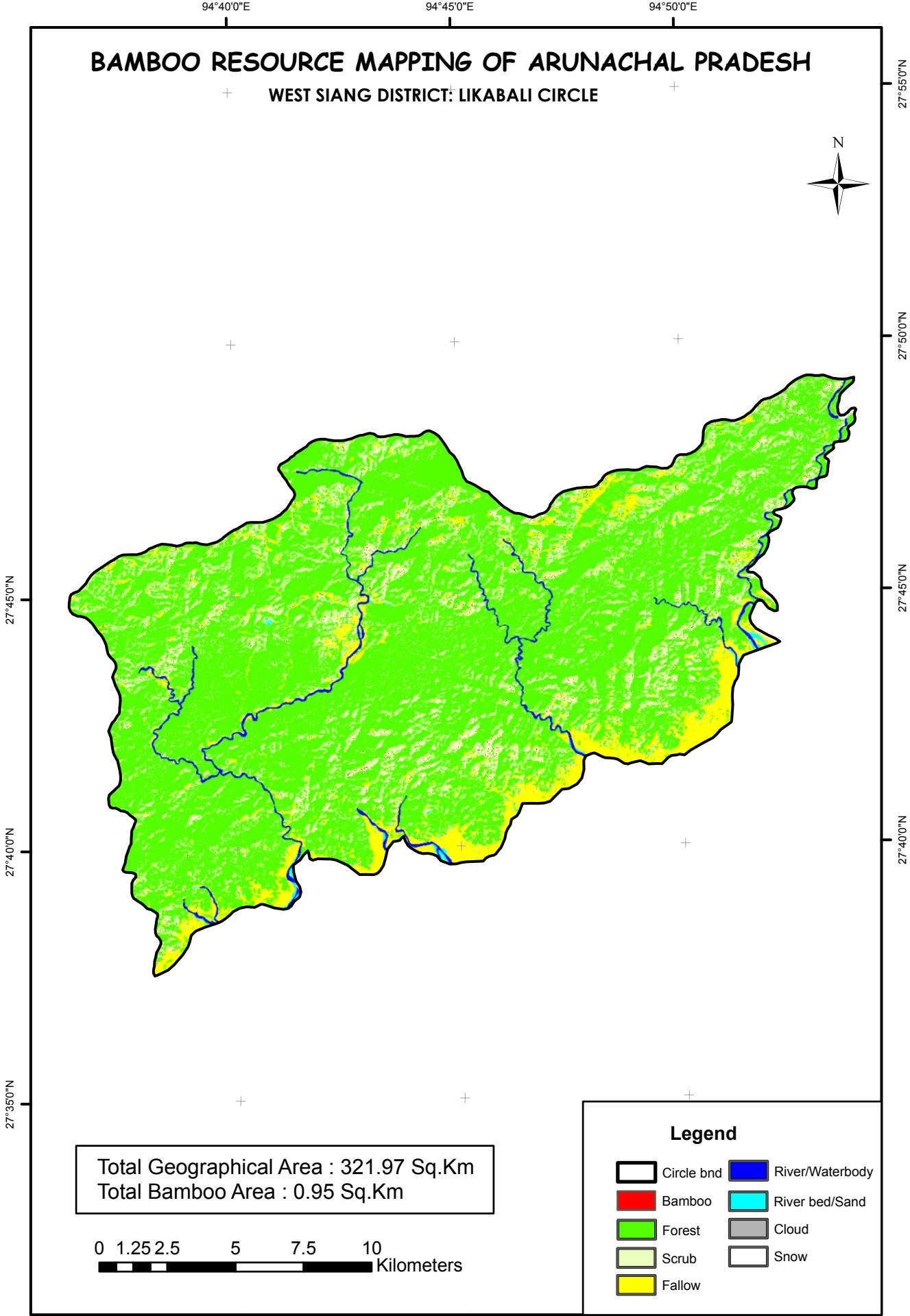
94°55'0"E

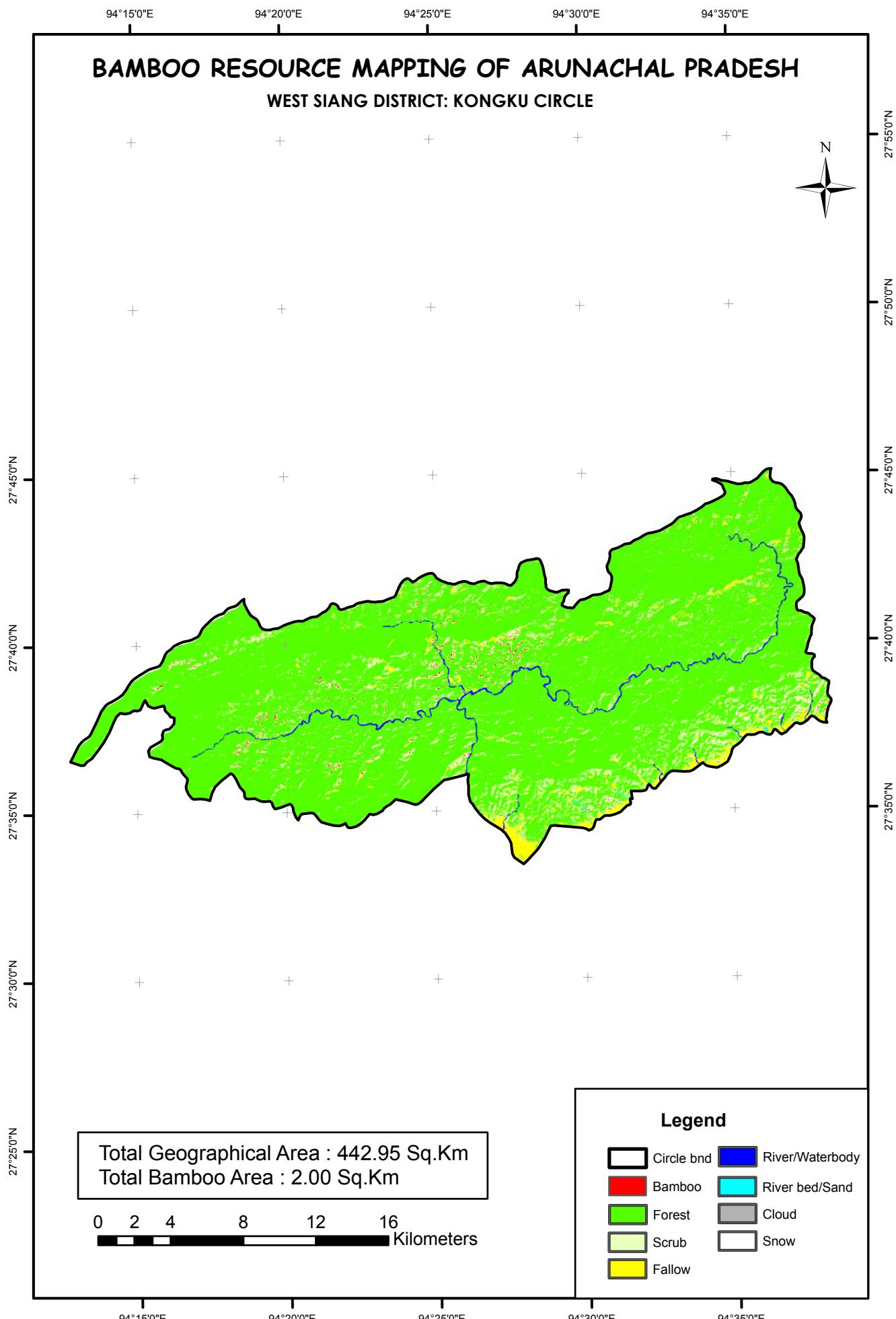




Total Geographical Area : 280.68 Sq.Km  
Total Bamboo Area : 2.53 Sq.Km

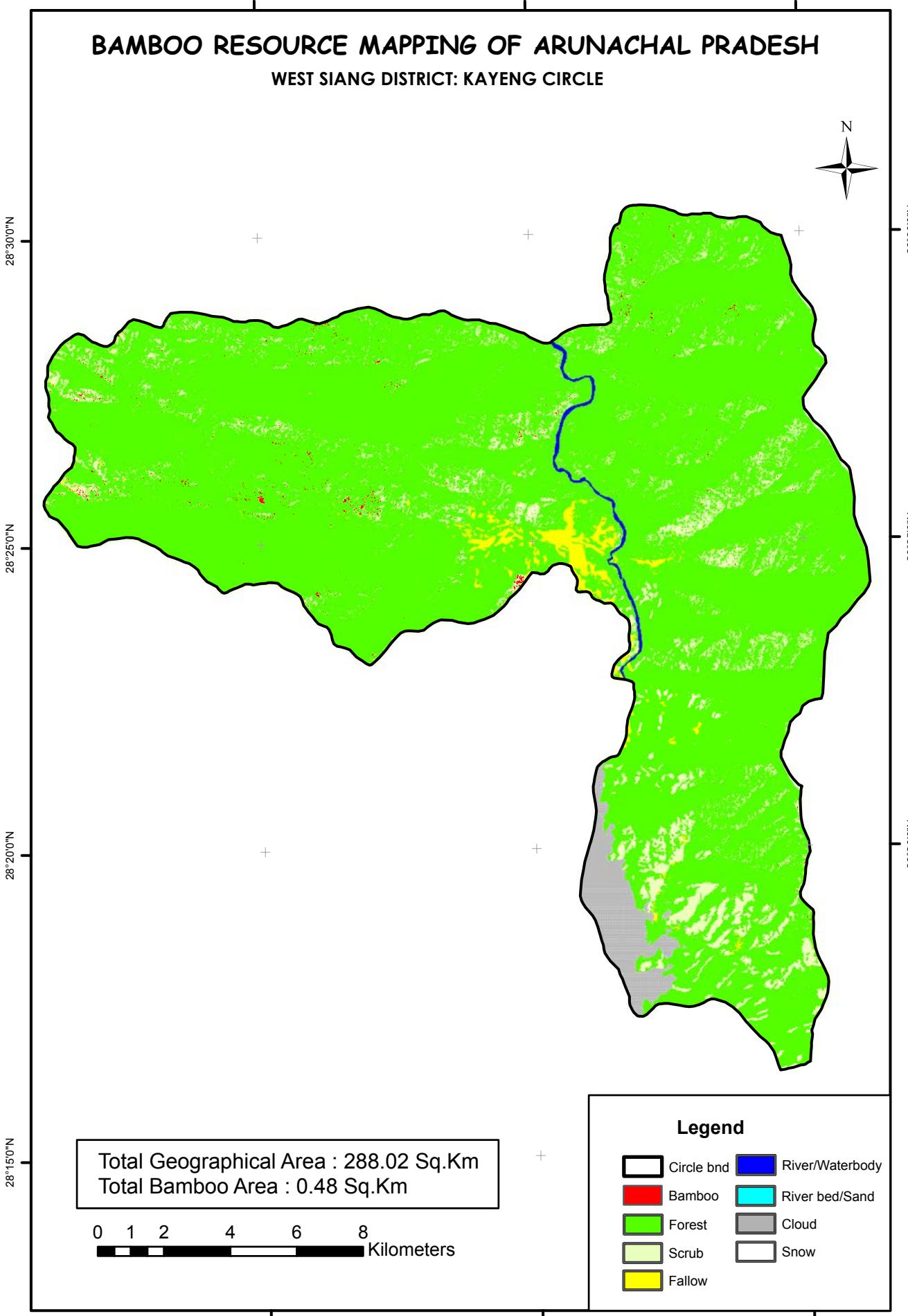
0 1 2 4 6 8 Kilometers





Total Geographical Area : 442.95 Sq.Km  
 Total Bamboo Area : 2.00 Sq.Km

0 2 4 8 12 16 Kilometers



94°45'0"E

94°50'0"E

94°55'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## WEST SANGI DISTRICT: JOMLU CIRCLE

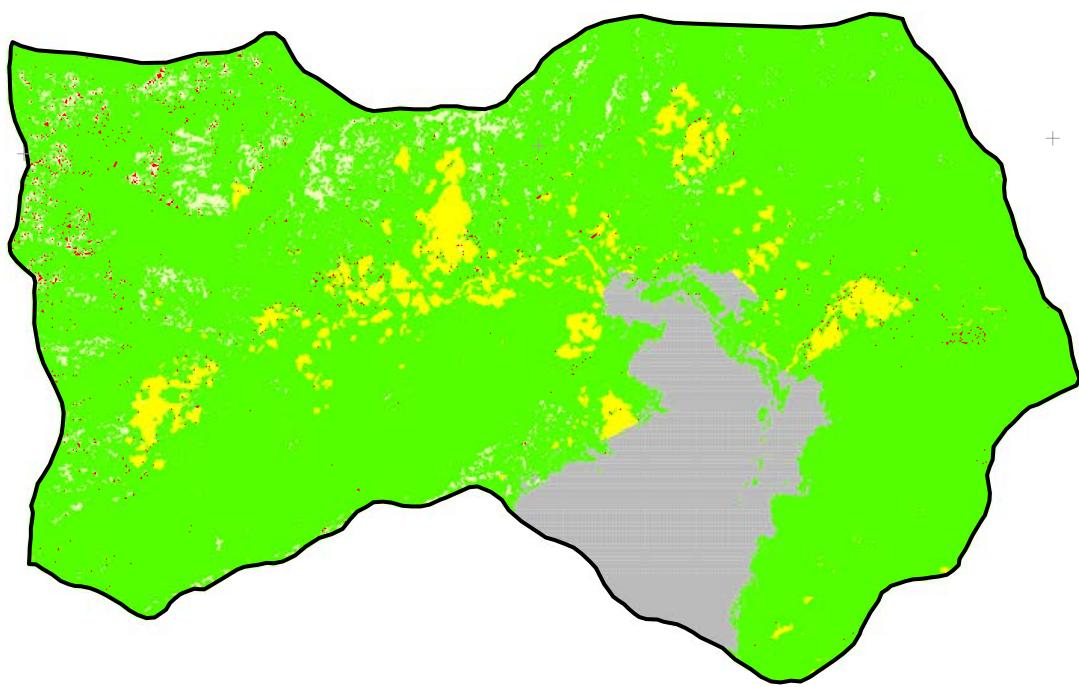


28°20'0"N

28°20'0"N

28°15'0"N

28°15'0"N



Total Geographical Area : 129.18 Sq.Km  
 Total Bamboo Area : 0.53 Sq.Km

0 0.5 1 2 3 4 Kilometers

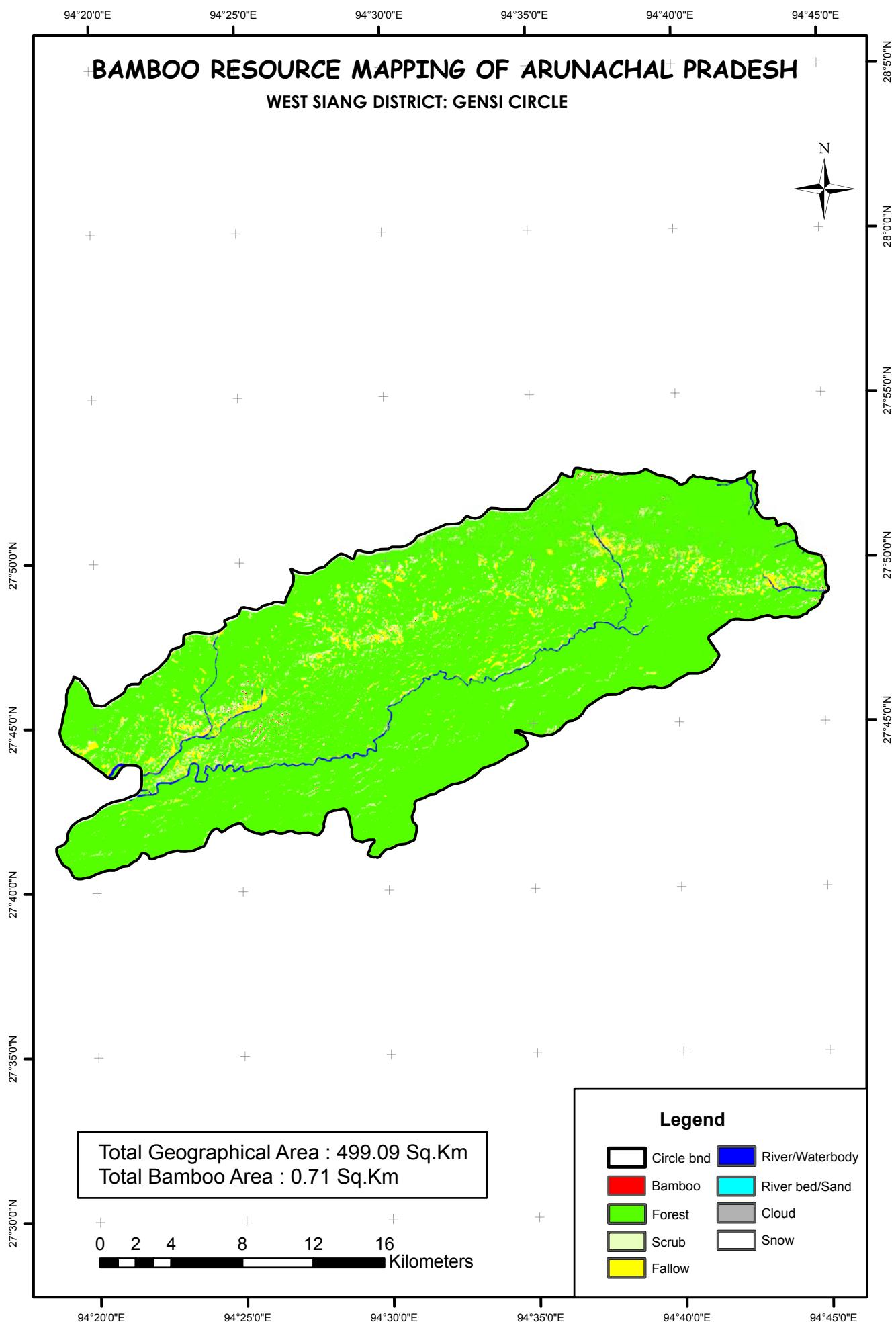
### Legend

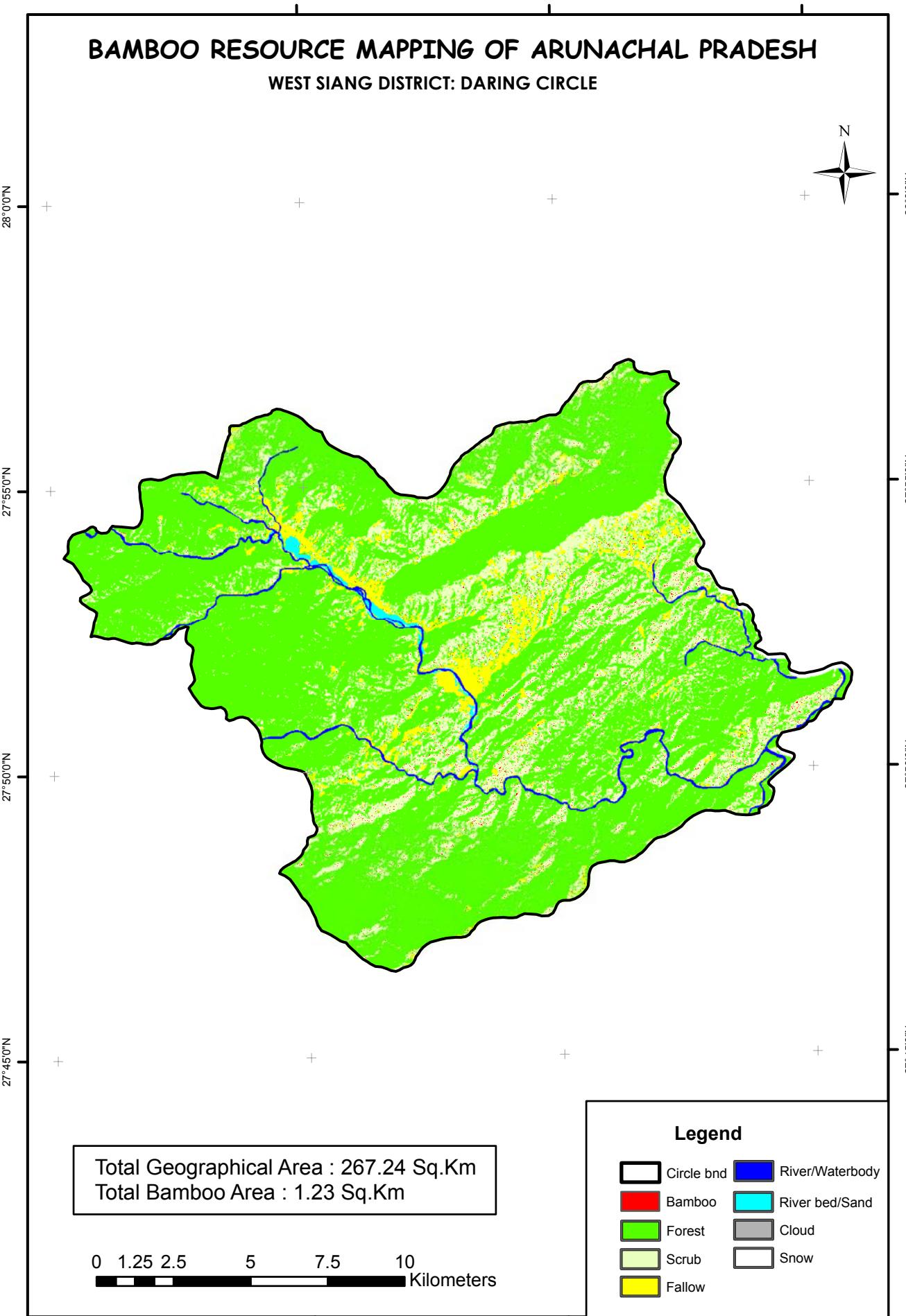
Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

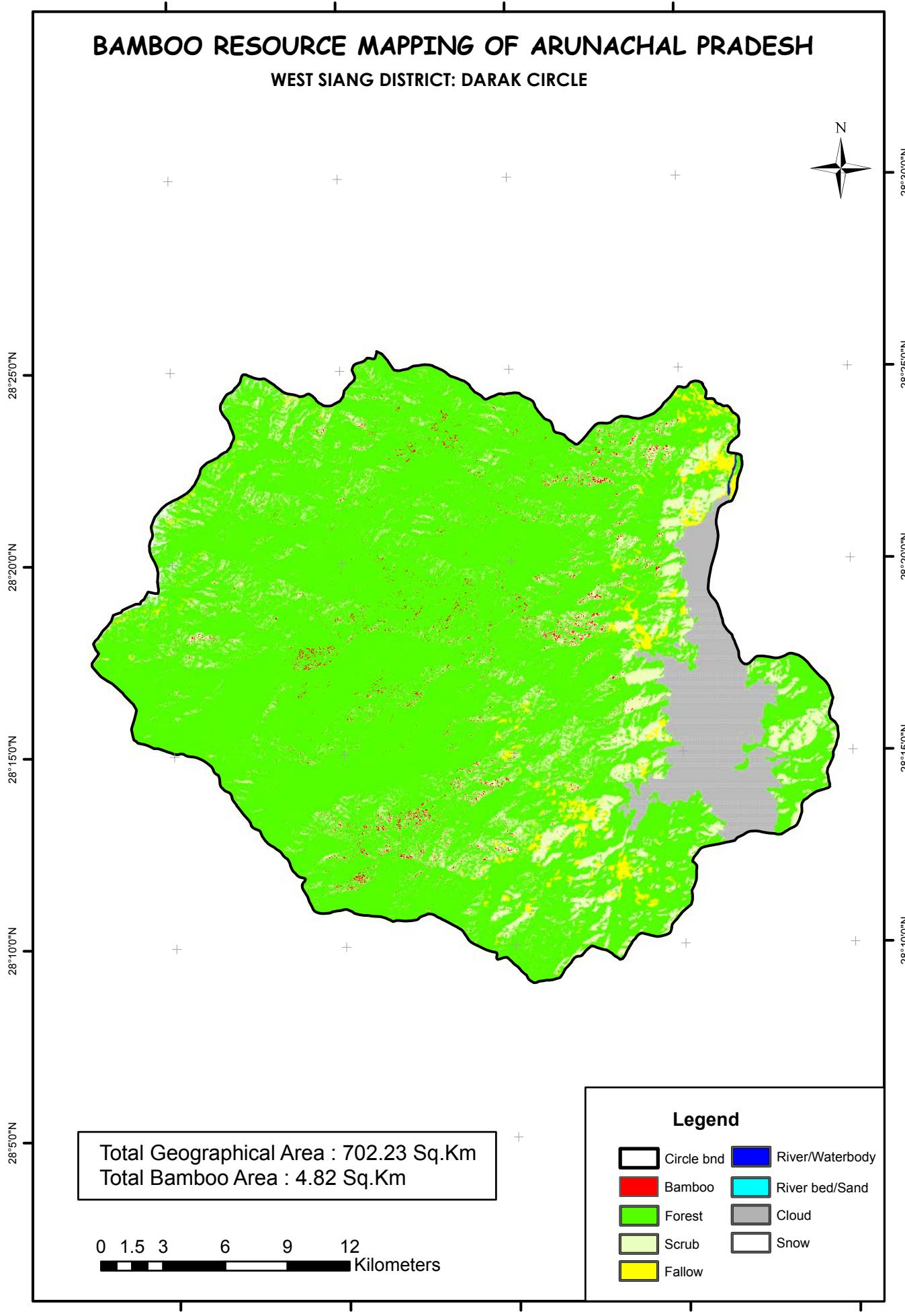
94°45'0"E

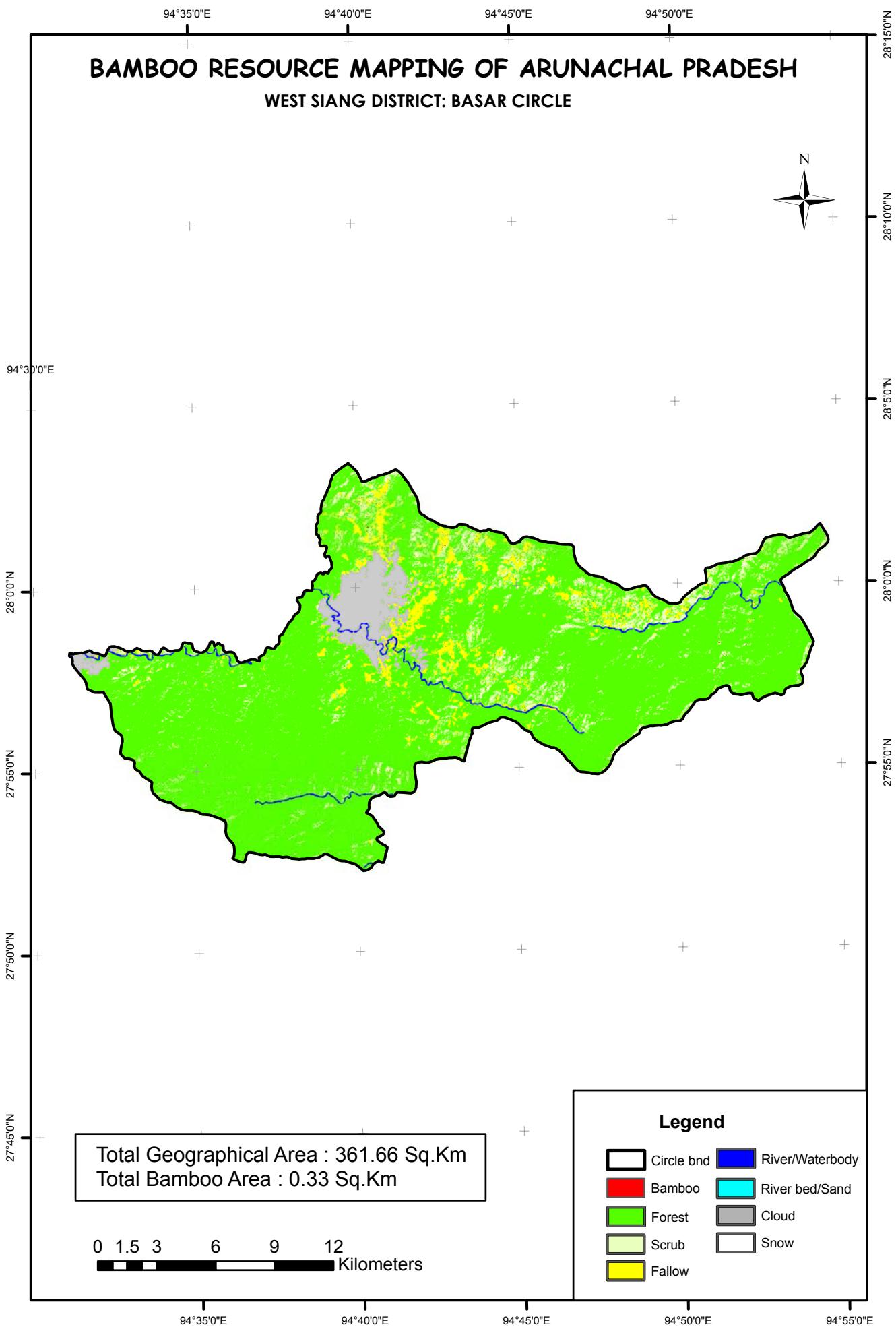
94°50'0"E

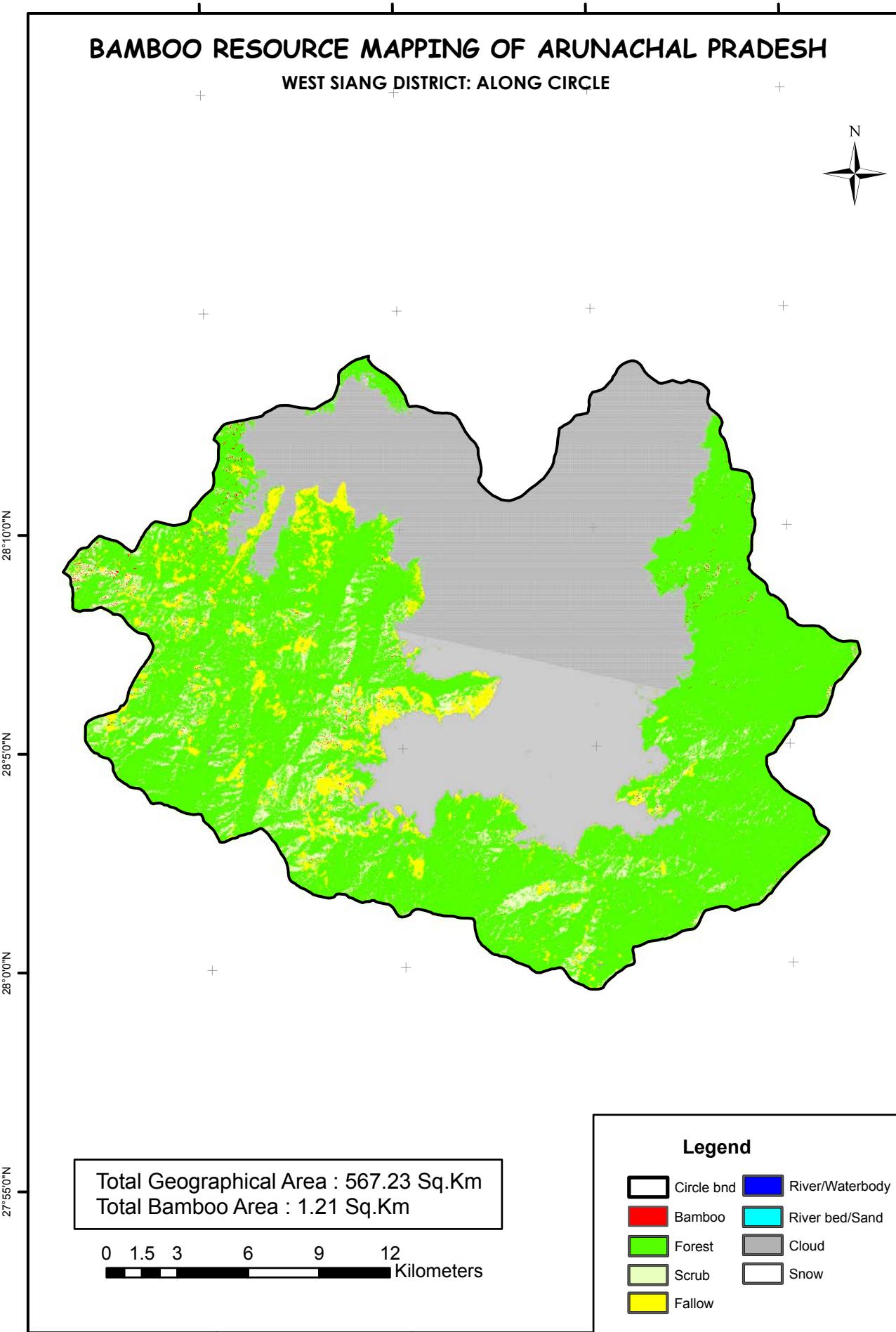
94°55'0"E



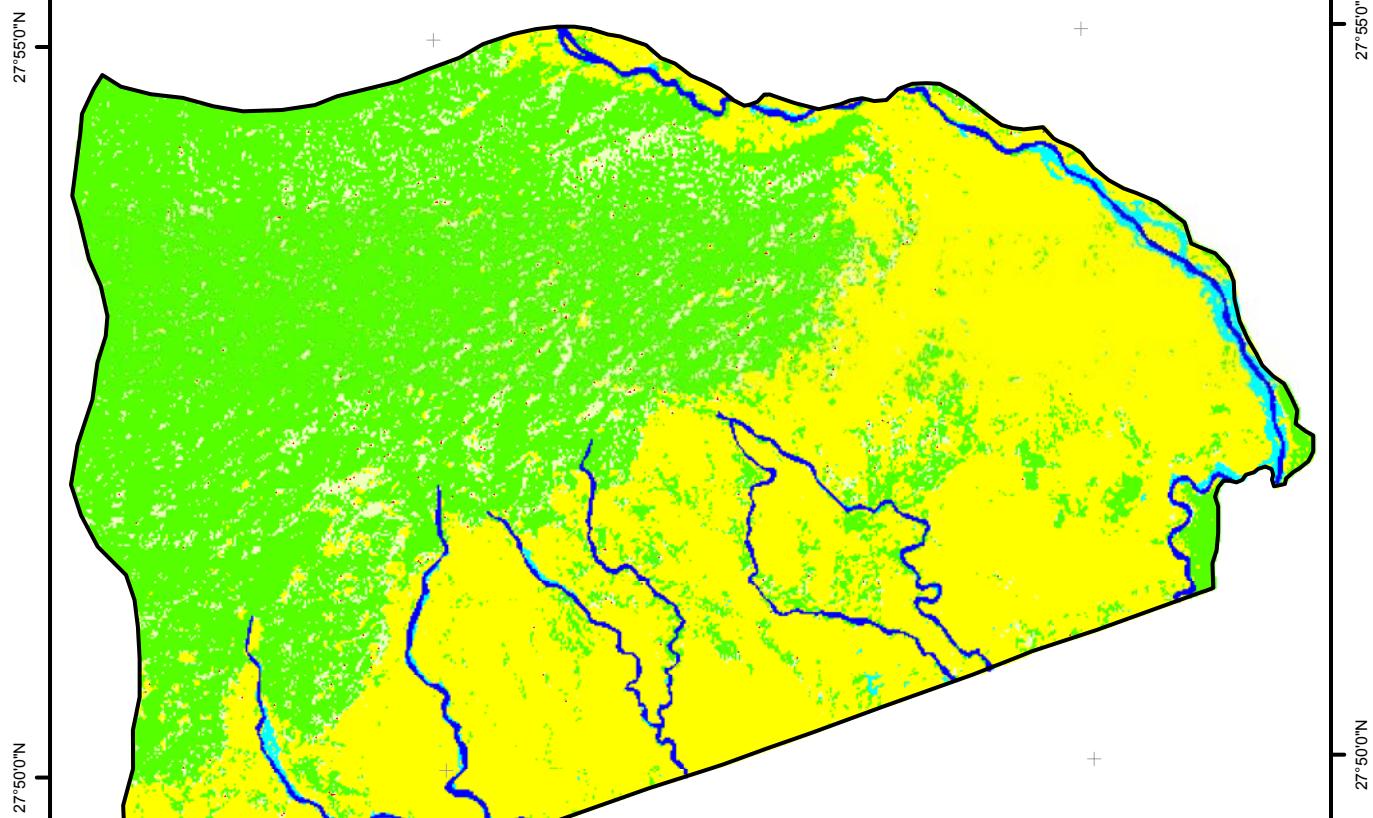








**BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH**  
**EAST SIANG DISTRICT : RUKSIN CIRCLE**



Total Geographical Area : 123.05 Sq.Km  
Total Bamboo Area : 0.09 Sq.Km

0 0.5 1 2 3 4 Kilometers

**Legend**

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

94°45'0"E

94°50'0"E

94°55'0"E

95°0'0"E

95°5'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## EAST SIANG DISTRICT : RIGA CIRCLE



28°40'0"N

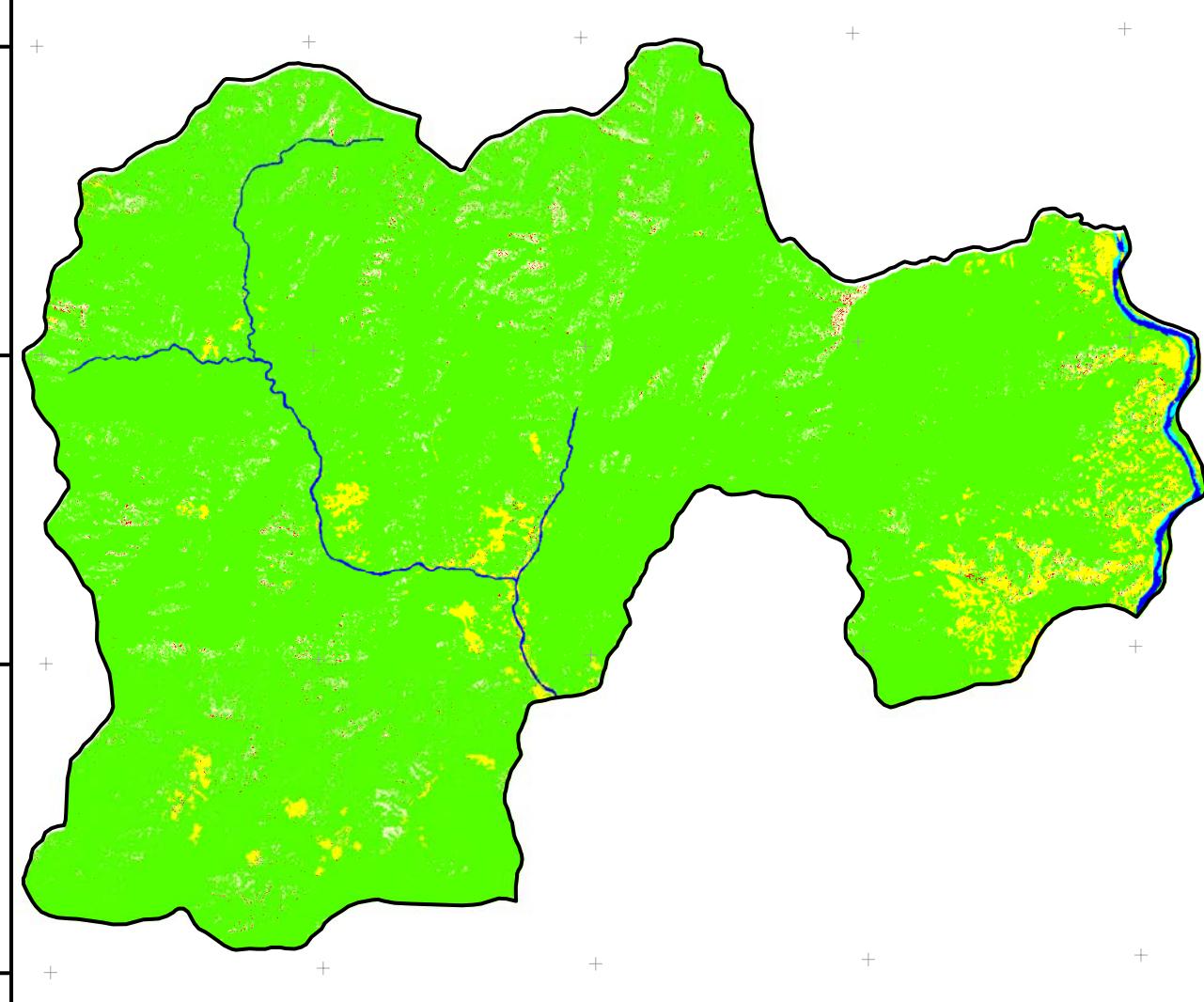
28°35'0"N

28°30'0"N

28°25'0"N

28°20'0"N

28°15'0"N



Total Geographical Area : 574.49 Sq.Km  
 Total Bamboo Area : 2.16 Sq.Km

0 1.5 3 6 9 12 Kilometers

### Legend

	Circle bnd		River/Waterbody
	Bamboo		River bed/Sand
	Forest		Cloud
	Scrub		Snow
	Fallow		

94°45'0"E

94°50'0"E

94°55'0"E

95°0'0"E

95°5'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

EAST SIANG DISTRICT : RIBOTARGING CIRCLE



28°20'0"N

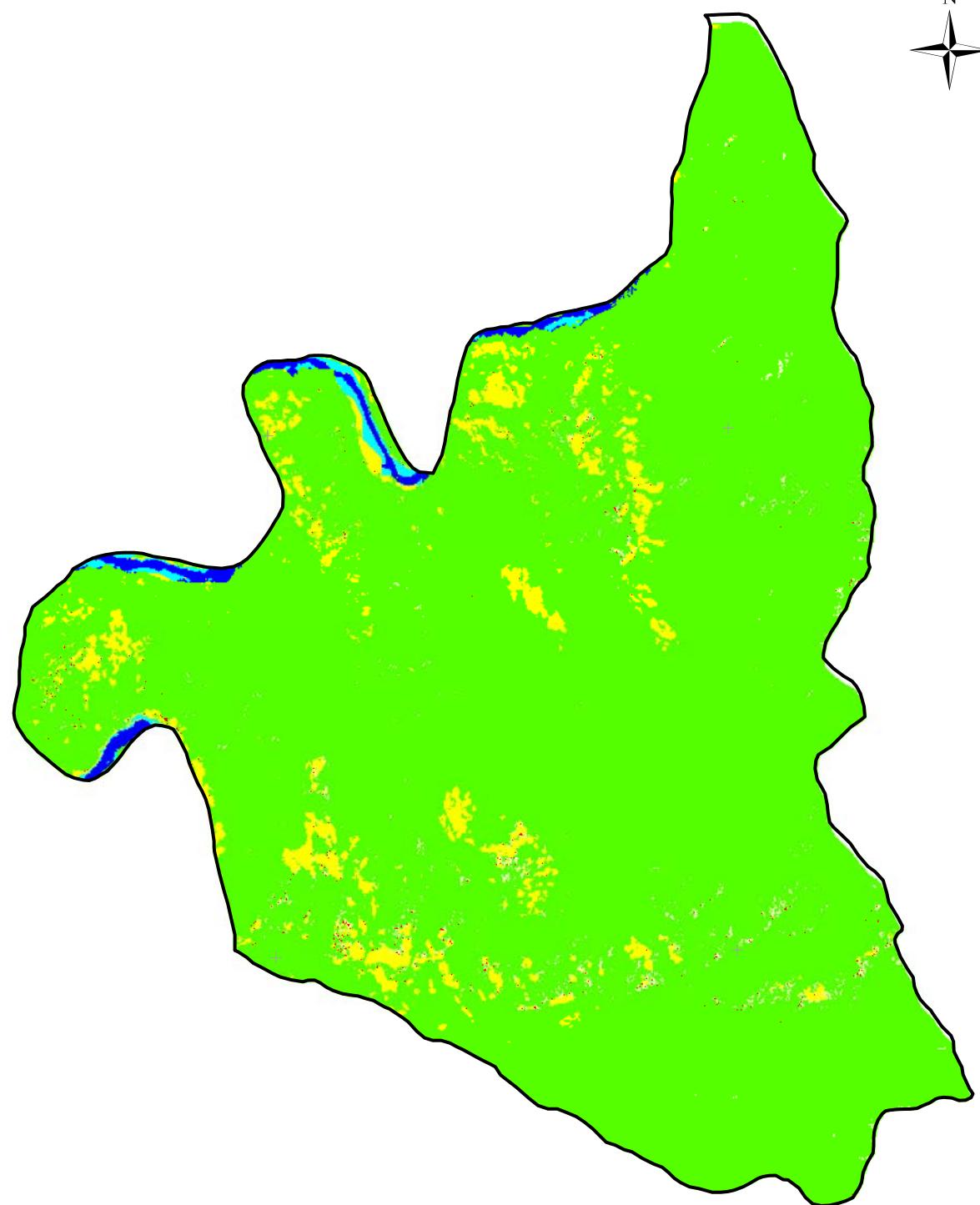
28°25'0"N

28°15'0"N

28°15'0"N

95°0'0"E

95°5'0"E



Total Geographical Area : 175.34 Sq.Km  
Total Bamboo Area : 0.17 Sq.Km

0 0.5 1 2 3 4 Kilometers

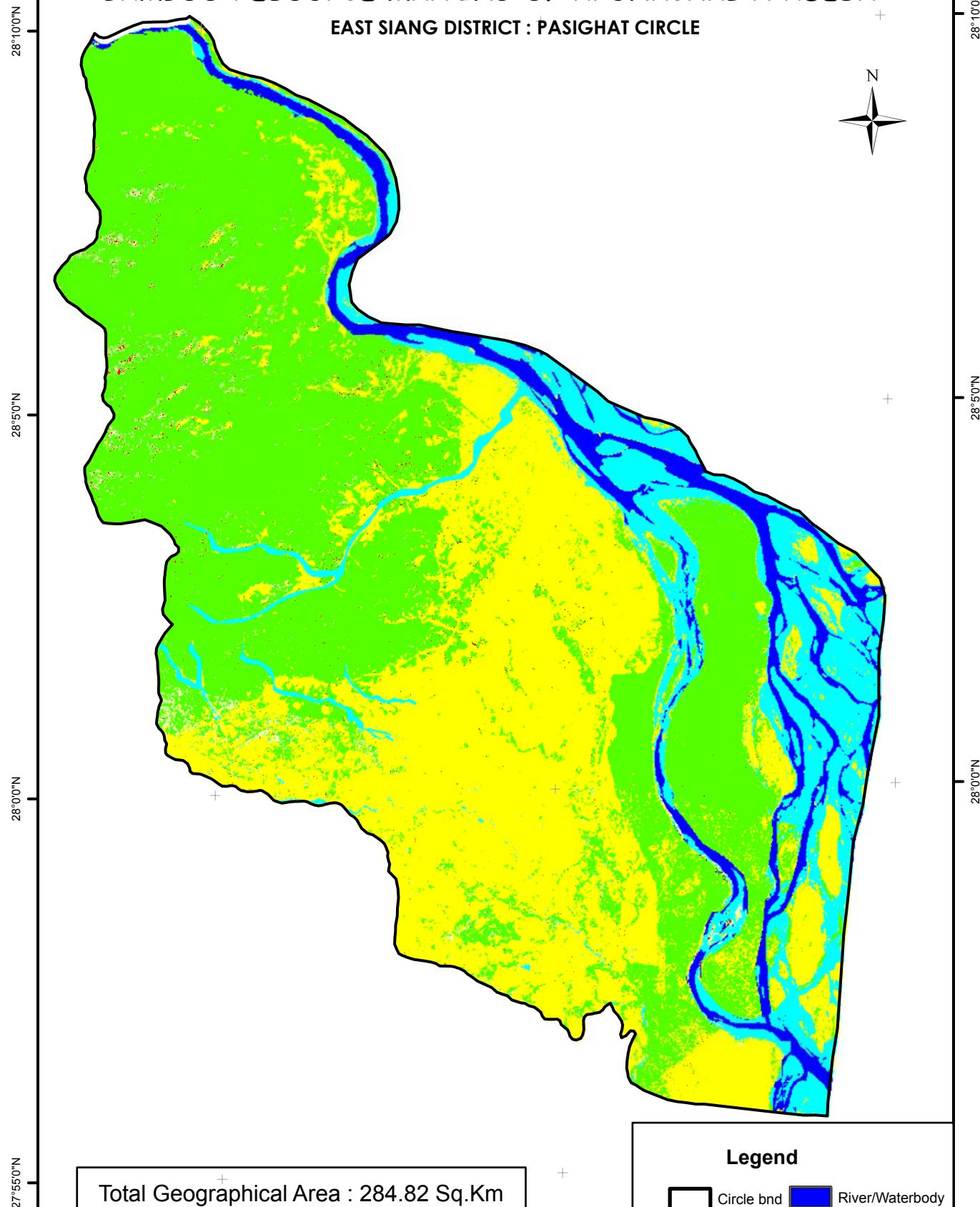
## Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

28°10'0"N

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

EAST SIANG DISTRICT : PASIGHAT CIRCLE



Total Geographical Area : 284.82 Sq.Km  
Total Bamboo Area : 0.55 Sq.Km

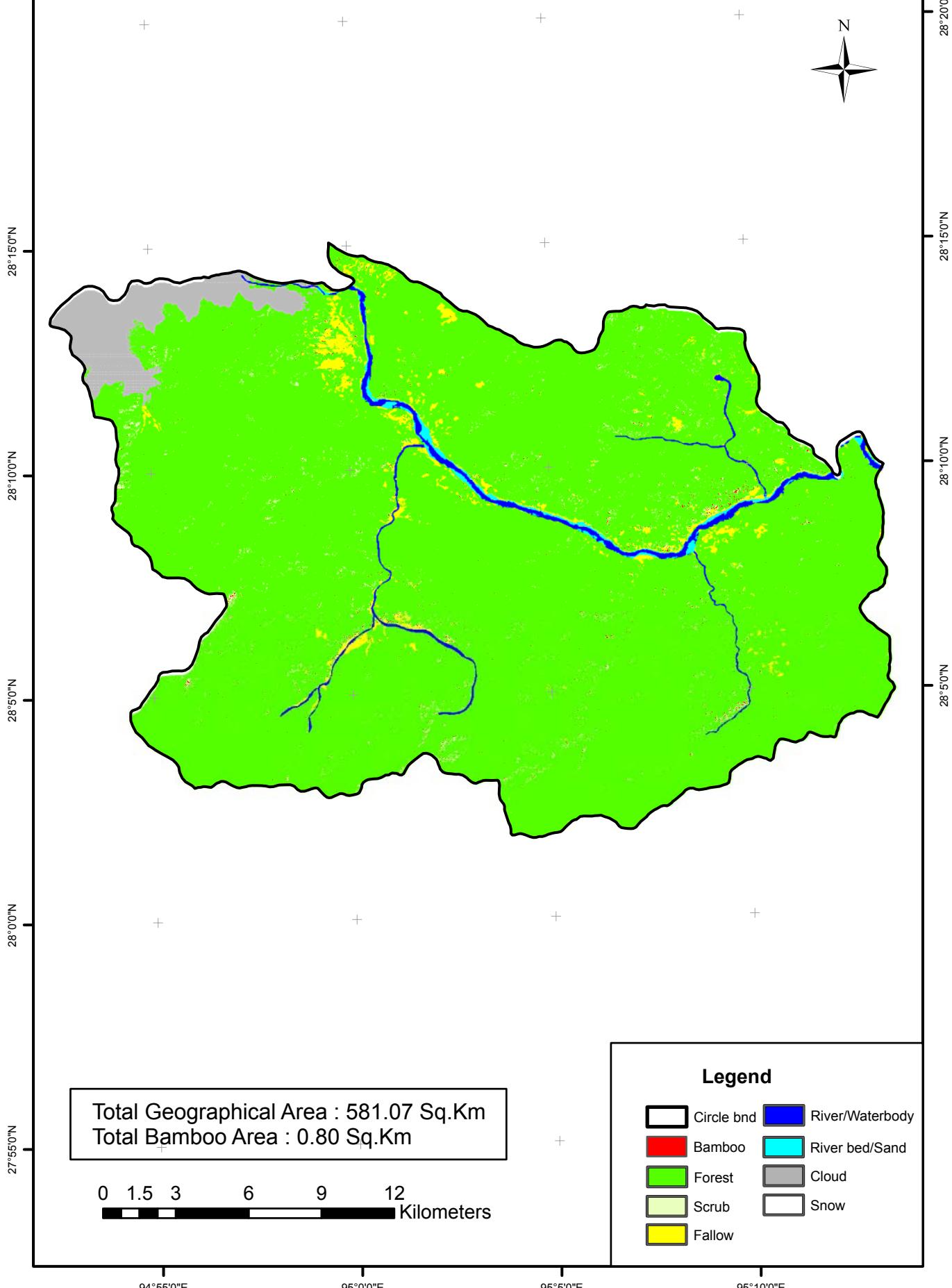
0 1 2 4 6 8 Kilometers

## Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## EAST SIANG DISTRICT : PANGIN CIRCLE



95°15'0"E

95°20'0"E

28°0'0"N

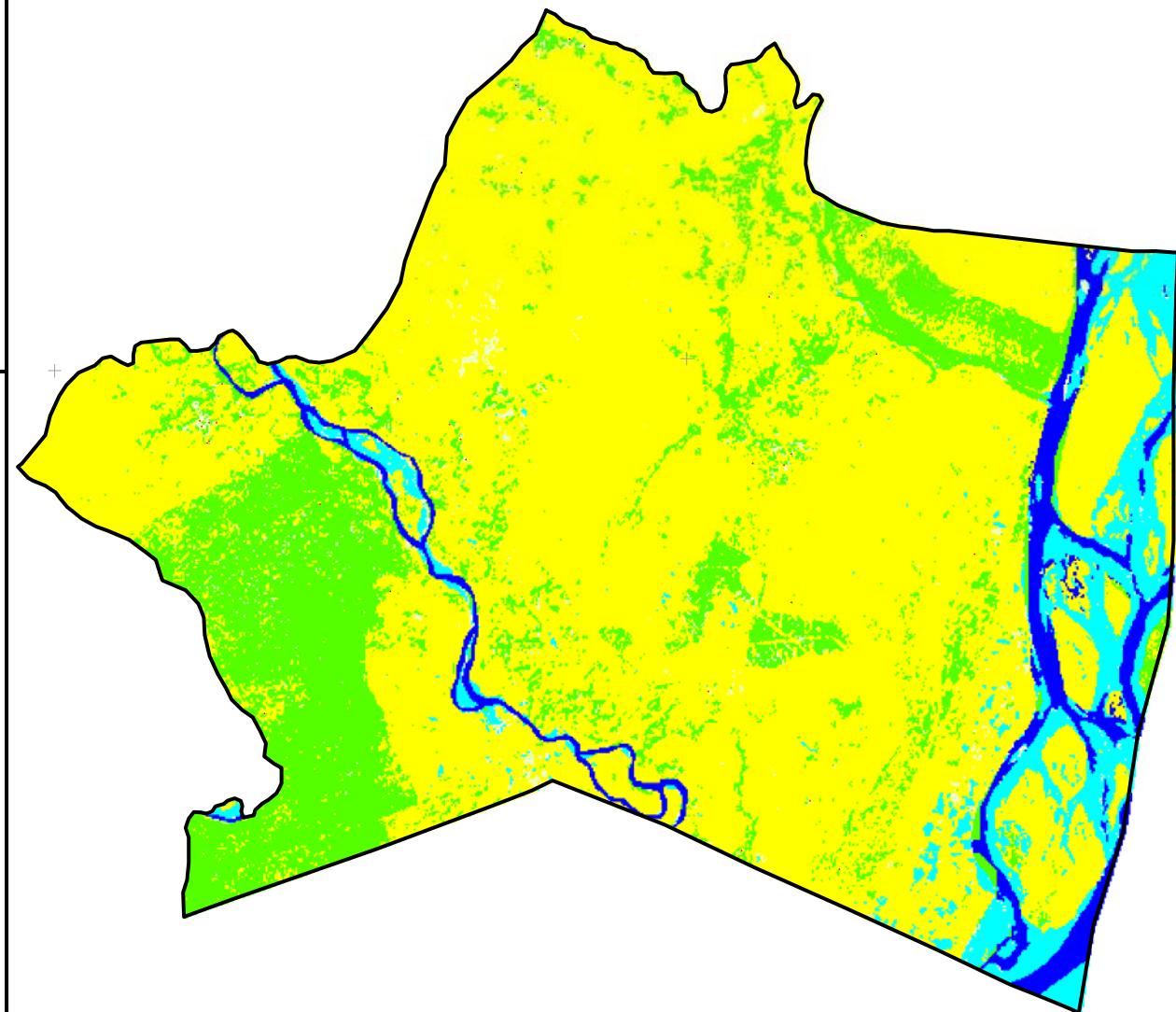
+ BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH  
EAST SIANG DISTRICT : OYAN CIRCLE



27°55'0"N

+

27°55'0"N



27°50'0"N

Total Geographical Area : 114.42 Sq.Km  
Total Bamboo Area : 0.01 Sq.Km

0 0.5 1 2 3 4 Kilometers

**Legend**

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

95°15'0"E

95°20'0"E

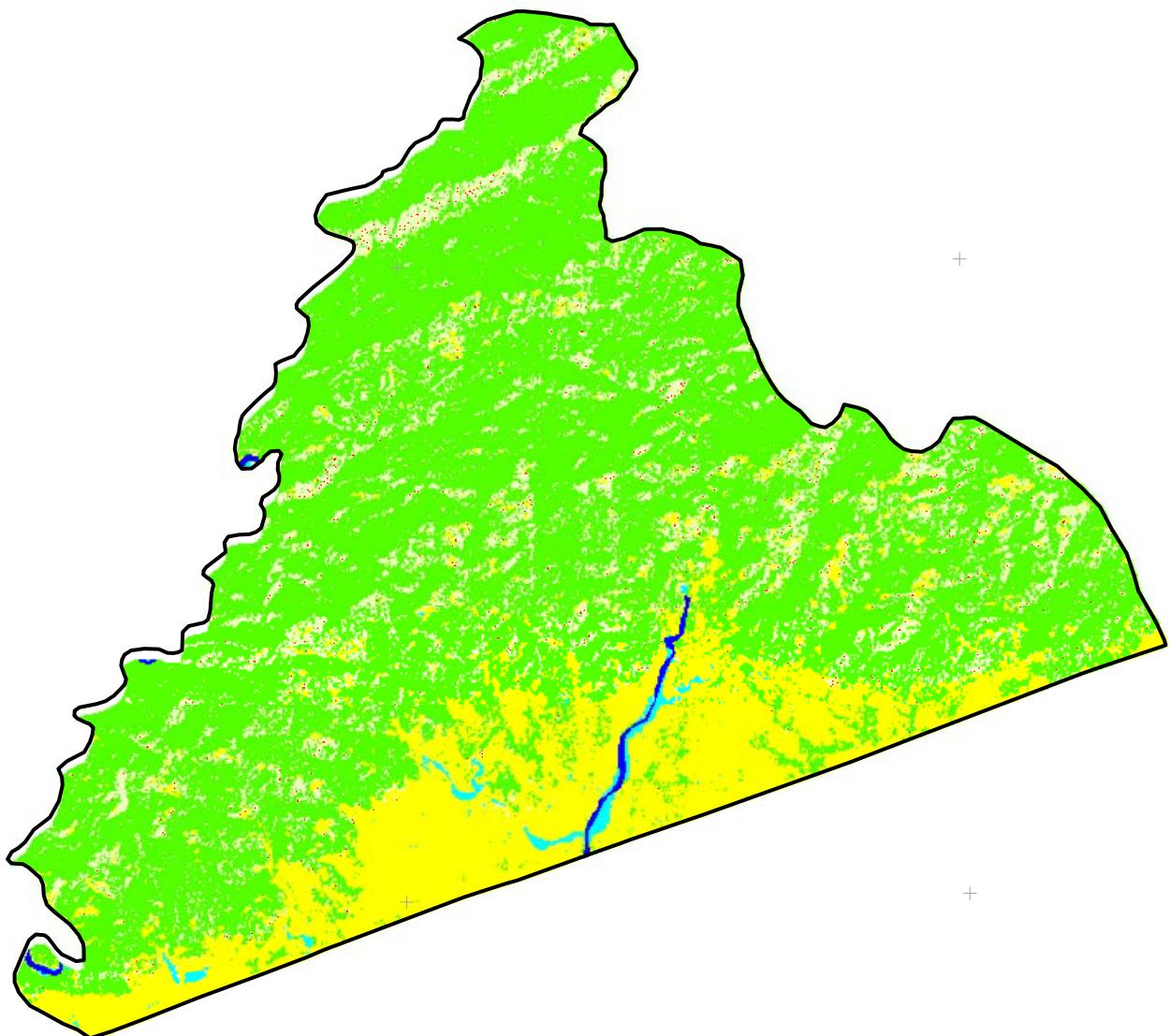
# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

EAST SIANG DISTRICT : NEW SEREN CIRCLE



27°50'0"N  
27°45'0"N  
27°45'0"N

94°55'0"E  
95°0'0"E  
27°50'0"N



Total Geographical Area : 114.66 Sq.Km  
Total Bamboo Area : 0.22 Sq.Km

0 0.5 1 2 3 4 Kilometers

## Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

94°55'0"E

95°0'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

EAST SIANG DISTRICT : NARI CIRCLE



27°55'0"N

27°55'0"N

27°50'0"N

27°50'0"N

27°45'0"N

Total Geographical Area : 143.13 Sq.Km  
Total Bamboo Area : 0.20 Sq.Km

0 0.5 1 2 3 4 Kilometers

## Legend

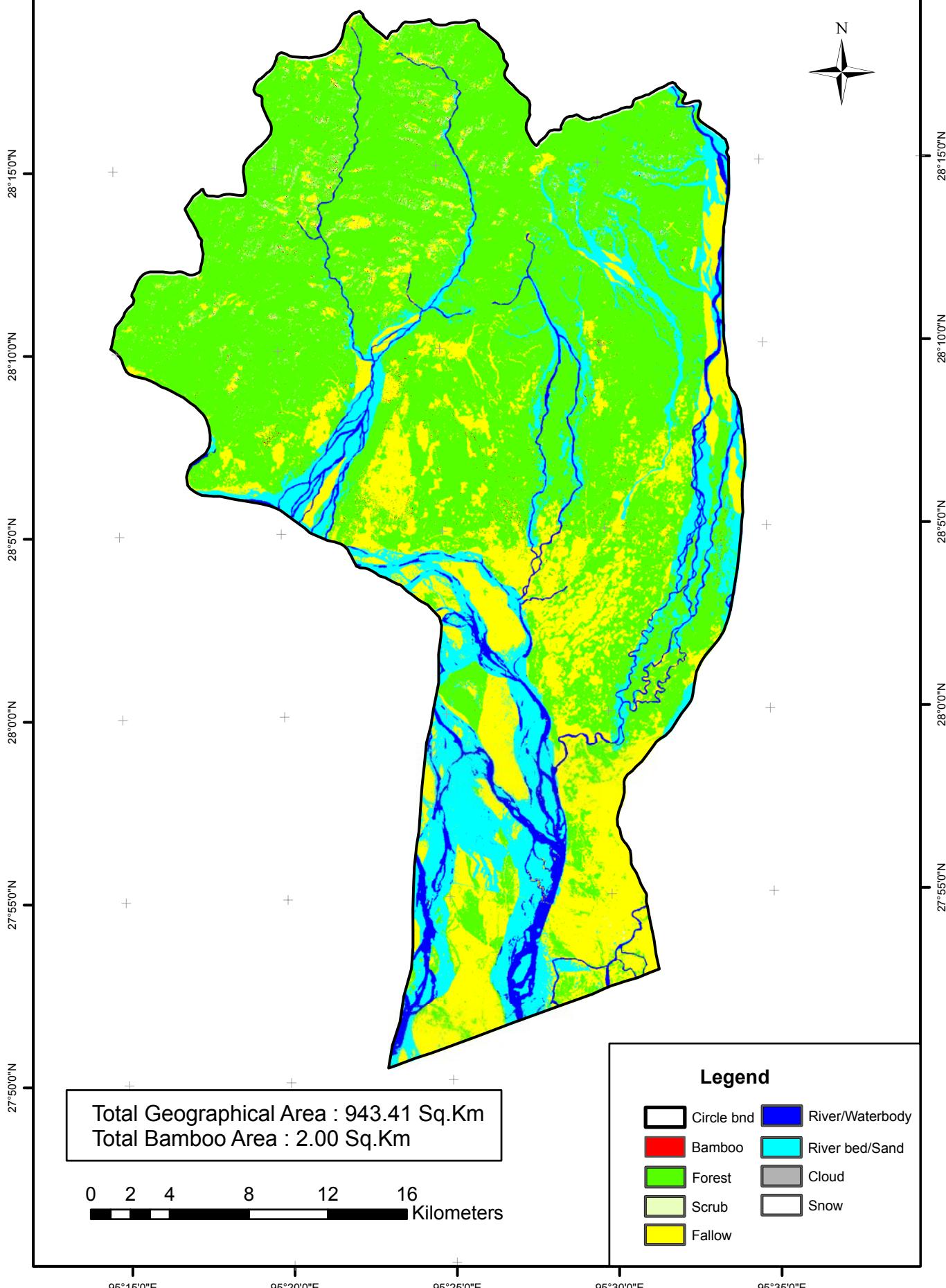
Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

95°0'0"E

95°5'0"E

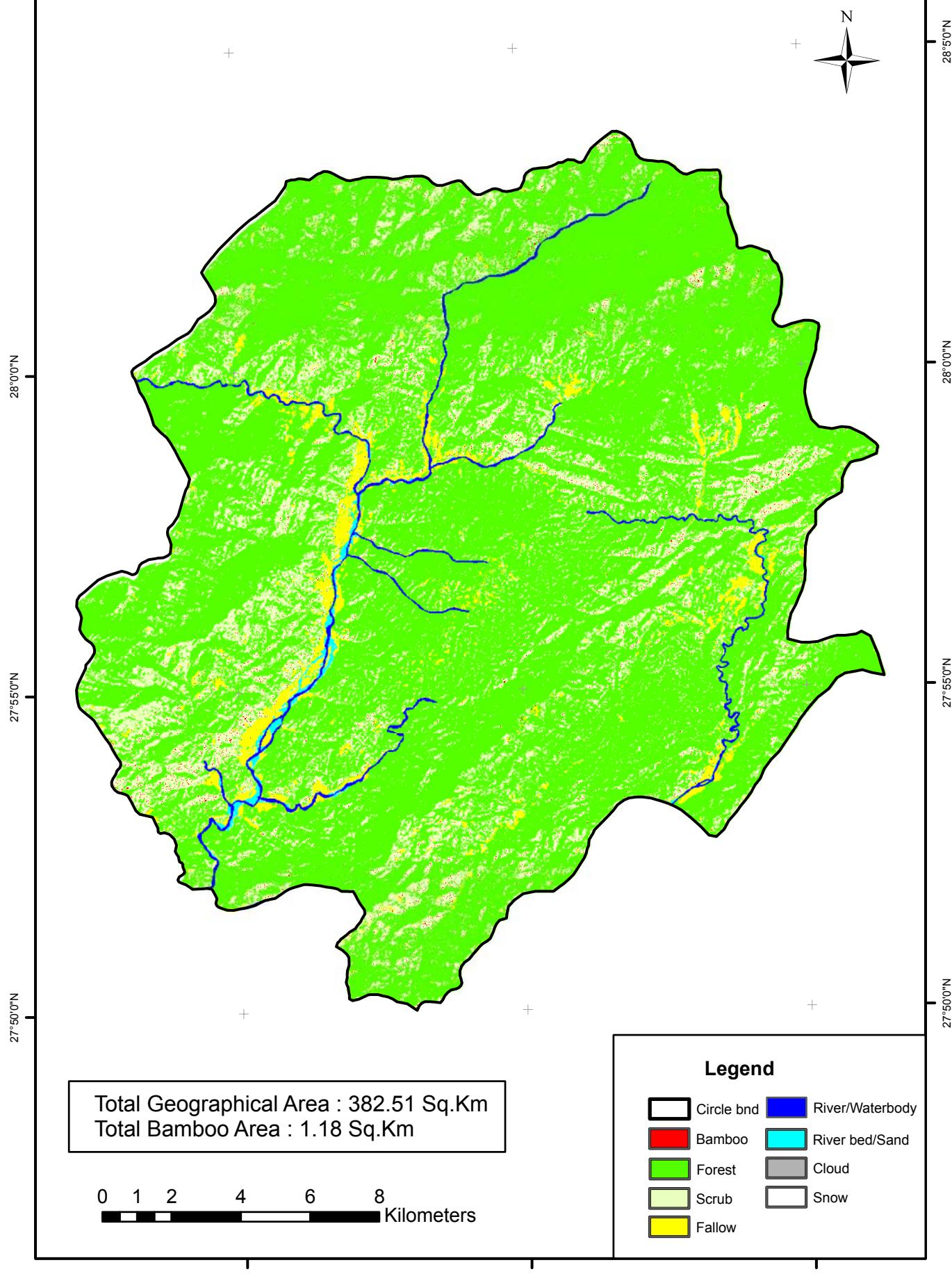
# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

EAST SIANG DISTRICT : MEBO CIRCLE



# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## EAST SIANG DISTRICT : KOYU CIRCLE



94°55'0"E

95°0'0"E

95°5'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## EAST SIANG DISTRICT : BOLENG CIRCLE



28°25'0"N

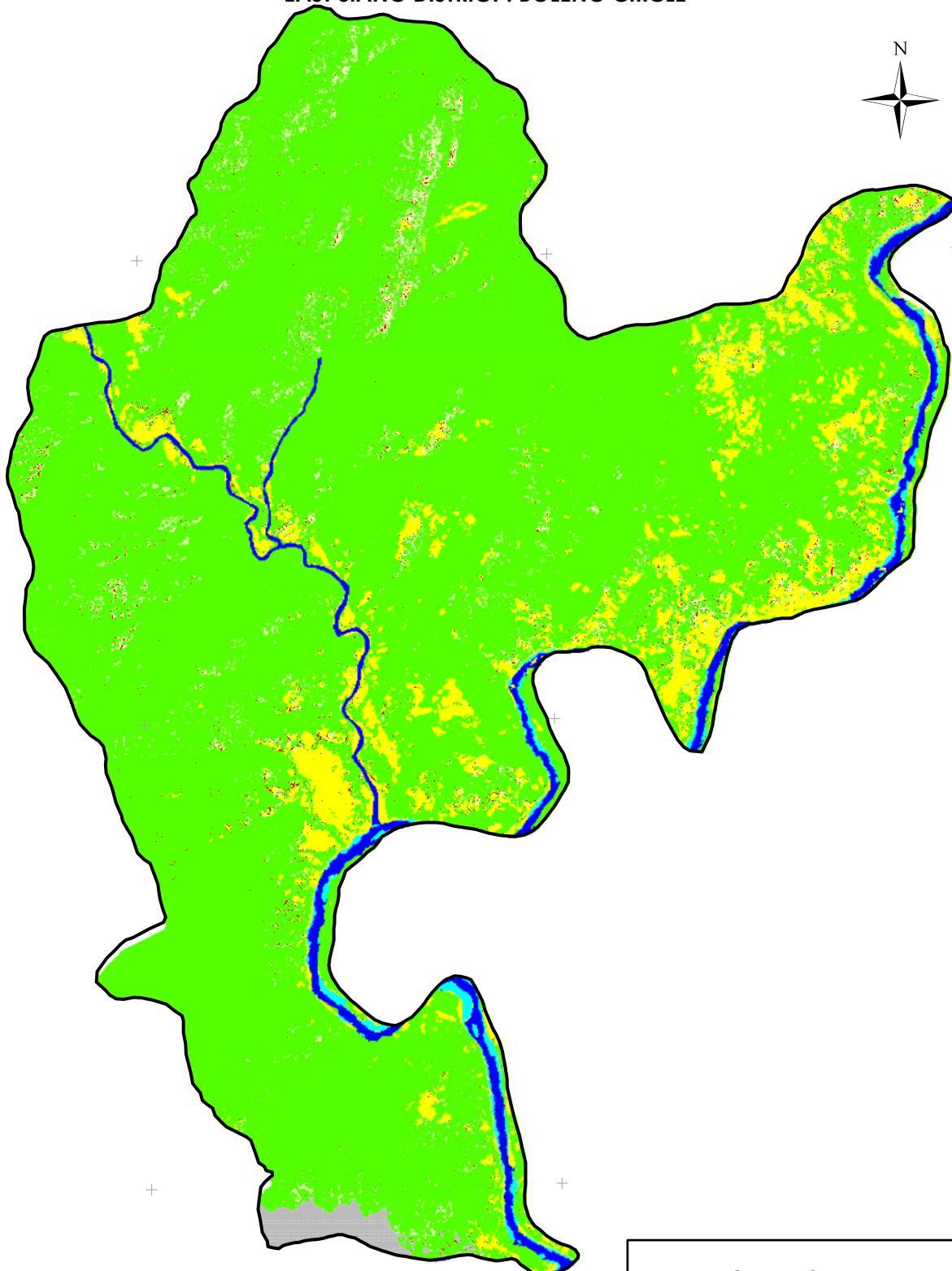
28°20'0"N

28°15'0"N

28°25'0"N

28°20'0"N

28°15'0"N



0    1    2    4    6    8  
Kilometers

### Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

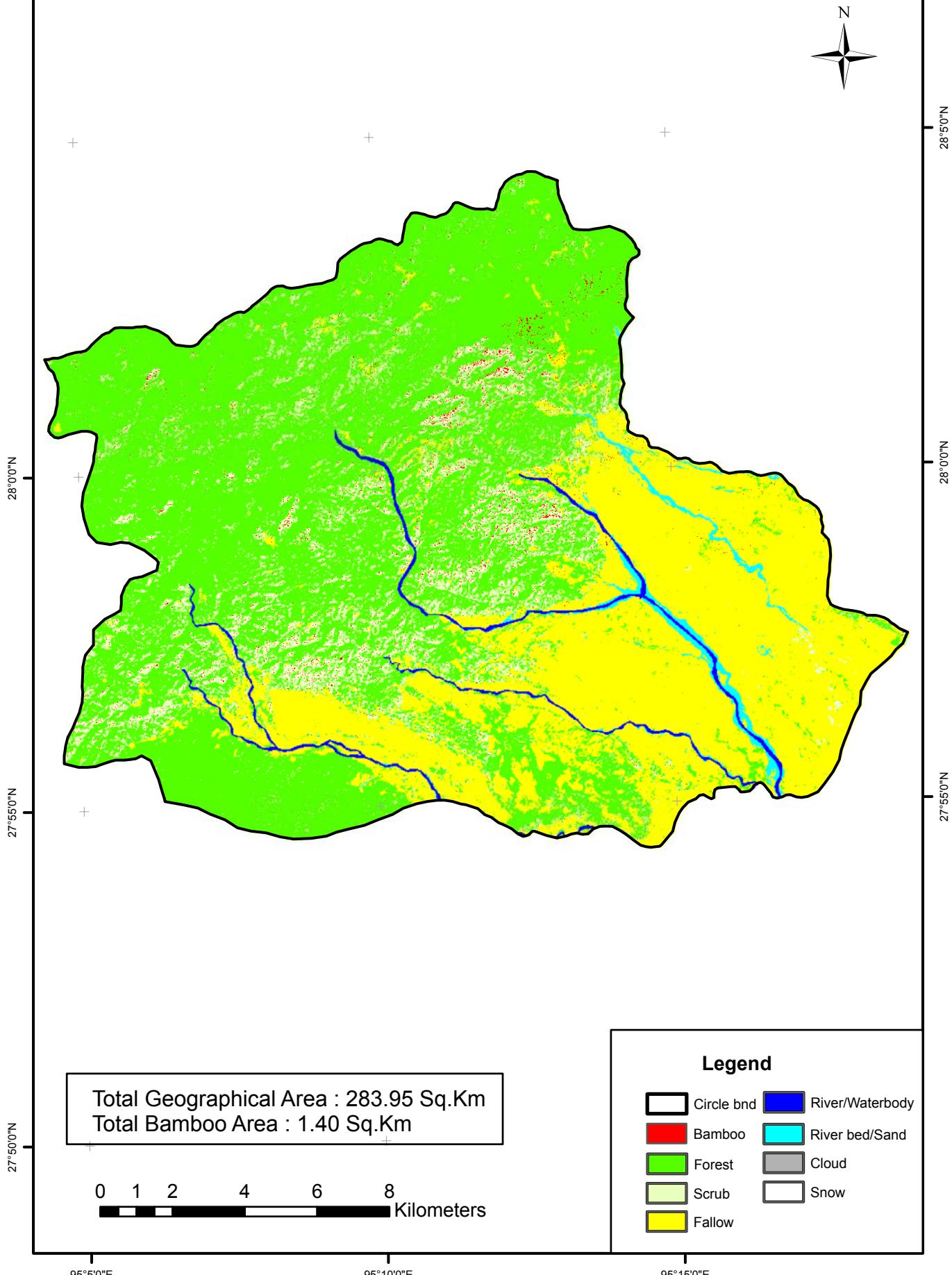
94°55'0"E

95°0'0"E

95°5'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

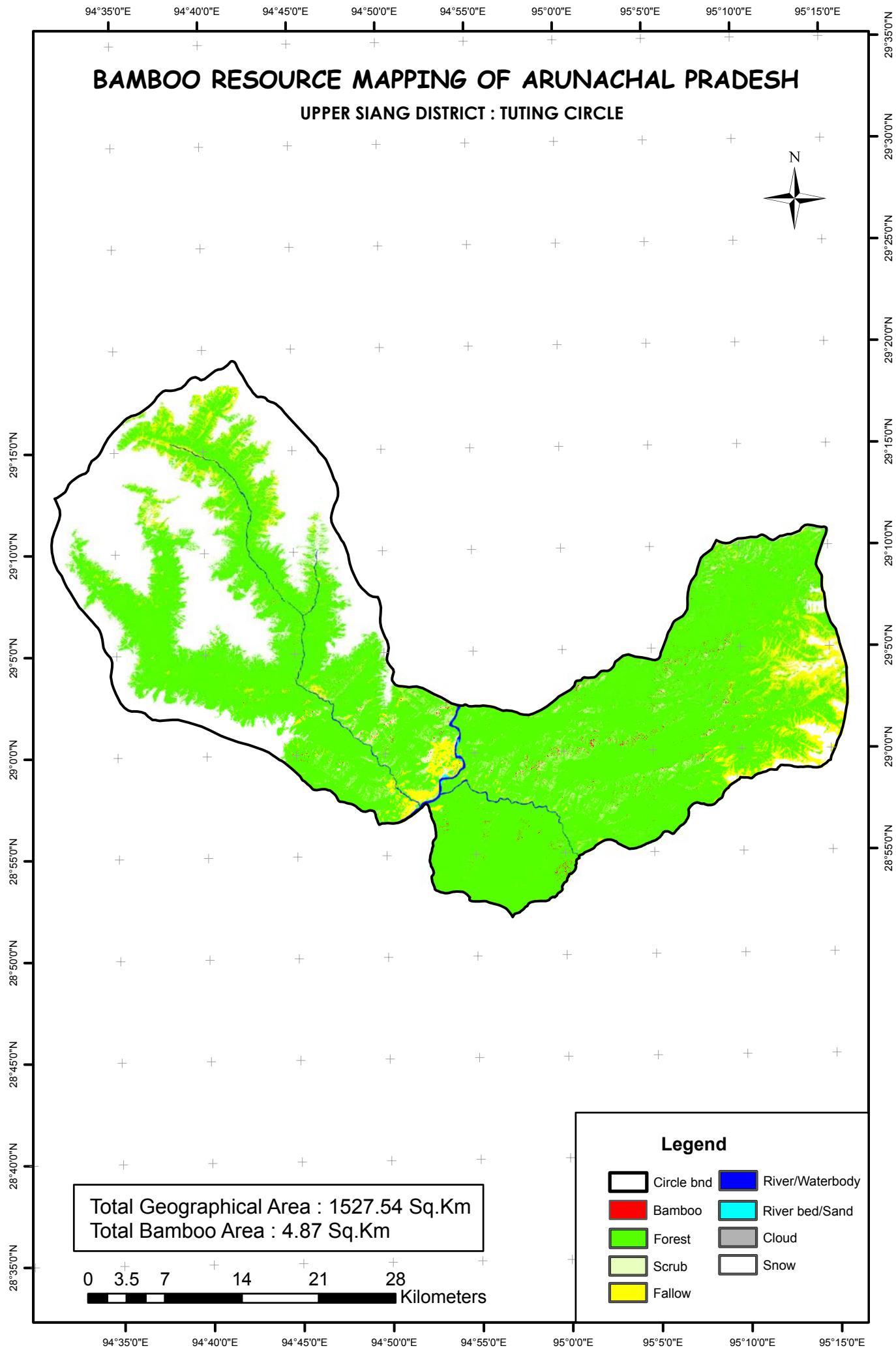
## EAST SIANG DISTRICT : BILAT CIRCLE



95°50'E

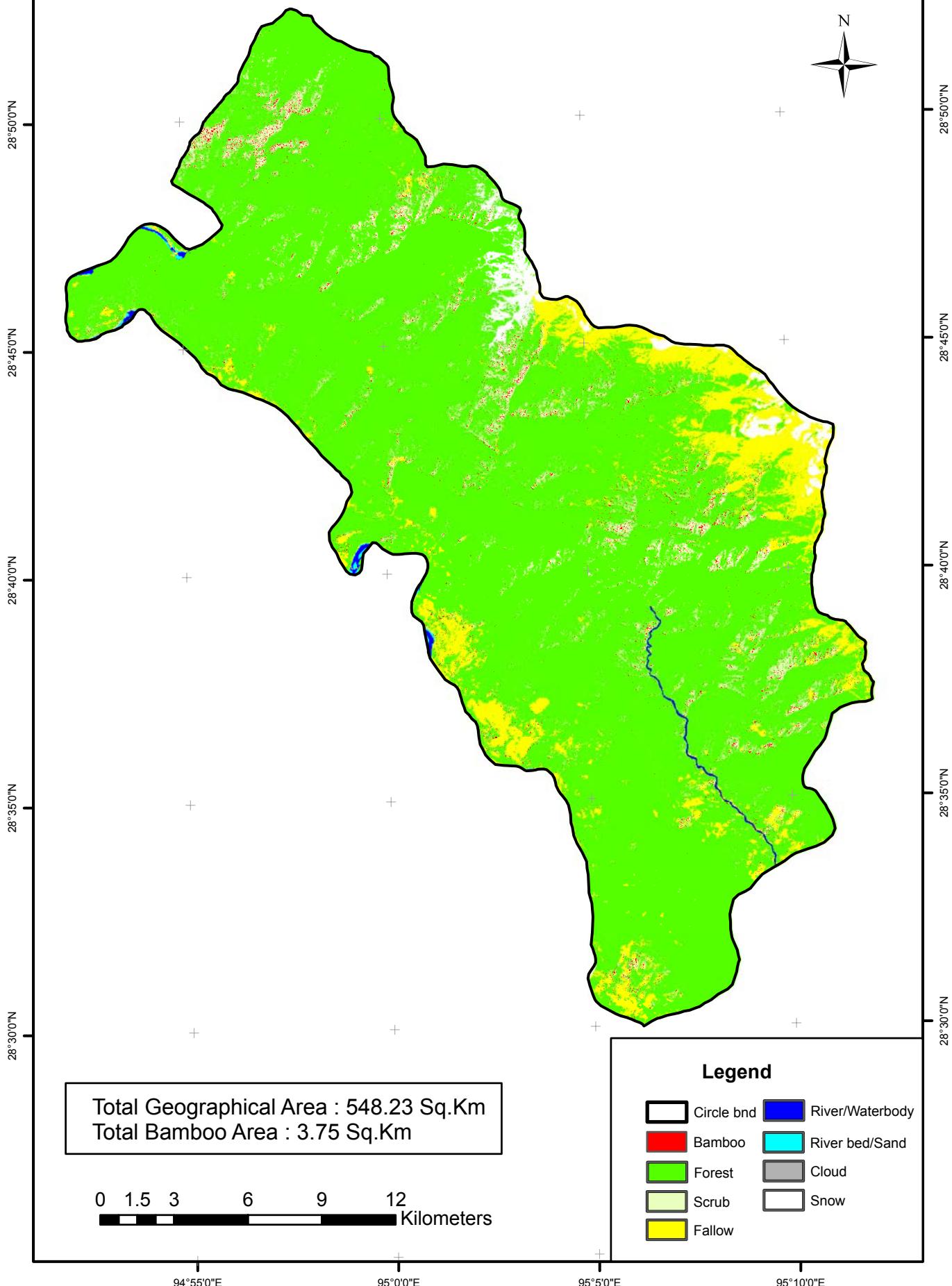
95°10'0"E

95°15'0"E



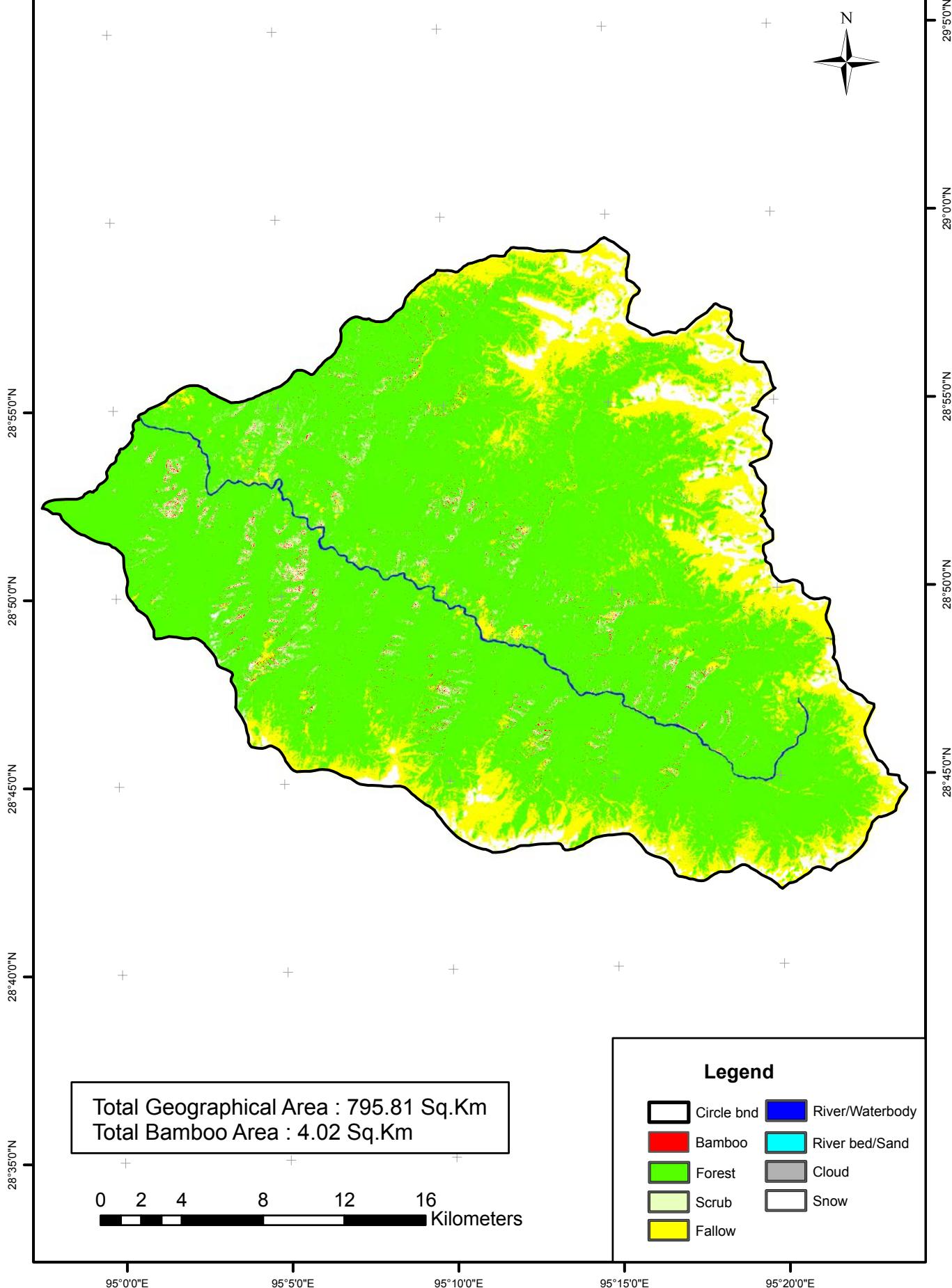
# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

UPPER SIANG DISTRICT : YINGKIONG CIRCLE



# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## UPPER SIANG DISTRICT : SINGA CIRCLE



94°50'0"E

94°55'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

UPPER SIANG DISTRICT : PALLING CIRCLE

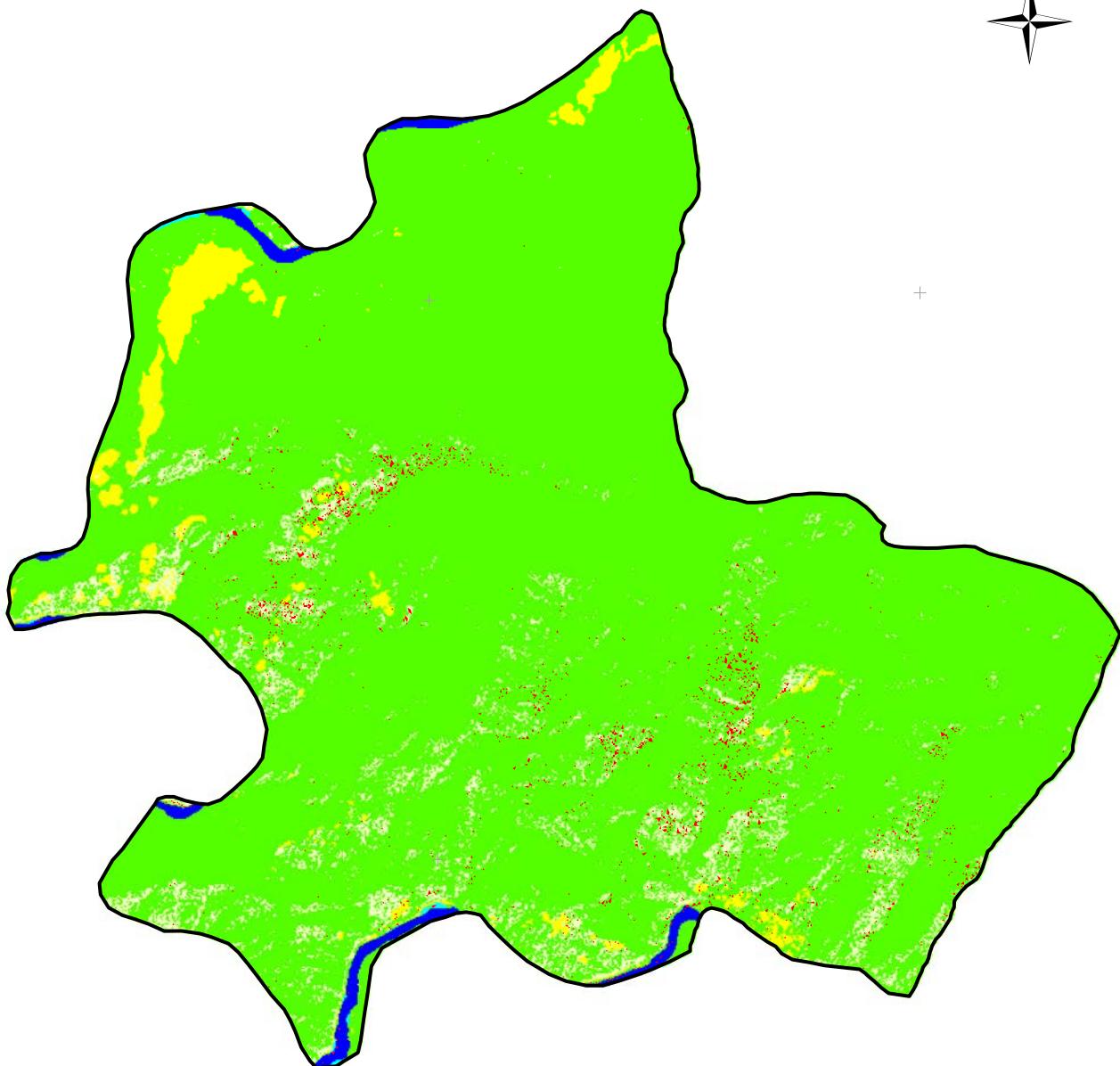


28°55'0"N

28°50'0"N

28°50'0"N

28°50'0"N



Total Geographical Area : 164.75 Sq.Km  
 Total Bamboo Area : 0.97 Sq.Km

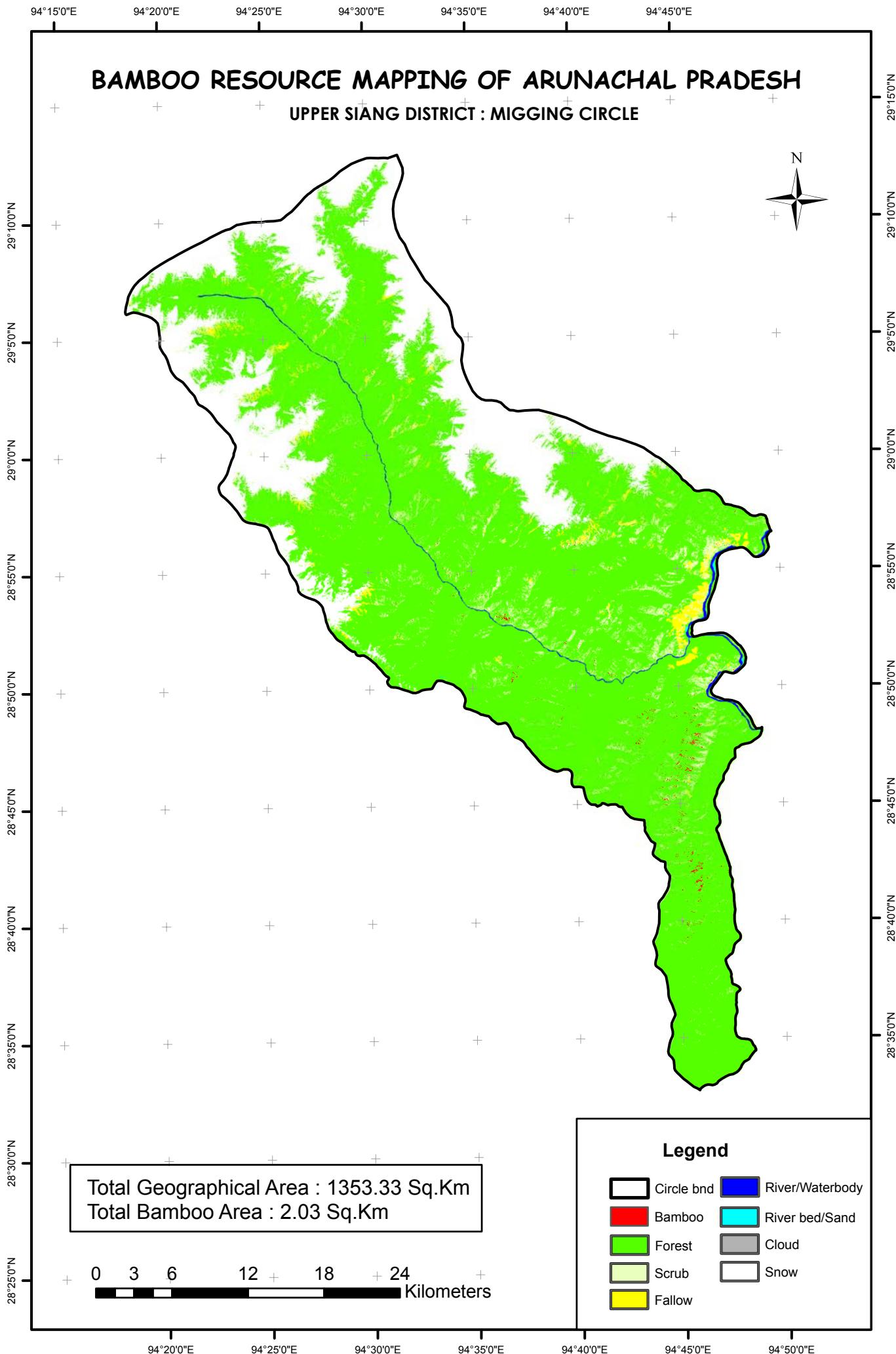
0 0.5 1 2 3 4 Kilometers

## Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

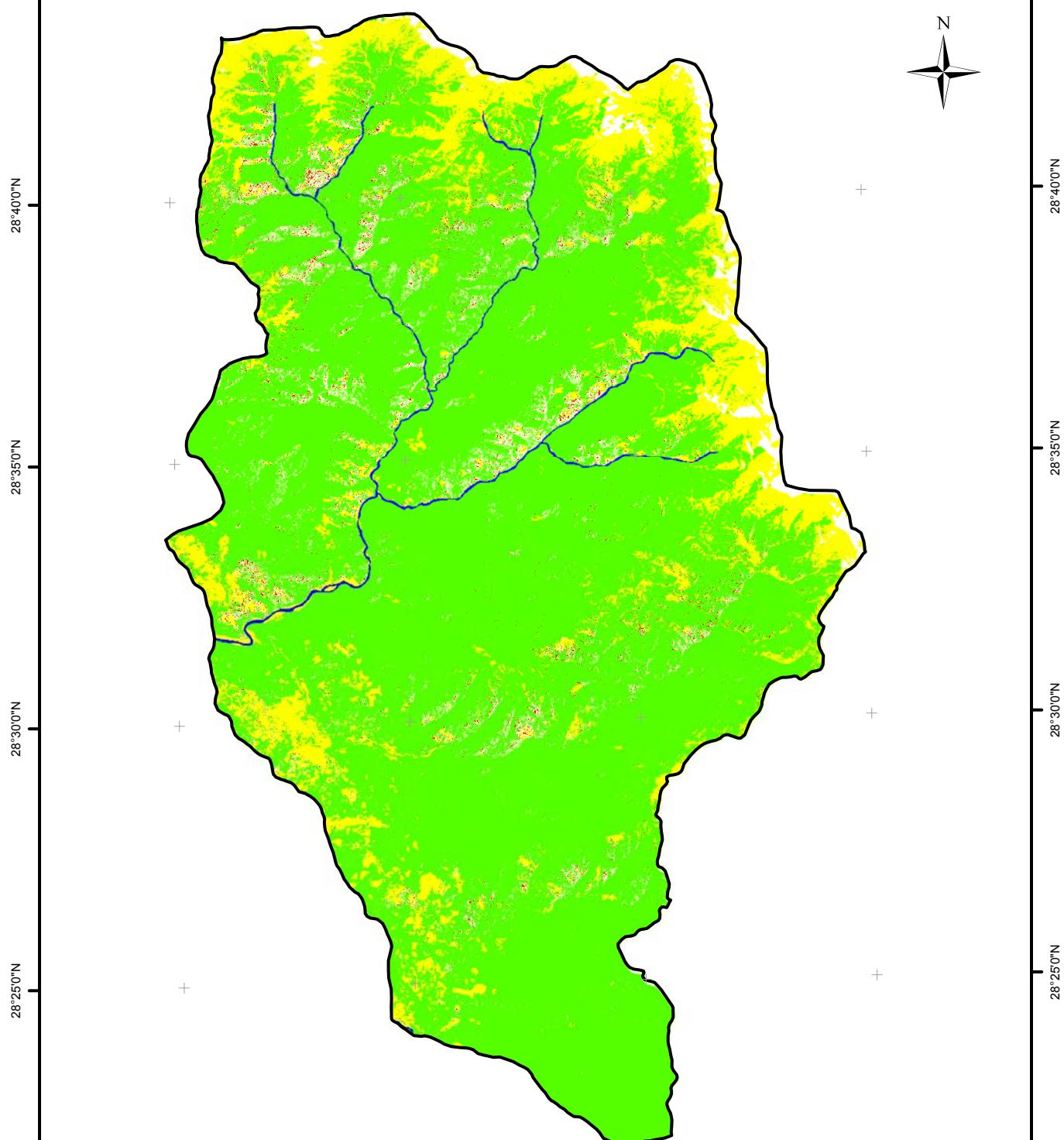
94°50'0"E

94°55'0"E



# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

UPPER SIANG DISTRICT : MARIYANG CIRCLE



Total Geographical Area : 611.19 Sq.Km  
Total Bamboo Area : 3.93 Sq.Km

0 1.5 3 6 9 12 Kilometers

## Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## UPPER SIANG DISTRICT : KATAN CIRCLE



28°25'0"N

28°20'0"N

28°15'0"N

28°10'0"N

28°5'0"N

28°20'0"N

28°15'0"N

28°10'0"N

28°5'0"N

95°10'0"E

95°15'0"E

95°20'0"E

Total Geographical Area : 454.07 Sq.Km  
Total Bamboo Area : 0.76 Sq.Km

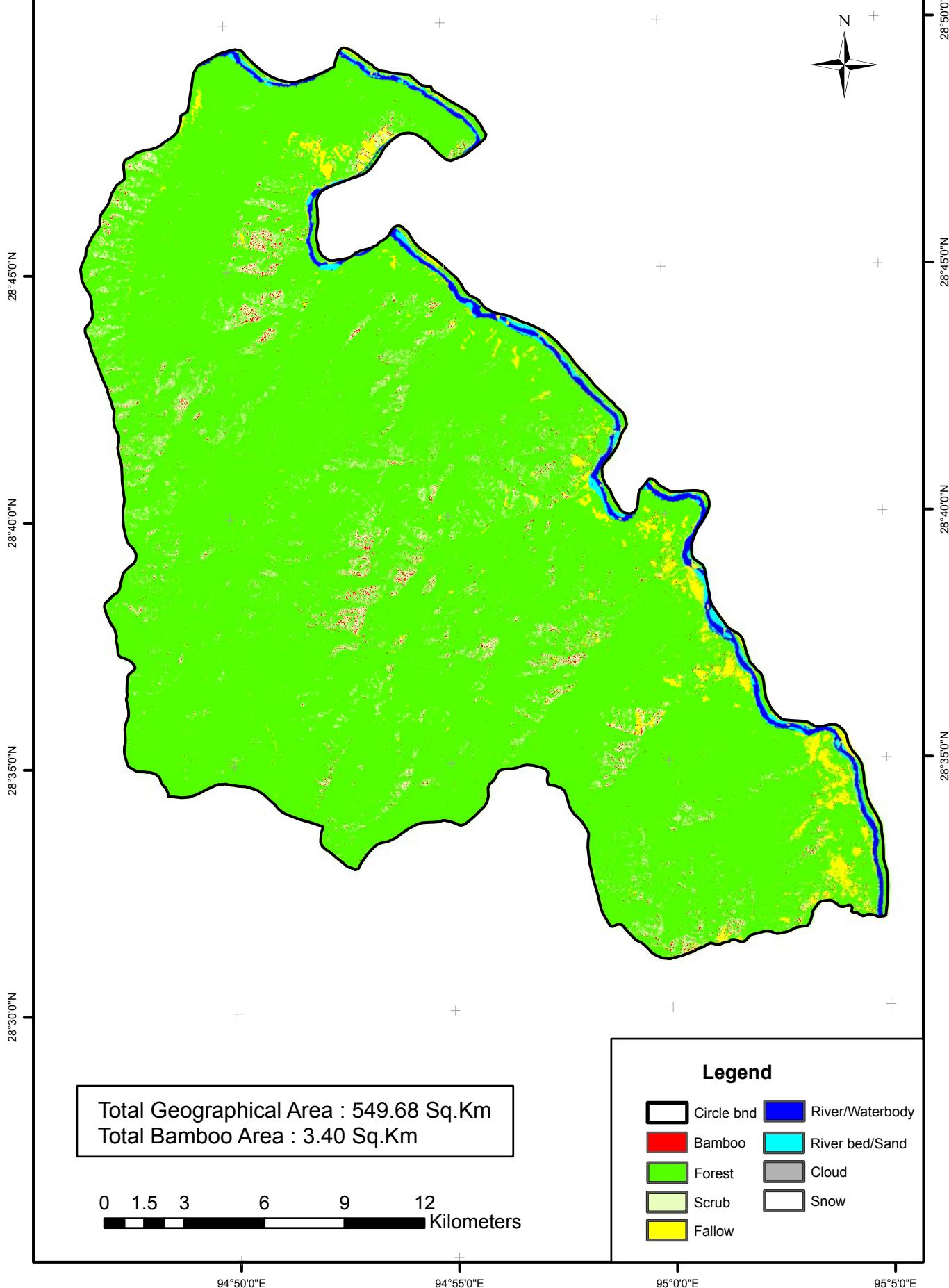
0 1.25 2.5 5 7.5 10 Kilometers

### Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## UPPER SIANG DISTRICT : JENGGING CIRCLE



94°50'0"E

94°55'0"E

95°0'0"E

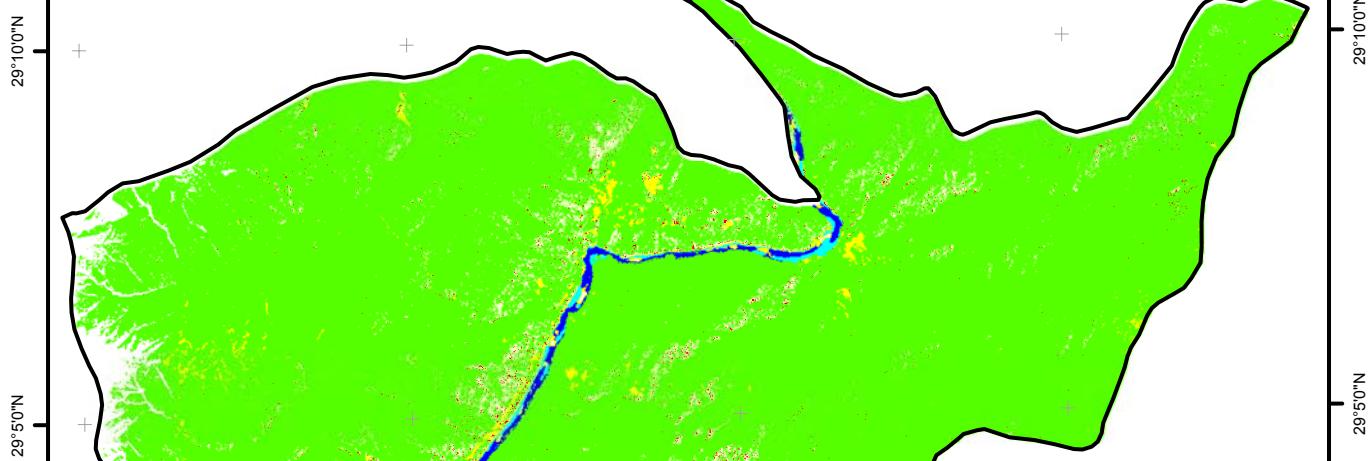
95°5'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## UPPER SIANG DISTRICT : GELLING CIRCLE



29°15'0"N



Total Geographical Area : 301.80 Sq.Km  
 Total Bamboo Area : 1.43 Sq.Km

0 1.5 3 6 9 12 Kilometers

### Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

28°55'0"N

94°50'0"E

94°55'0"E

95°0'0"E

95°5'0"E

95°5'0"E

95°10'0"E

28°35'0"N

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

UPPER SIANG DISTRICT : GEKU CIRCLE



28°30'0"N

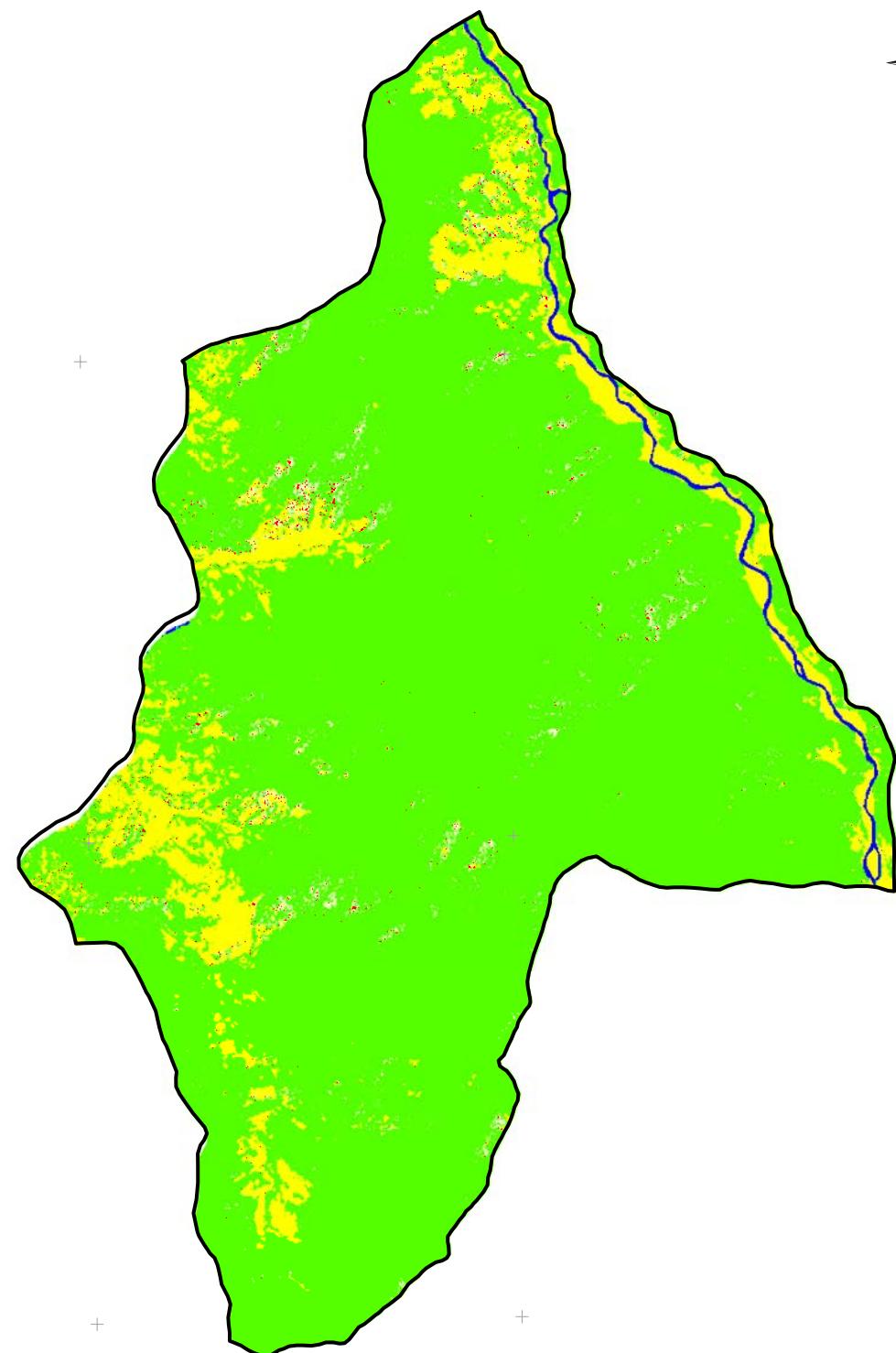
28°25'0"N

28°20'0"N

28°30'0"N

28°25'0"N

28°20'0"N



Total Geographical Area : 204.65 Sq.Km  
 Total Bamboo Area : 0.57 Sq.Km

0 1.25 2.5 5 7.5 10 Kilometers

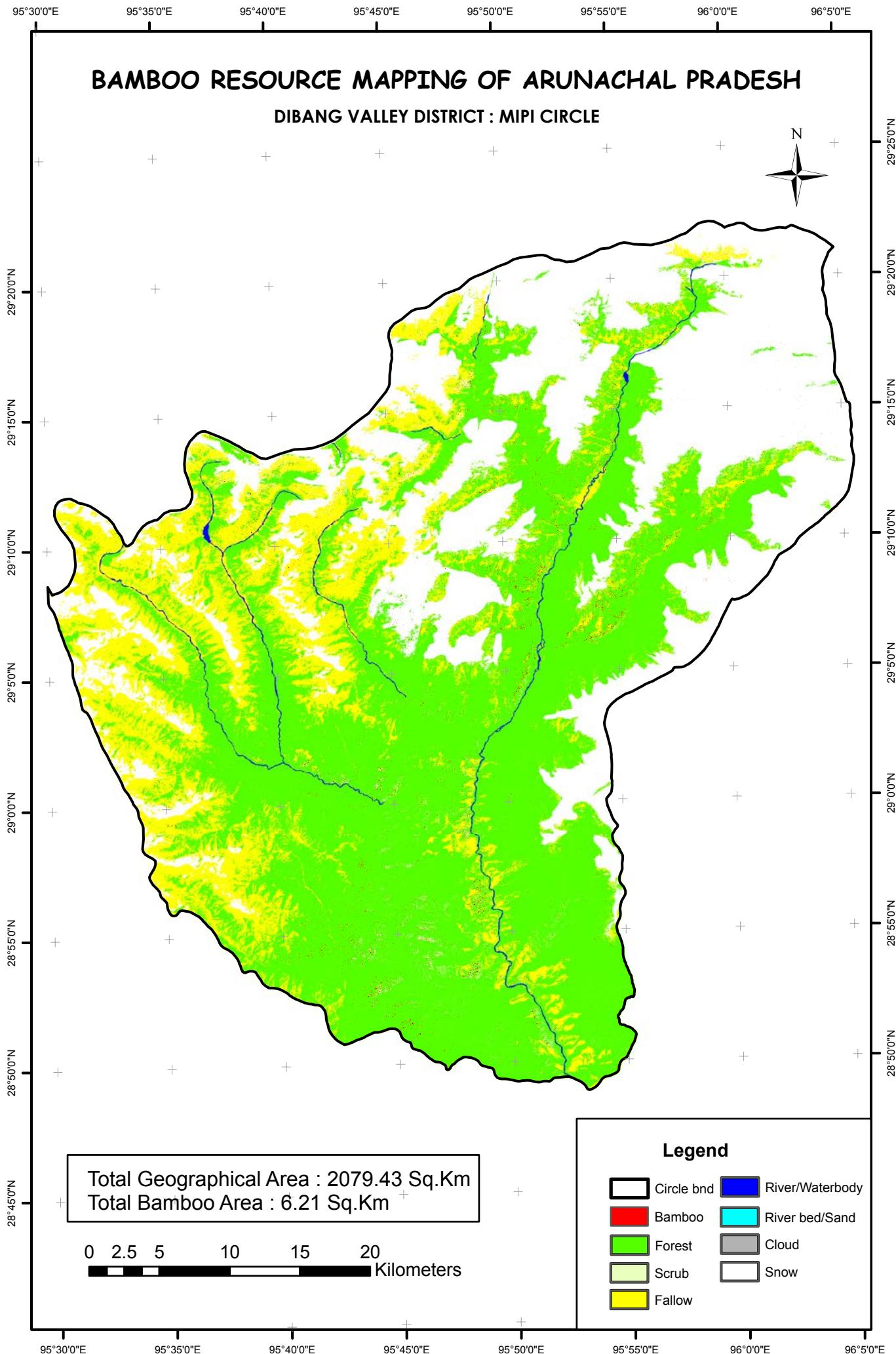
## Legend

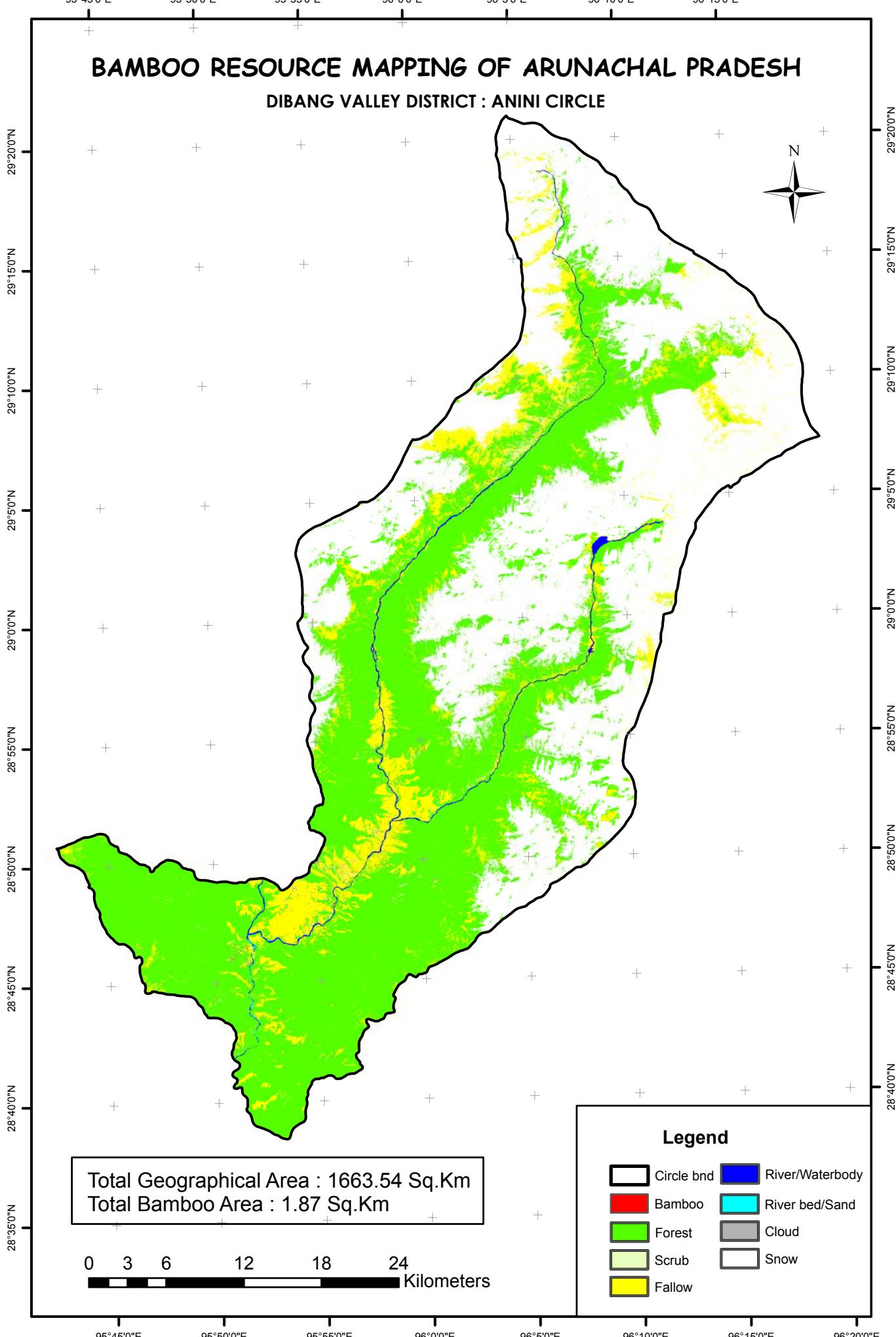
	Circle bnd		River/Waterbody
	Bamboo		River bed/Sand
	Forest		Cloud
	Scrub		Snow
	Fallow		

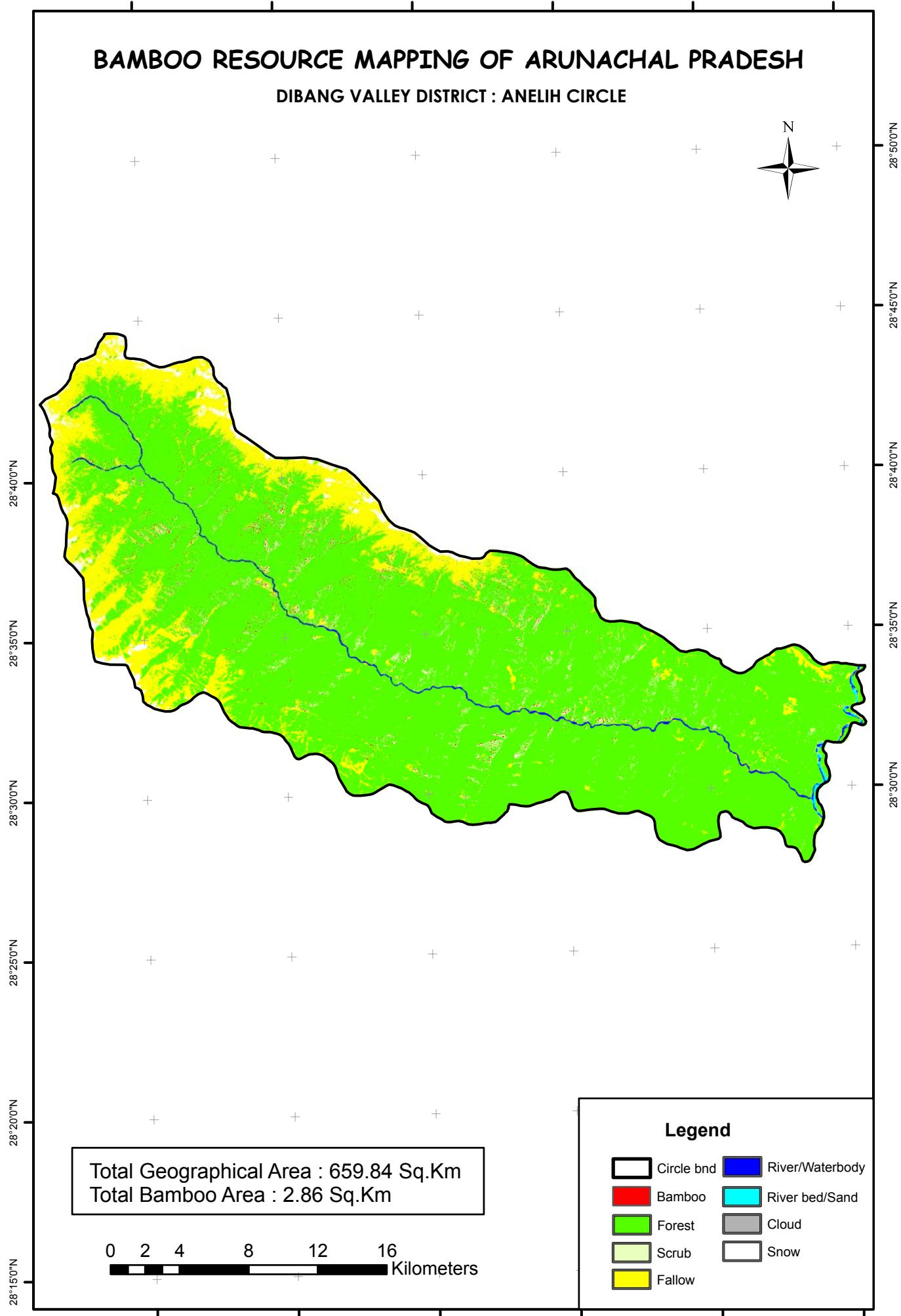
95°5'0"E

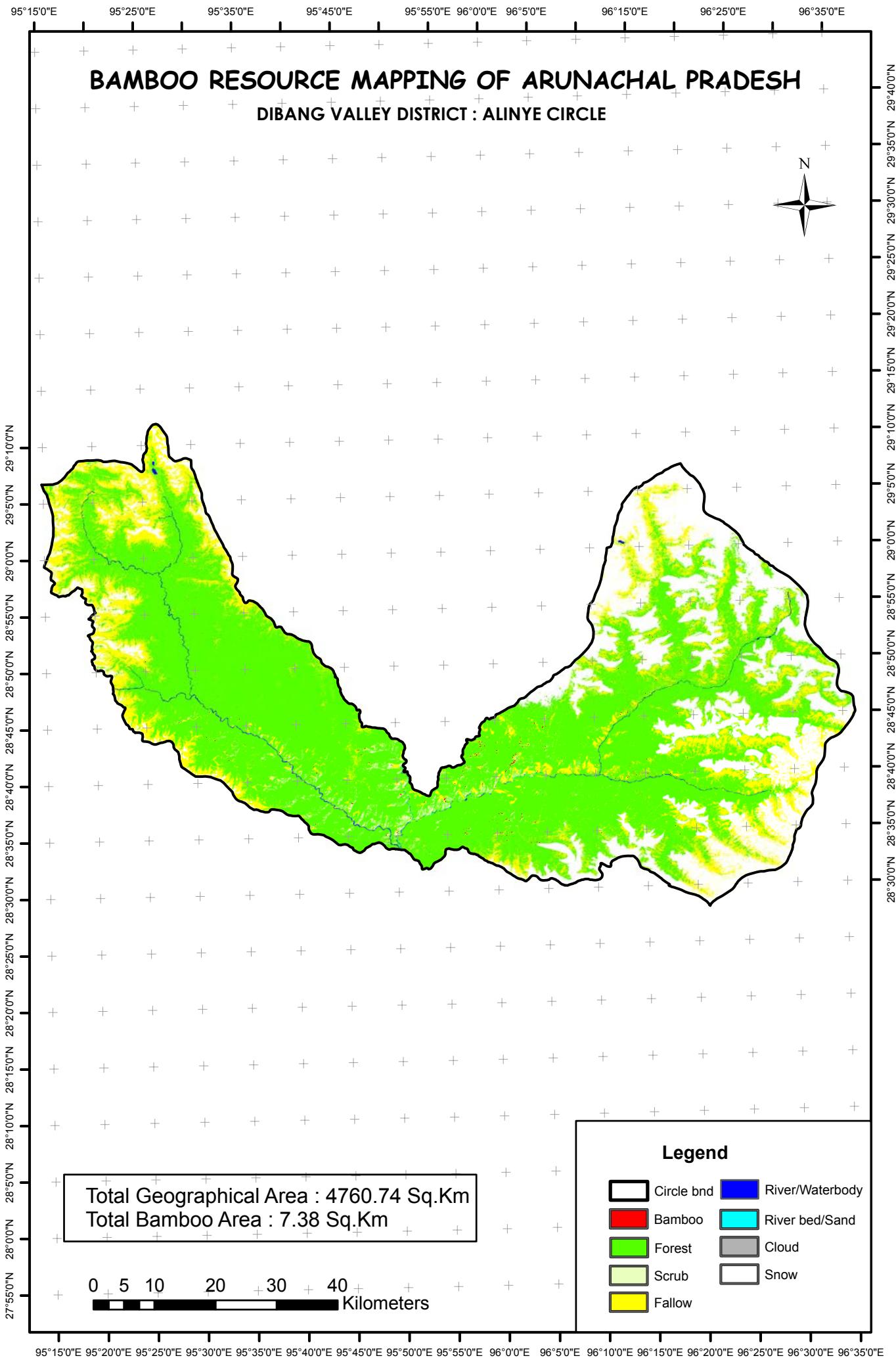
95°10'0"E

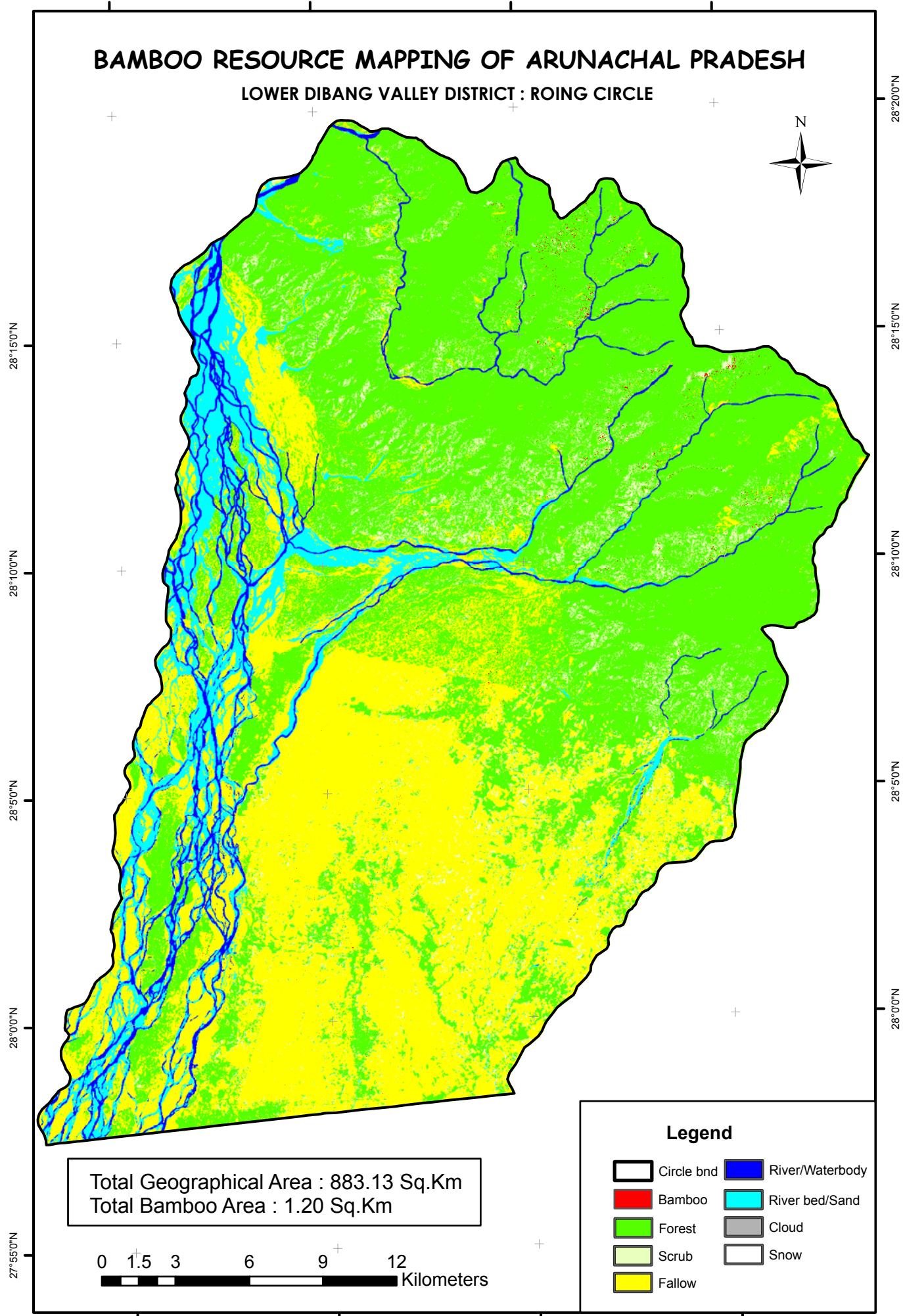
95°15'0"E

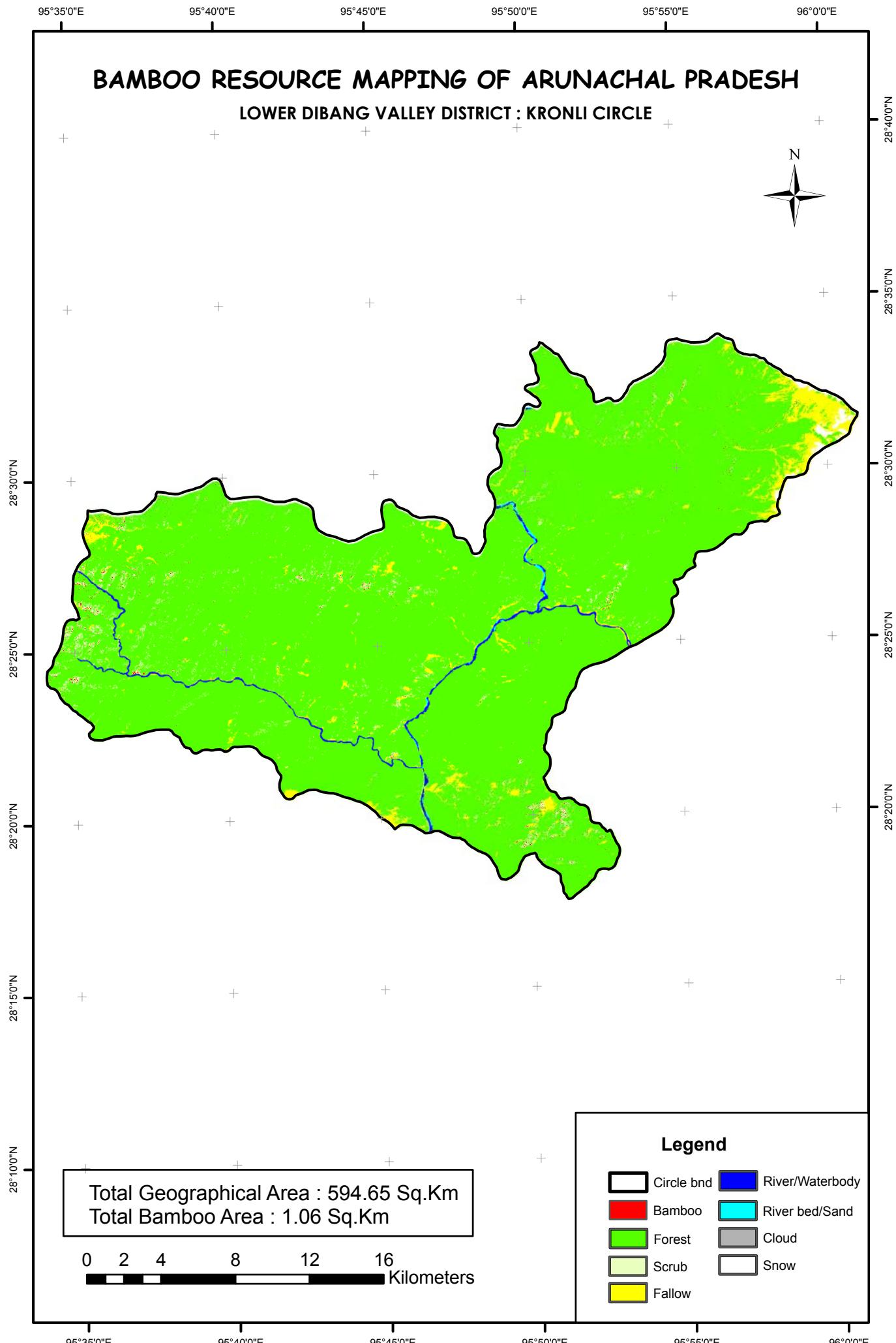










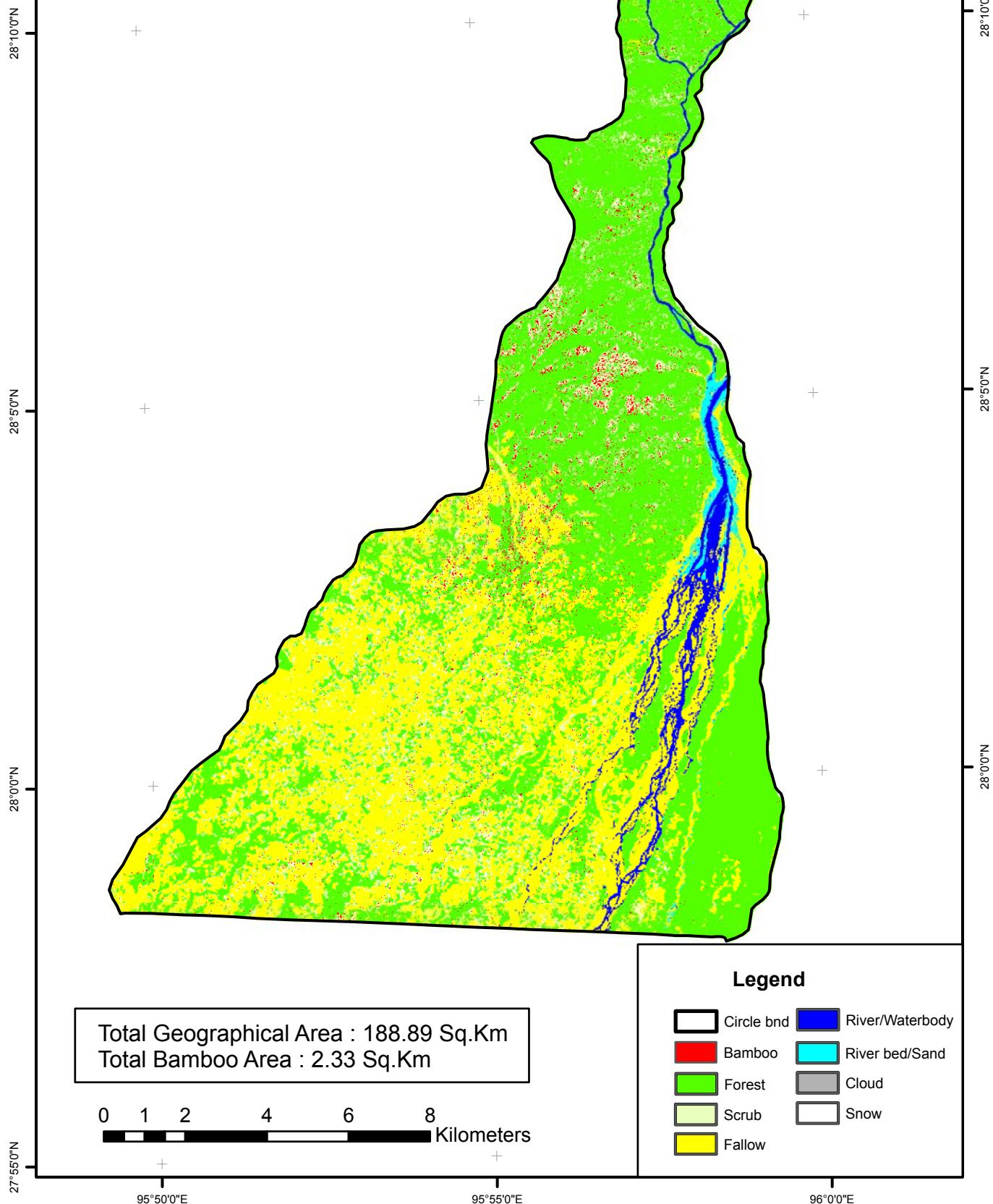


95°50'0"E

95°55'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## LOWER DIBANG VALLEY DISTRICT : KORONU CIRCLE



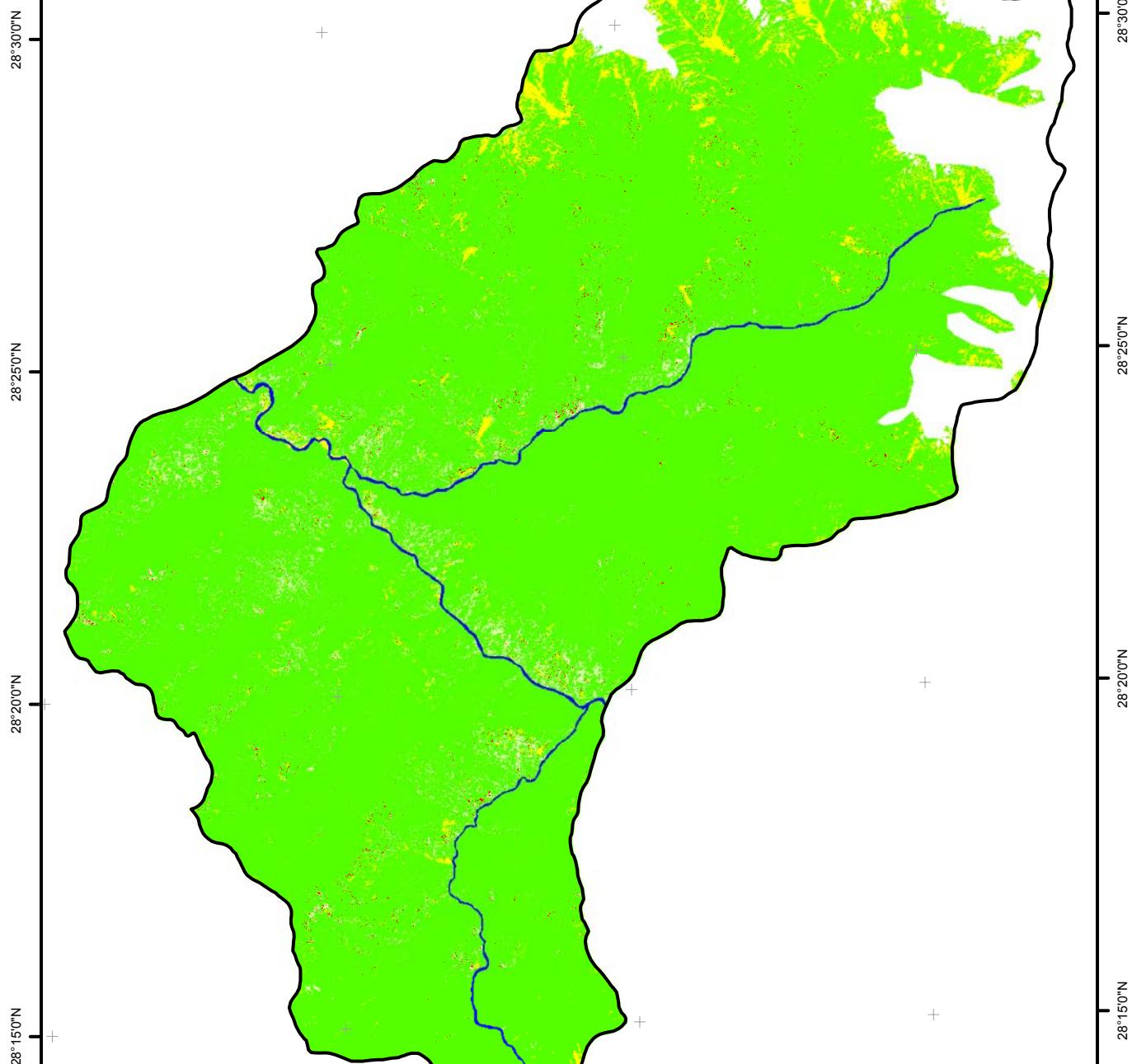
95°55'0"E

96°0'0"E

96°5'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## LOWER DIBANG VALLEY DISTRICT : HUNLI CIRCLE



Total Geographical Area : 475.36 Sq.Km  
 Total Bamboo Area : 1.11 Sq.Km

0 1.25 2.5 5 7.5 10 Kilometers

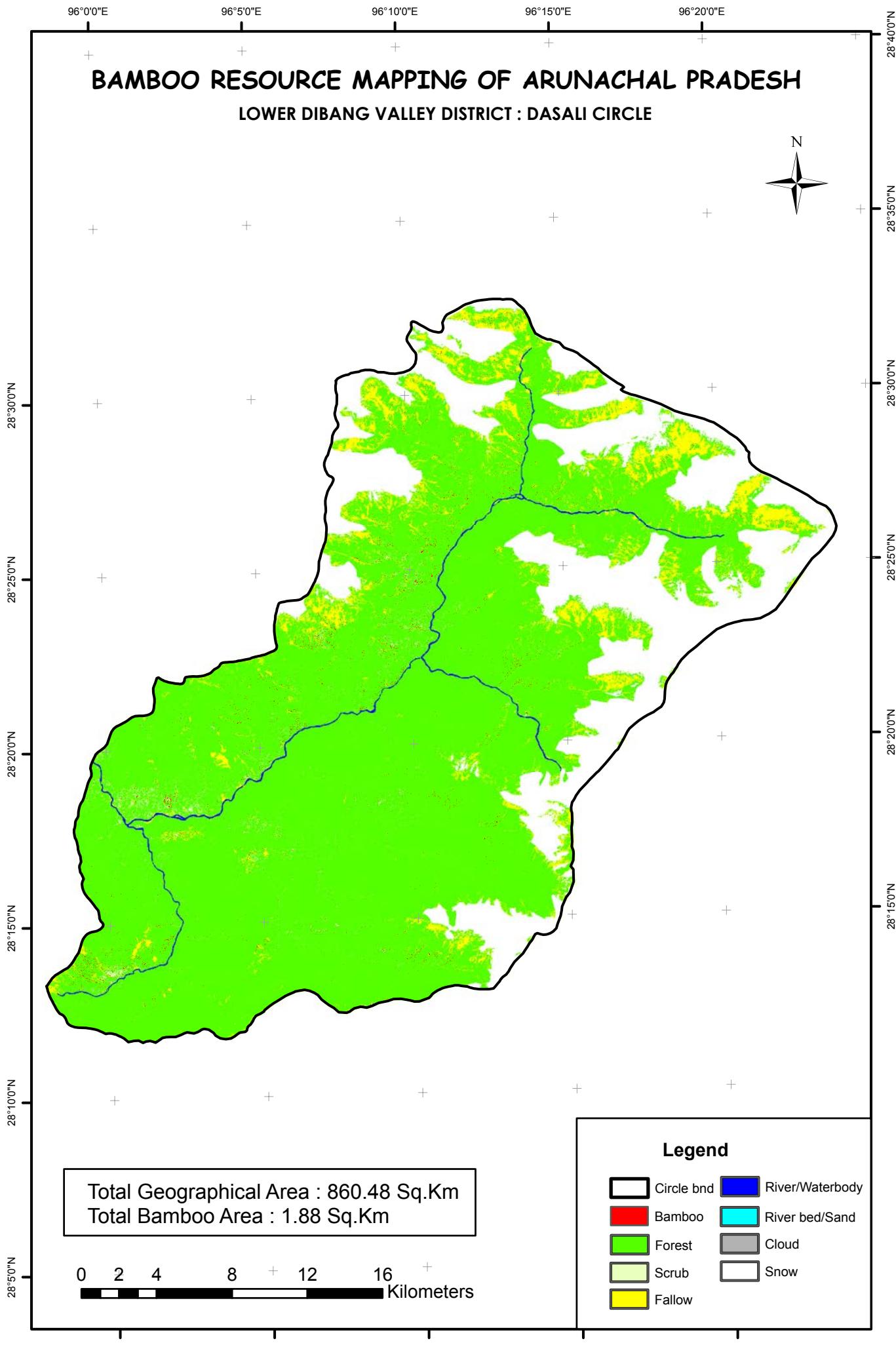
### Legend

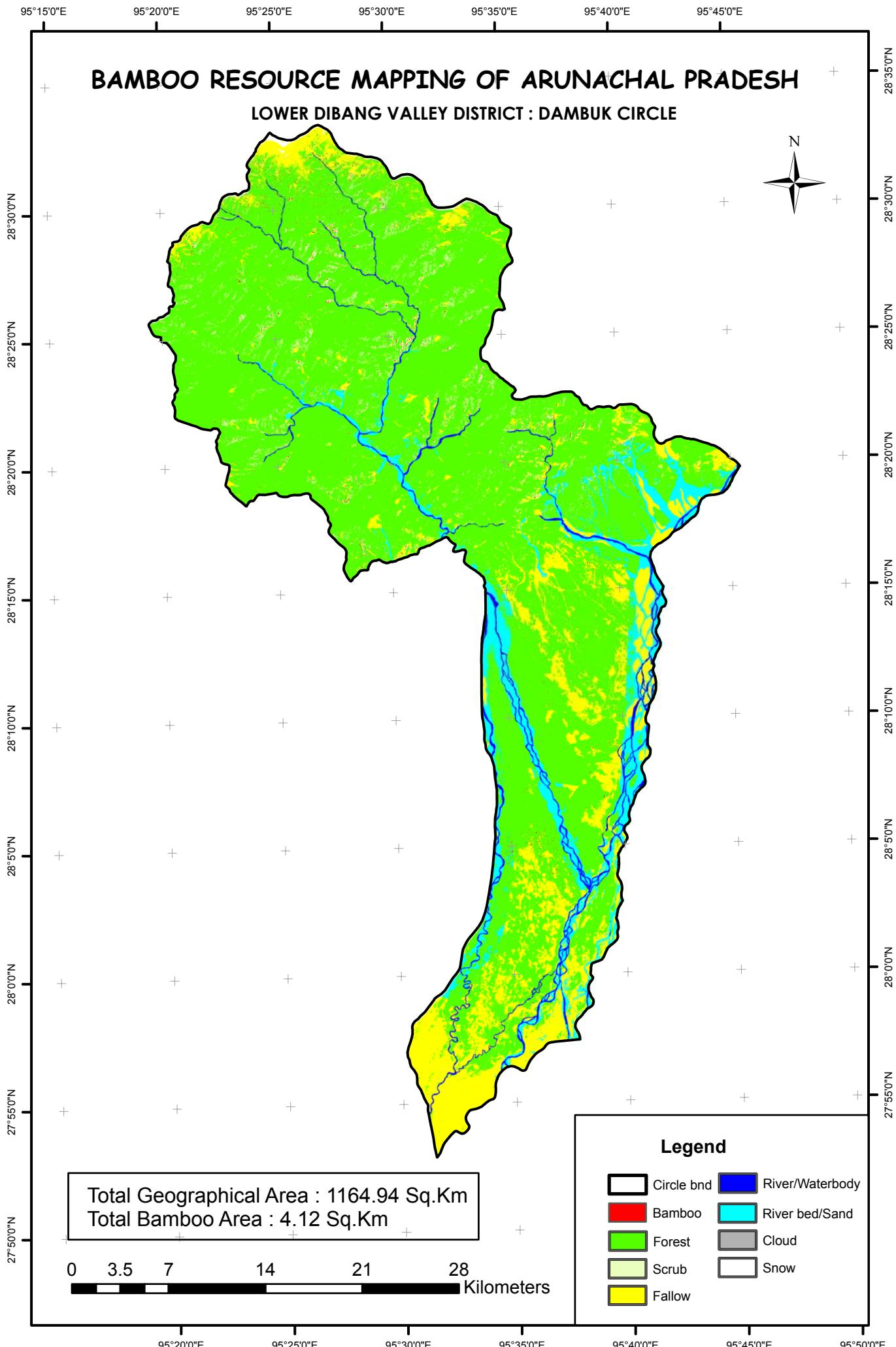
Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

95°55'0"E

96°0'0"E

96°5'0"E

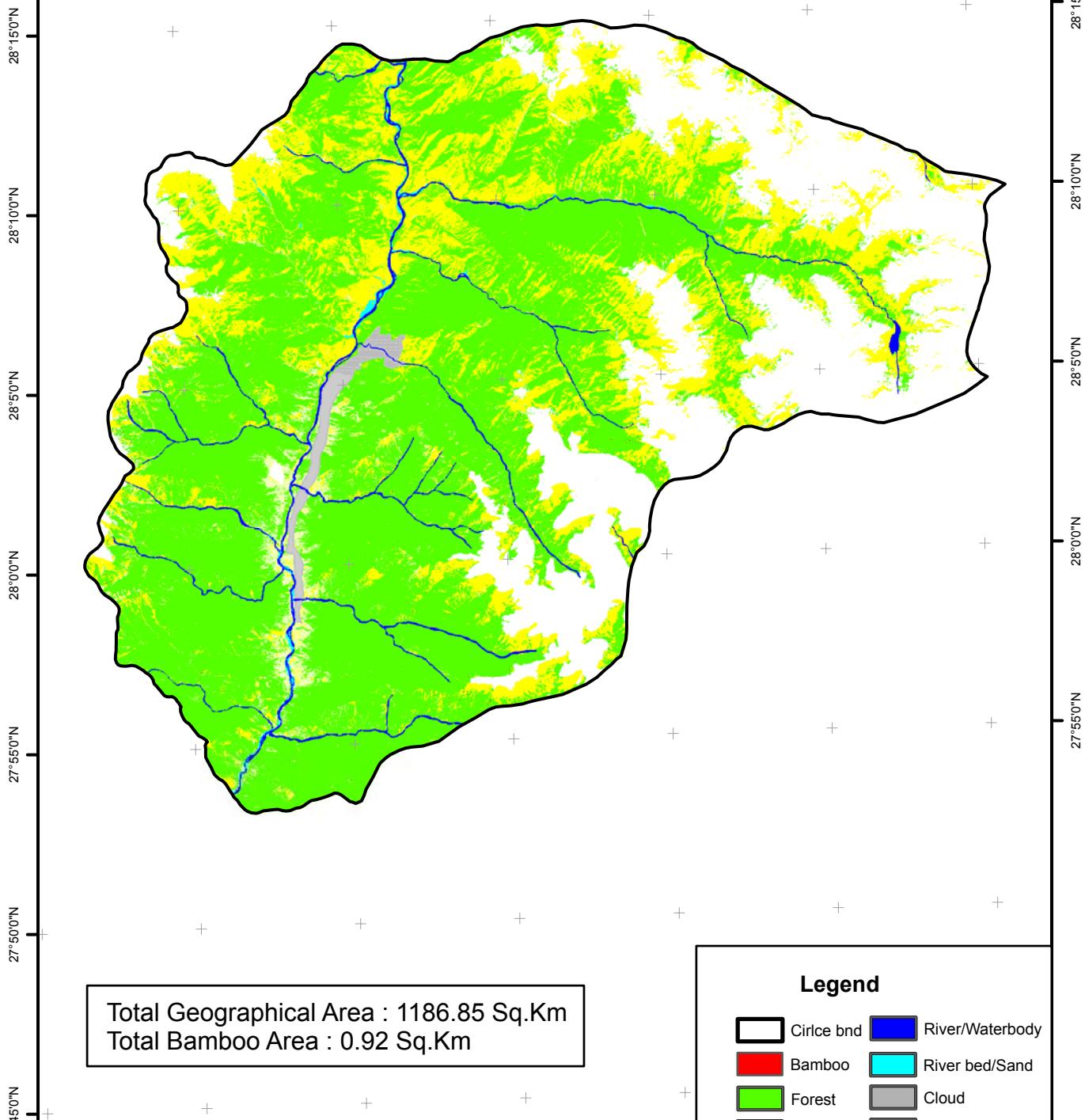


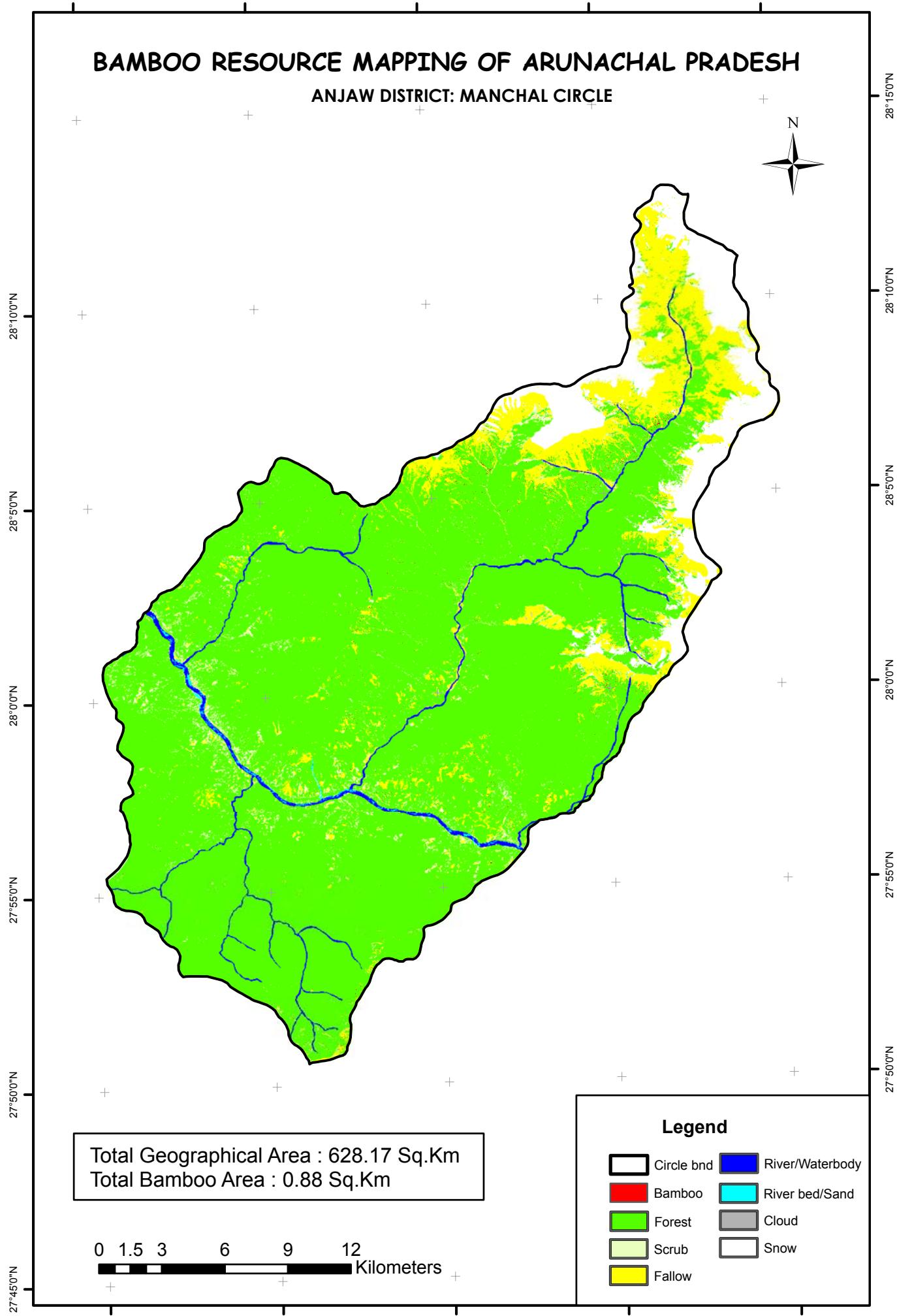


96°55'0"E 97°0'0"E 97°5'0"E 97°10'0"E 97°15'0"E 97°20'0"E  
28°25'0"N

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

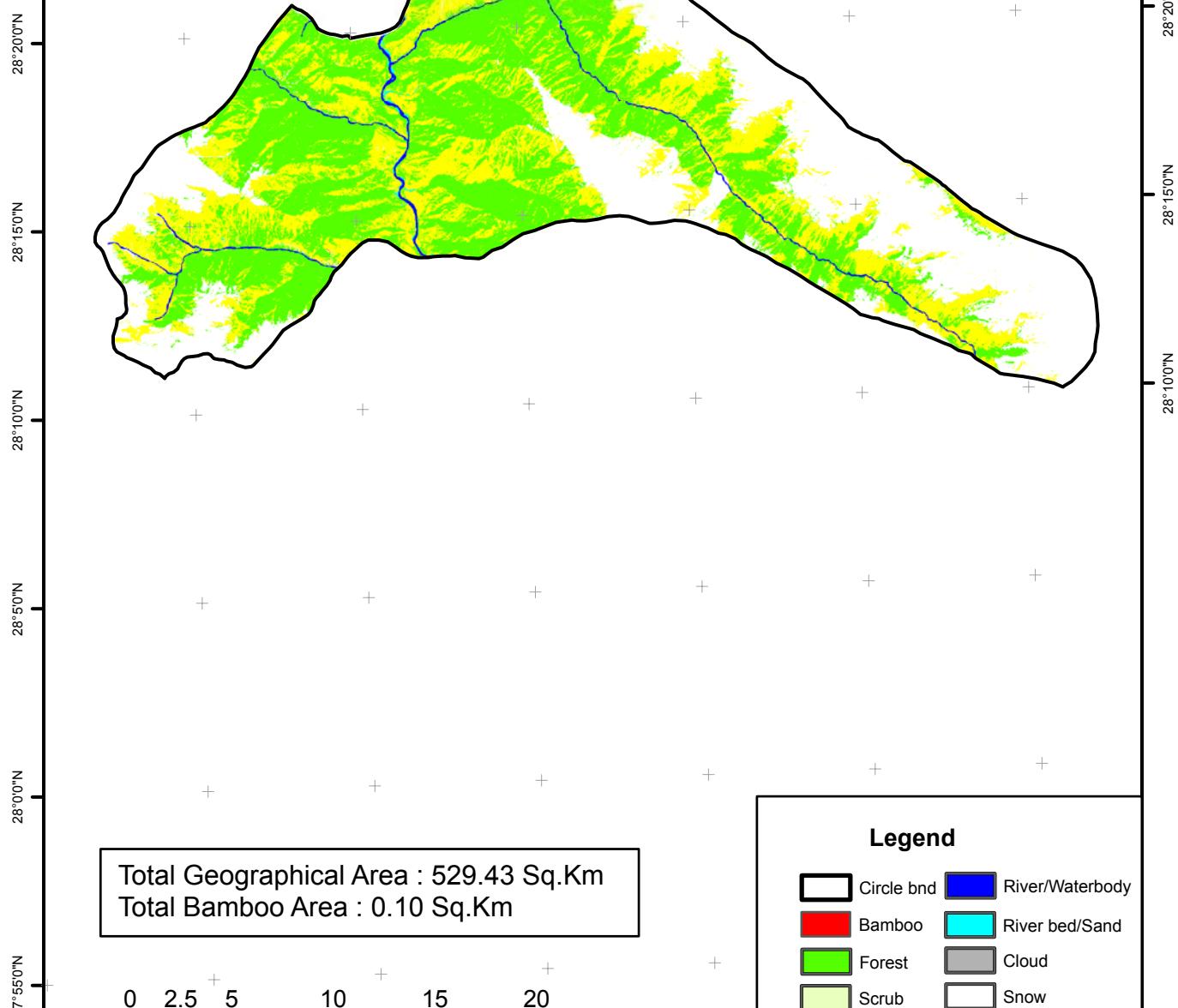
## ANJAW DISTRICT: WALONG CIRCLE





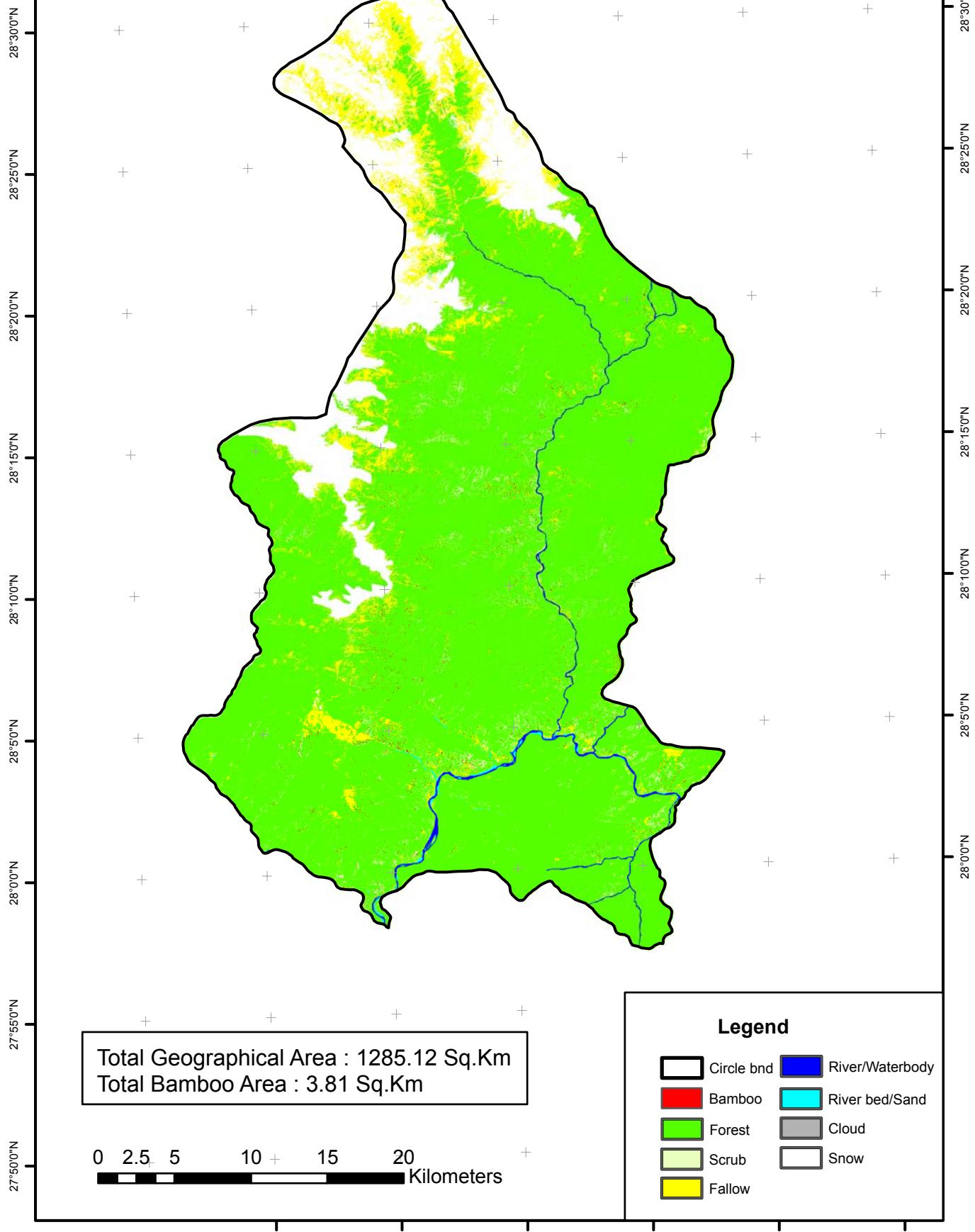
# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

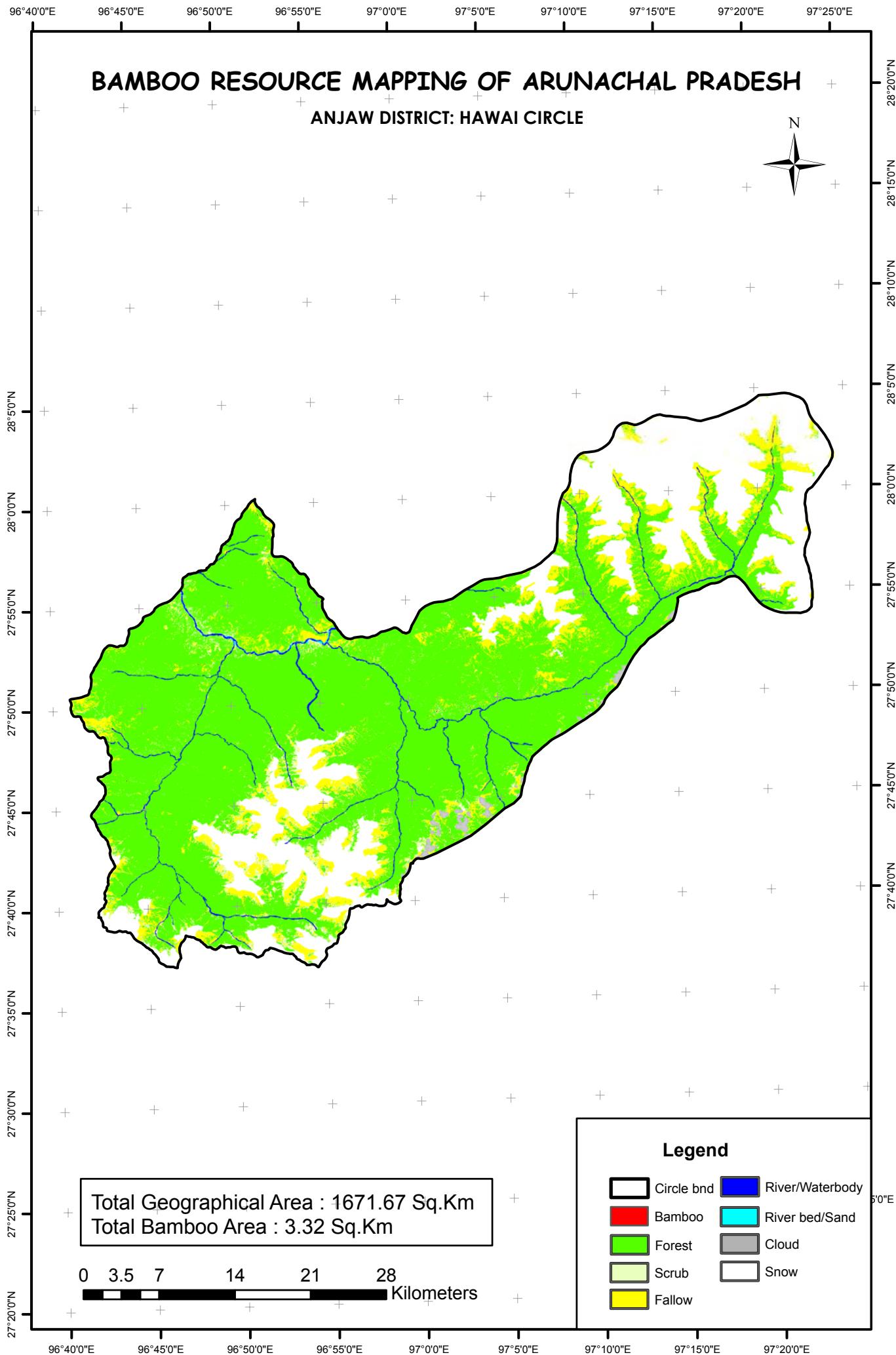
ANJAW DISTRICT: KIBITHOO CIRCLE



# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

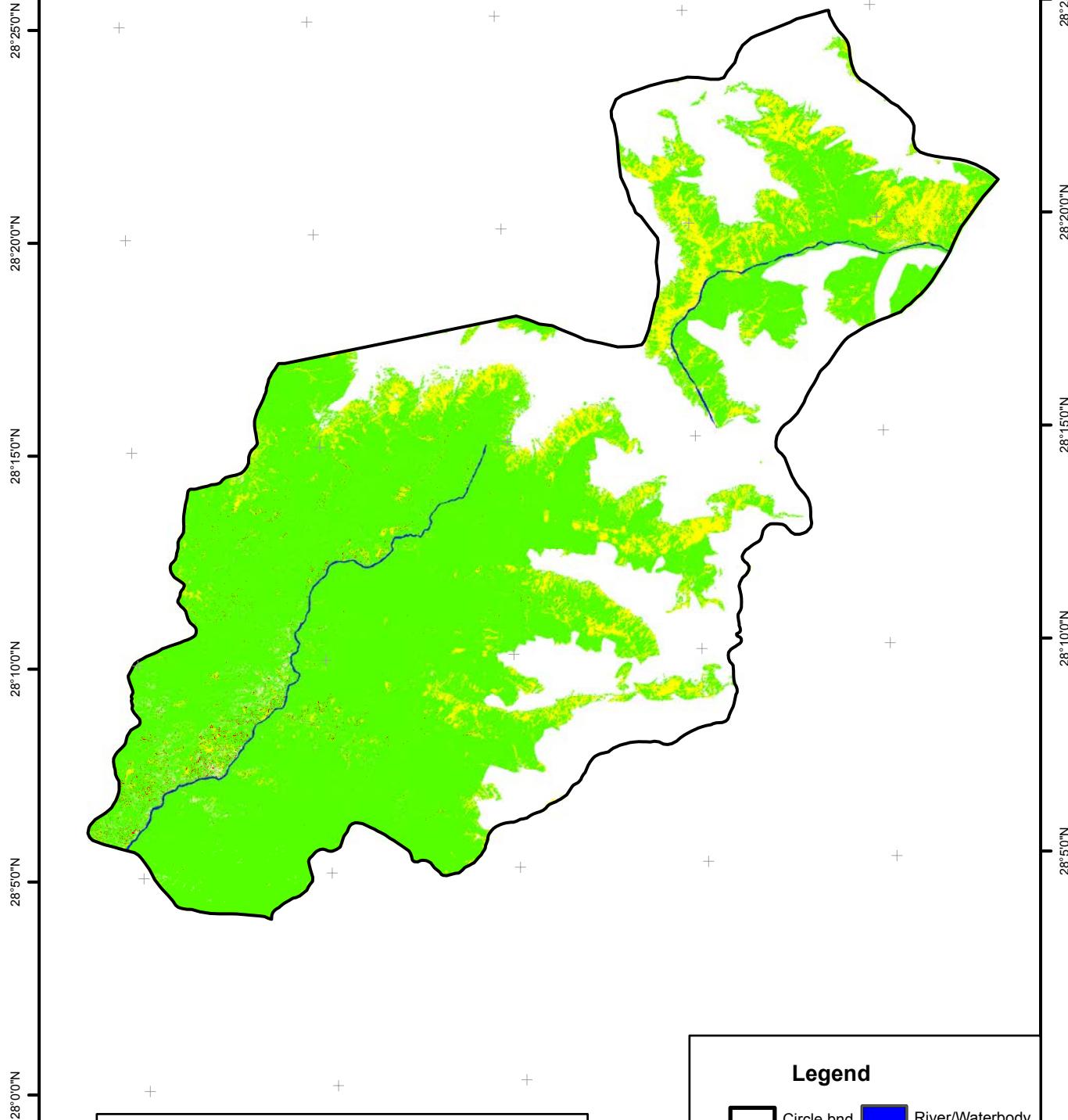
ANJAW DISTRICT: HAYULIANG CIRCLE





# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## ANJAW DISTRICT: GOILIANG CIRCLE



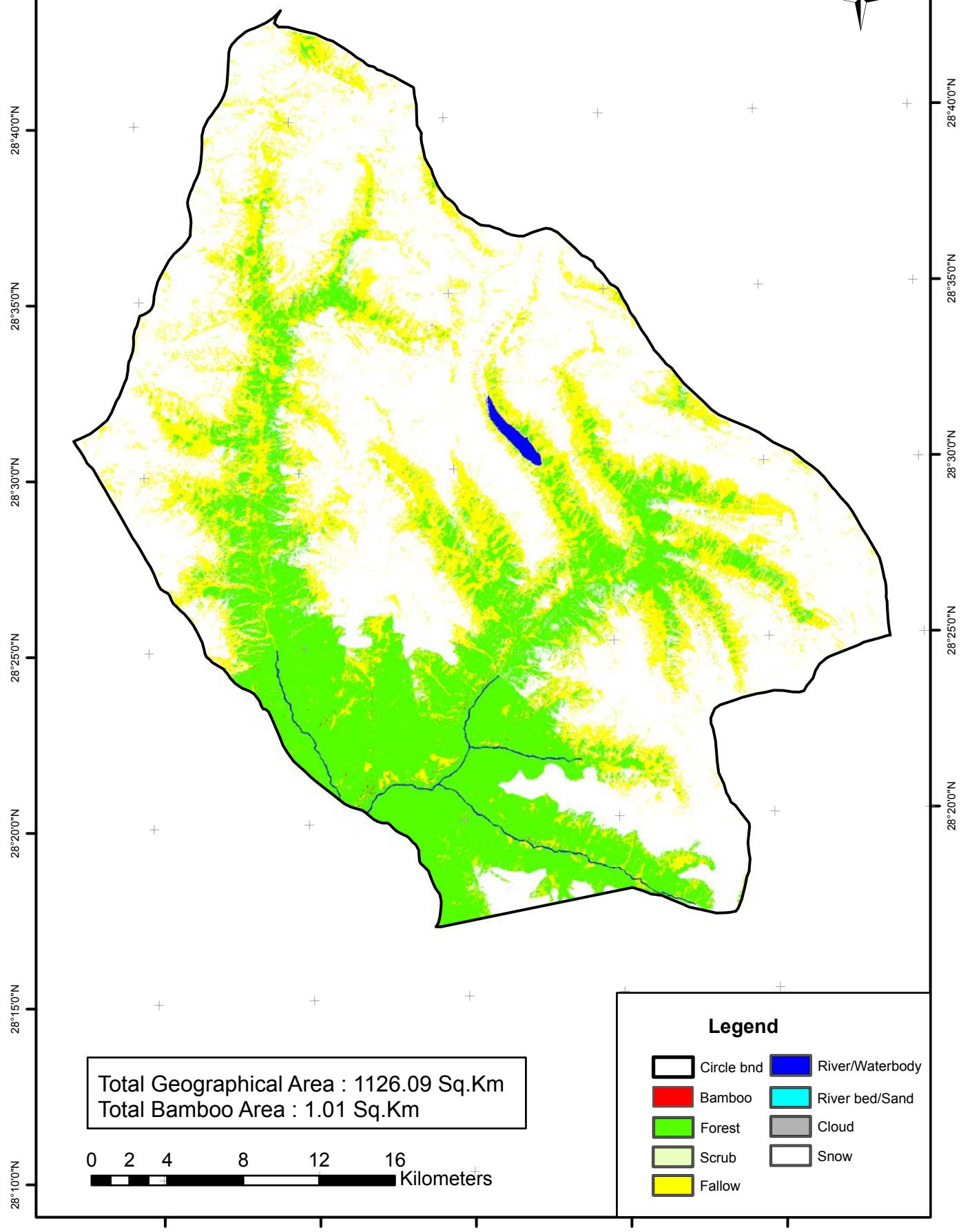
0 2 4 8 12 16 Kilometers

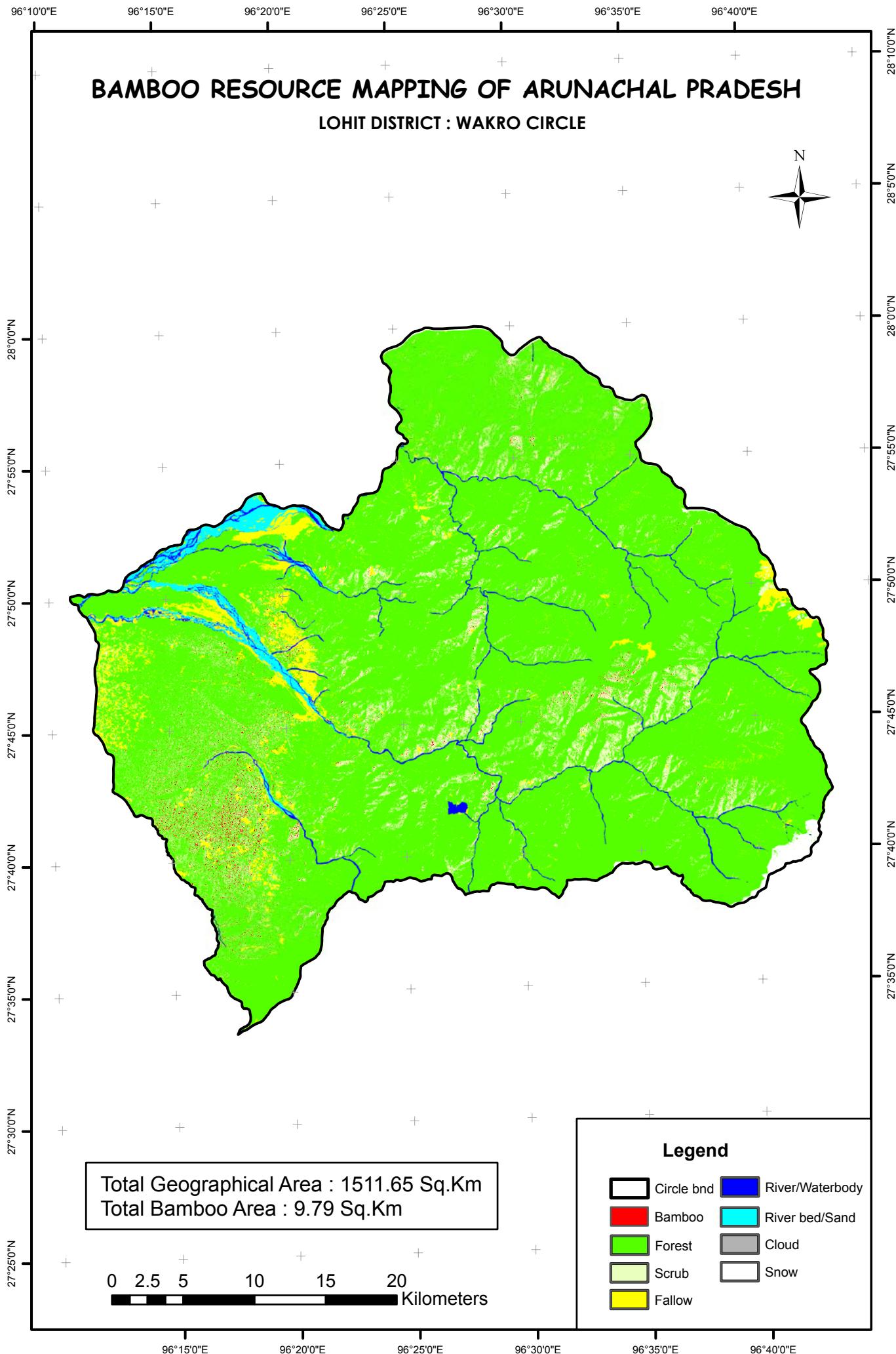
### Legend

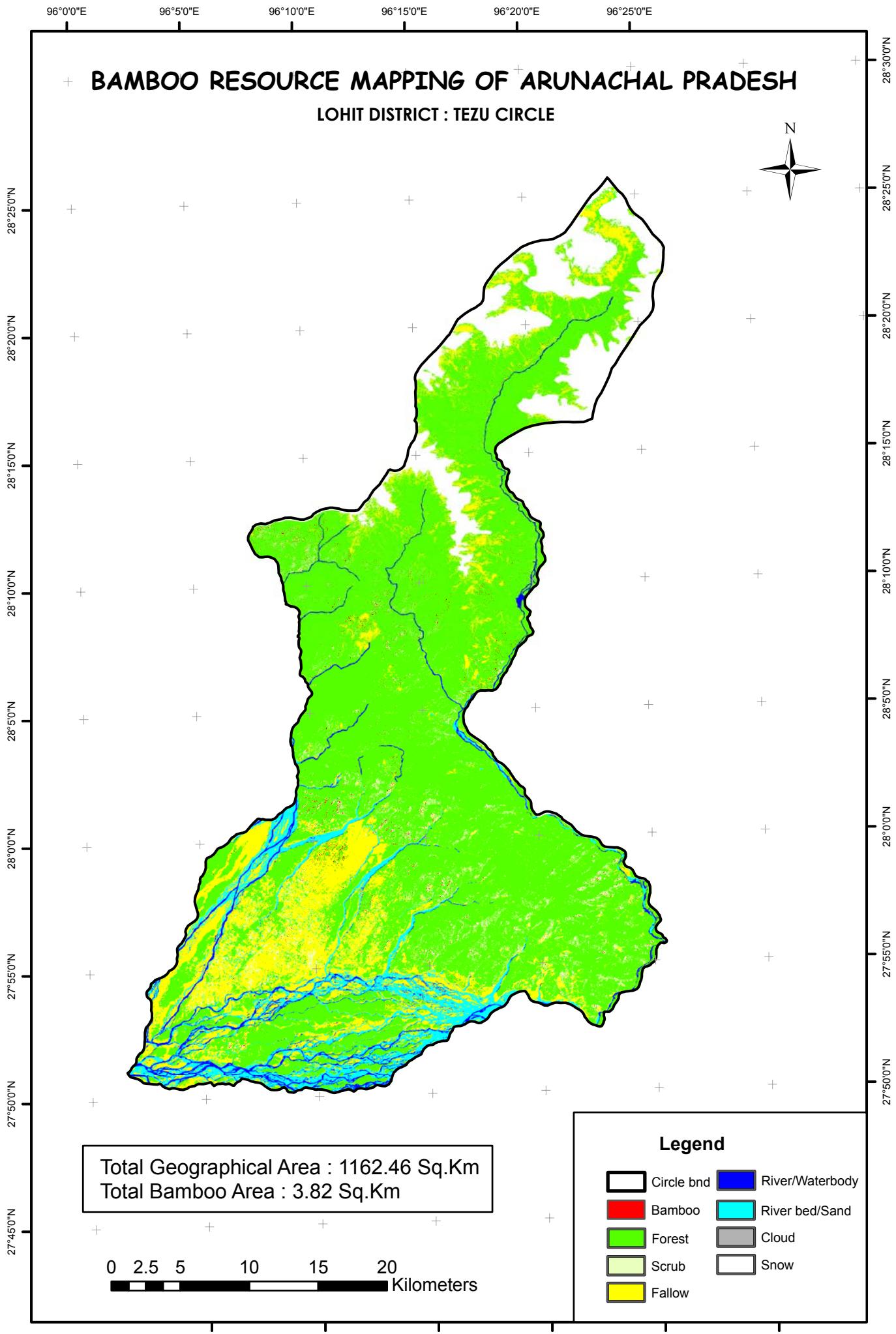
Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## ANJAW DISTRICT: CHANGLAGAON CIRCLE

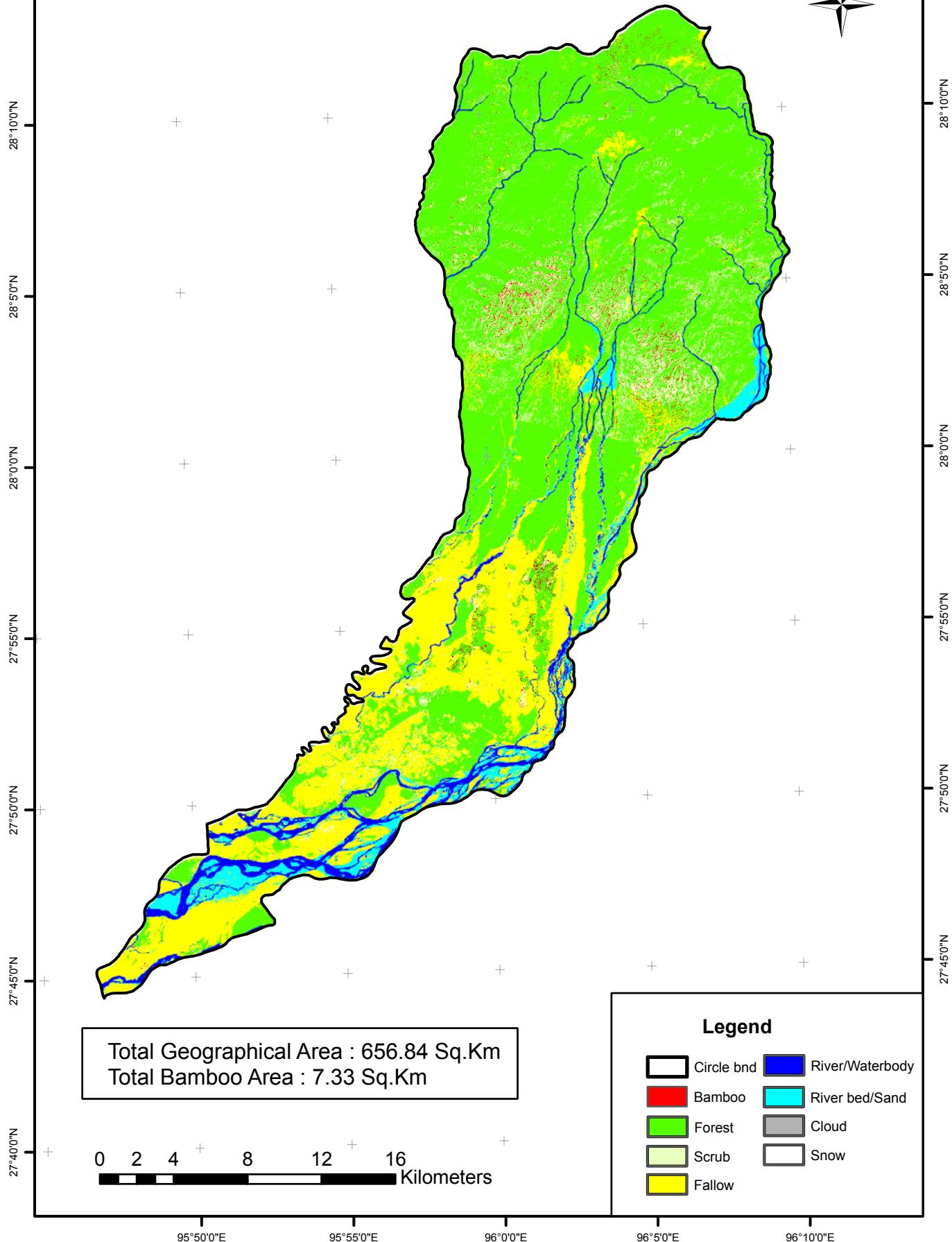






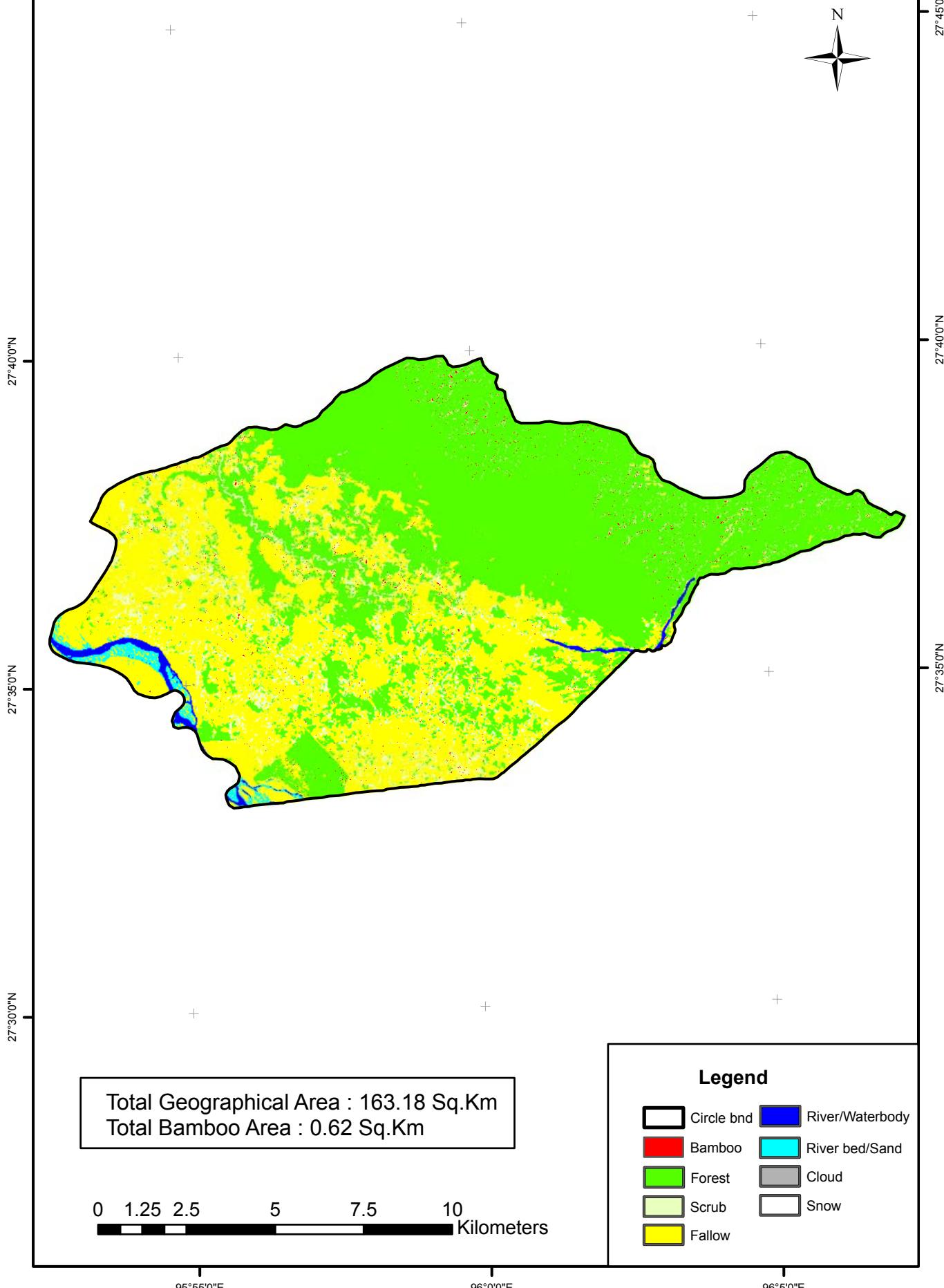
# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## LOHIT DISTRICT : SANPURA CIRCLE



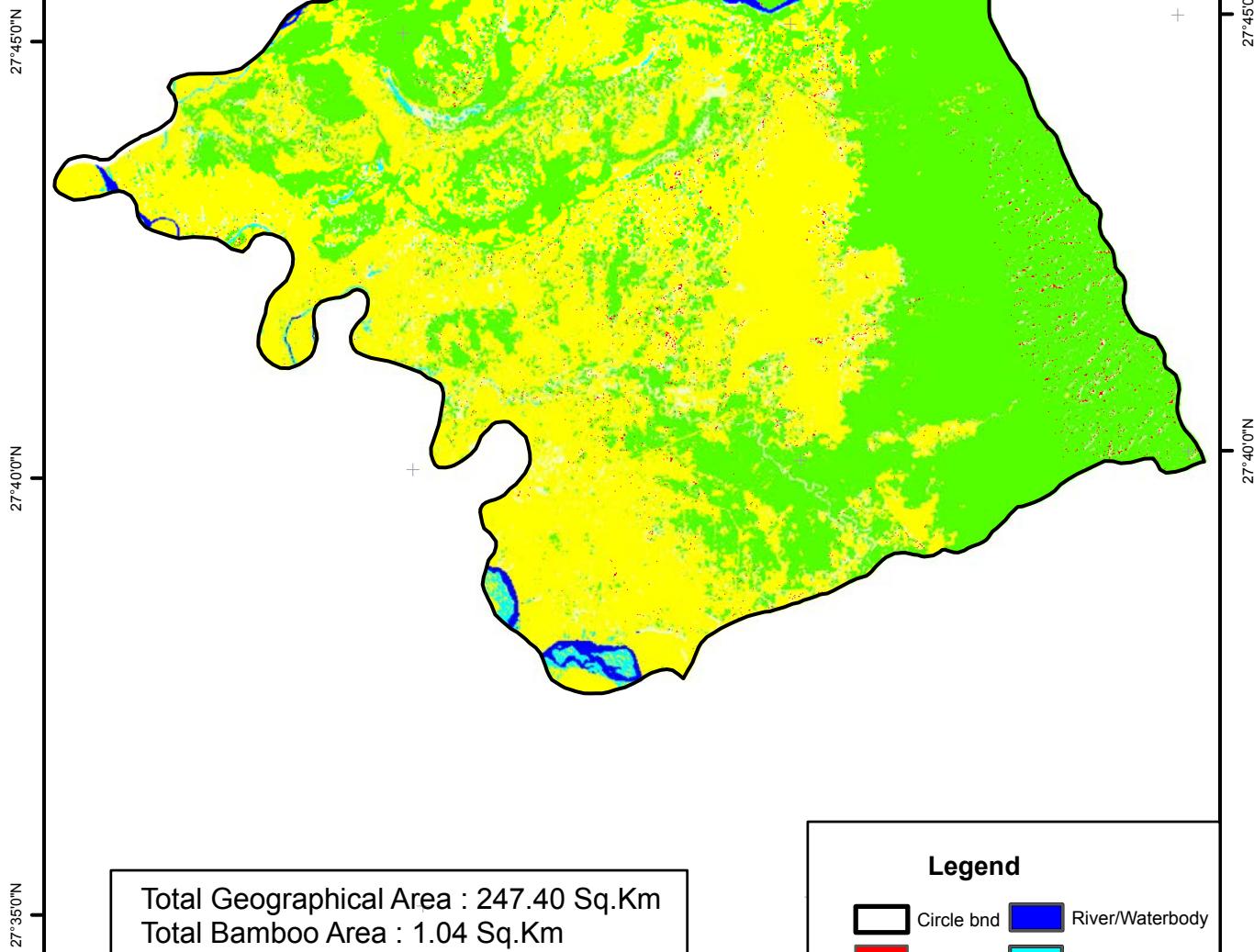
# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## LOHIT DISTRICT: PAYONG CIRCLE



# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## LOHIT DISTRICT: NAMSAI CIRCLE

N  
27°50'N

0 1.25 2.5 5 7.5 10 Kilometers

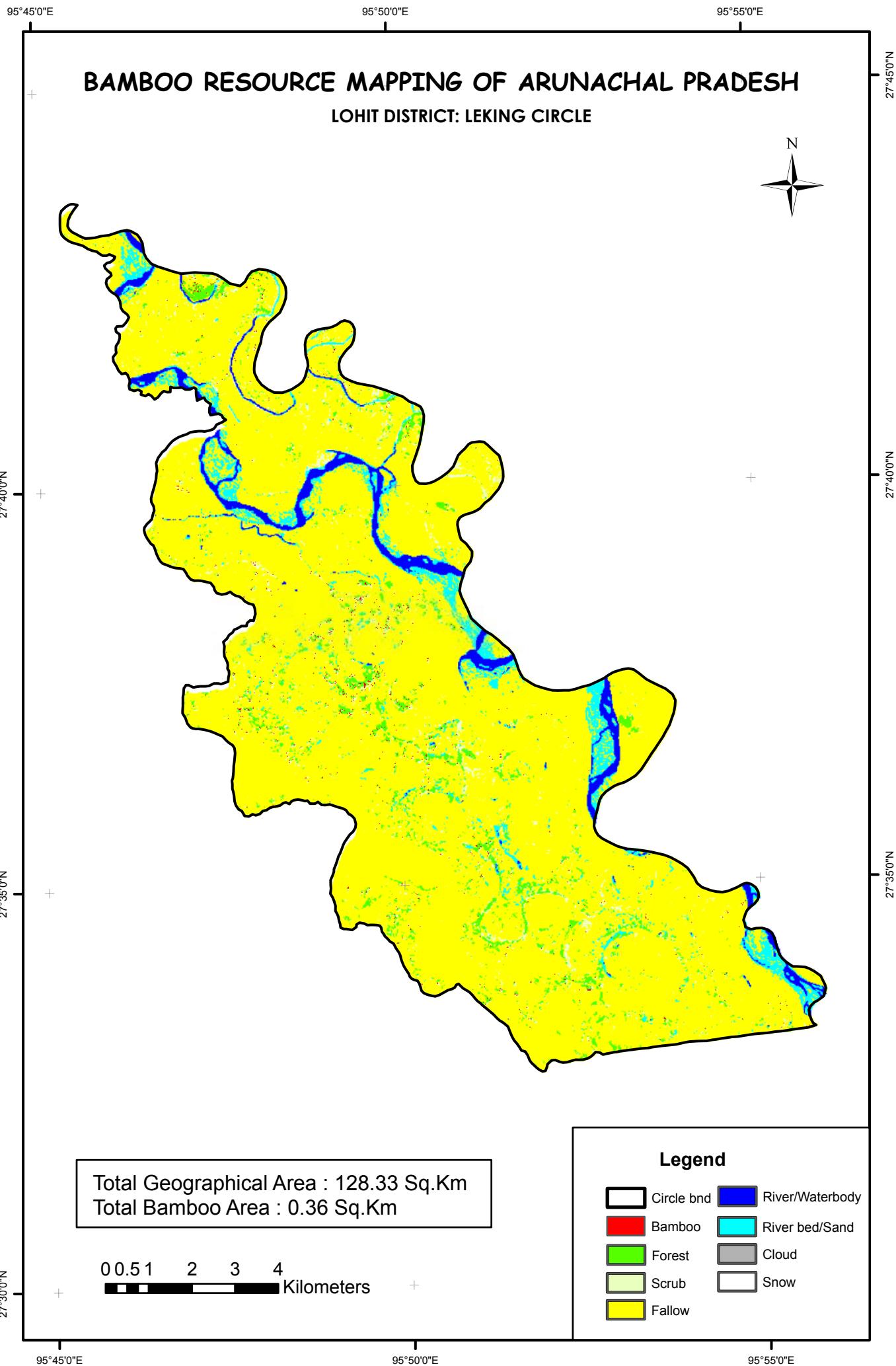
### Legend

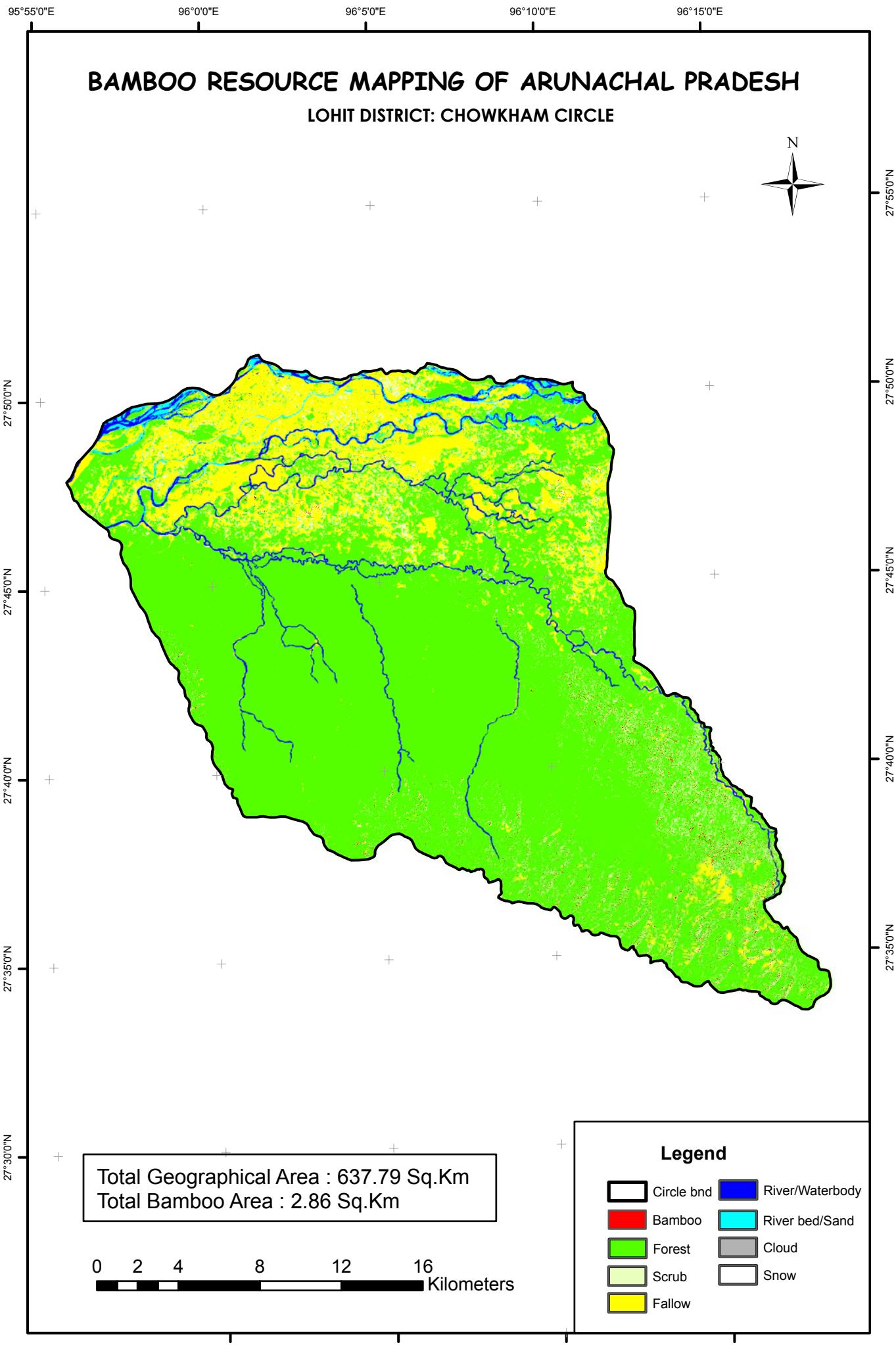
Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

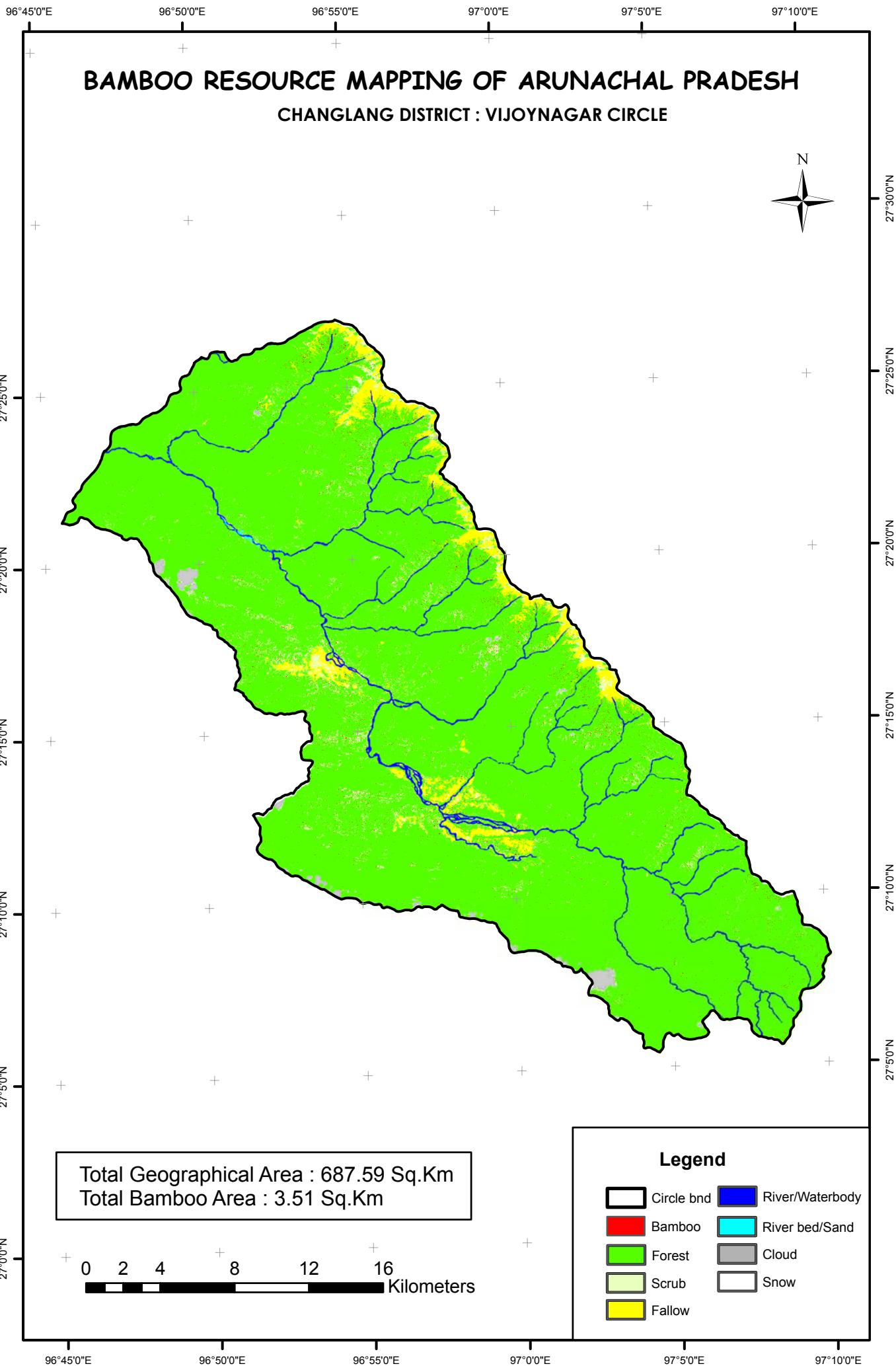
95°50'0"E

95°55'0"E

96°0'0"E







95°40'0"E

95°45'0"E

95°50'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

CHANGLANG DISTRICT : NAMTAK CIRCLE

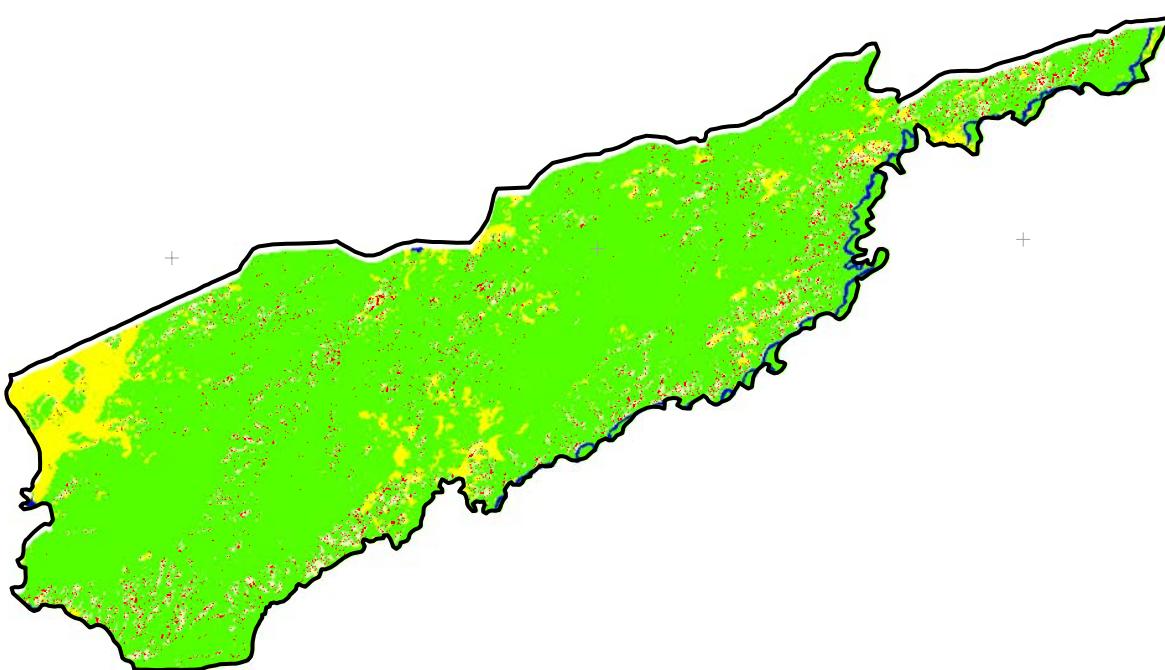


27°20'0"N

27°15'0"N

27°10'0"N

27°5'0"N



Total Geographical Area : 100.61 Sq.Km  
 Total Bamboo Area : 1.94 Sq.Km

0 1 2 4 6 8 Kilometers

## Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

27°5'0"N

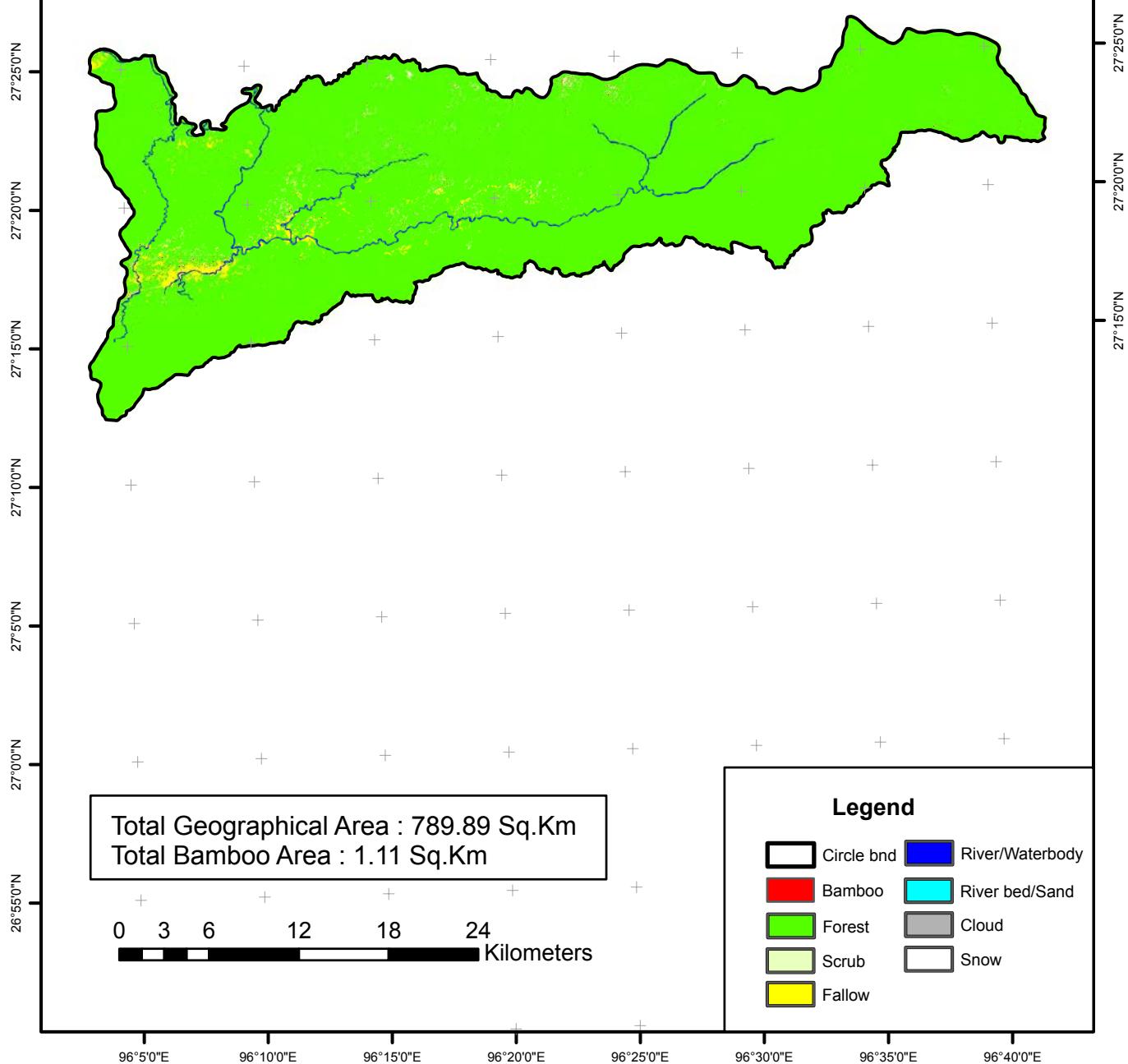
95°40'0"E

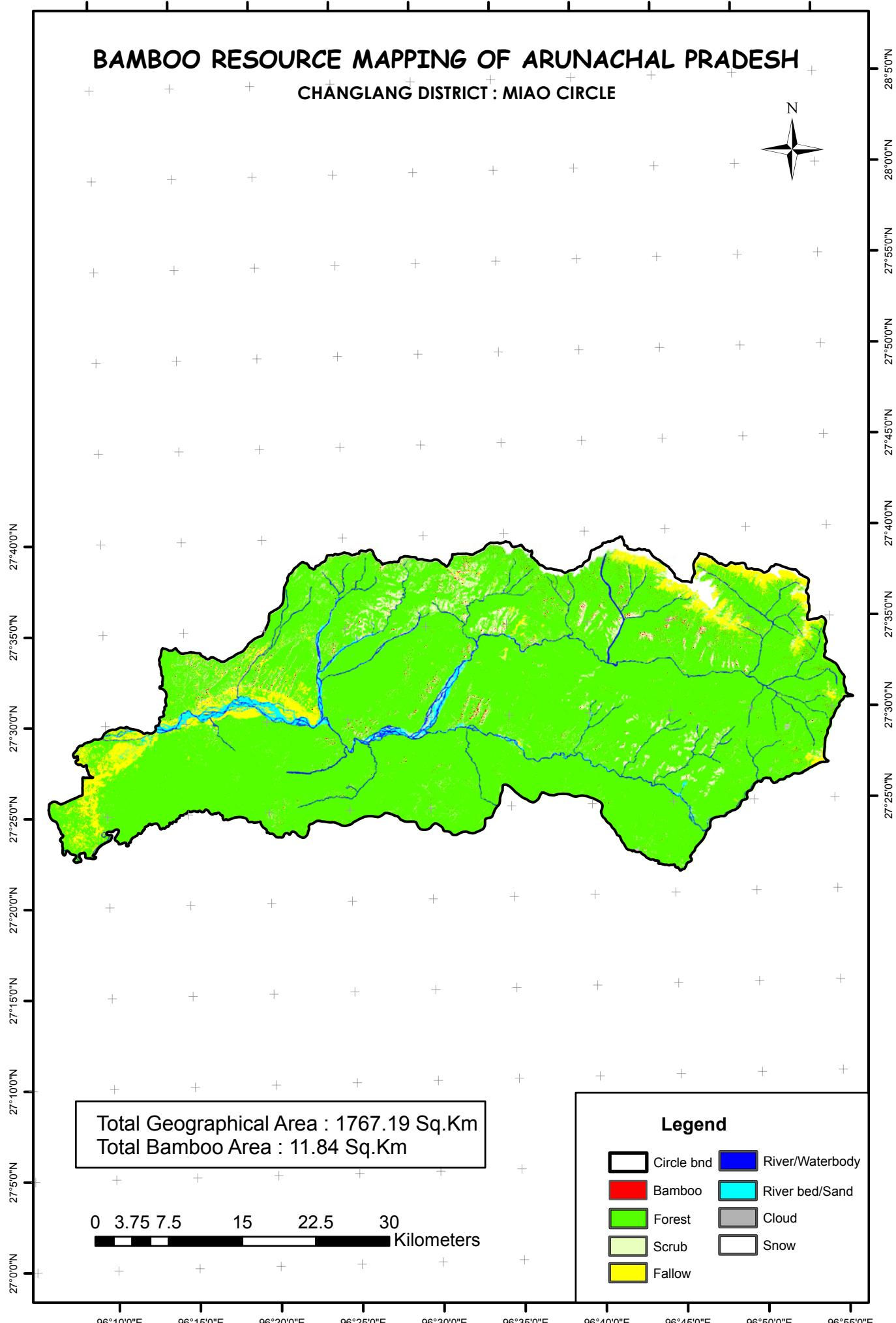
95°45'0"E

95°50'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

CHANGLANG DISTRICT: NAMPONG CIRCLE





# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## CHANGLANG DISTRICT : MANMAO CIRCLE

**Legend**

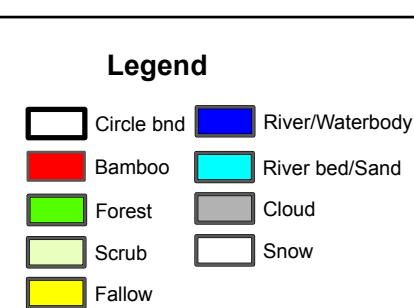
- Circle bnd
- River/Waterbody
- Bamboo
- River bed/Sand
- Forest
- Cloud
- Scrub
- Snow
- Fallow

Total Geographical Area : 281.15 Sq.Km  
Total Bamboo Area : 1.94 Sq.Km

0 1.25 2.5 5 7.5 10 Kilometers

Total Geographical Area : 281.15 Sq.Km  
Total Bamboo Area : 1.94 Sq.Km

A scale bar representing distance in kilometers. It features a horizontal line with tick marks at 0, 1.25, 2.5, 5, 7.5, and 10. The segments between 0-1.25, 1.25-2.5, 2.5-5, 5-7.5, and 7.5-10 are each divided into four equal parts by smaller internal tick marks. The word "Kilometers" is written in black text to the right of the scale bar.



The legend includes:  
 - Forest (dark green)  
 - Cloud (grey)  
 - Scrub (light green)  
 - Snow (white)  
 - Farmland (yellow)  
 A scale bar shows distances from 0 to 10 Kilometers, with a north arrow (+) and a coordinate label 27°0'0"N.

PROBLEMS FOR SELF-STUDY AND ATTACHMENT TO TEACHING

PREPARED BY : NESAC DOS /UMIAMS-Z93103 MEGHALAYA

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## CHANGLANG DISTRICT : KHARSANG CIRCLE



27°35'N

27°30'N

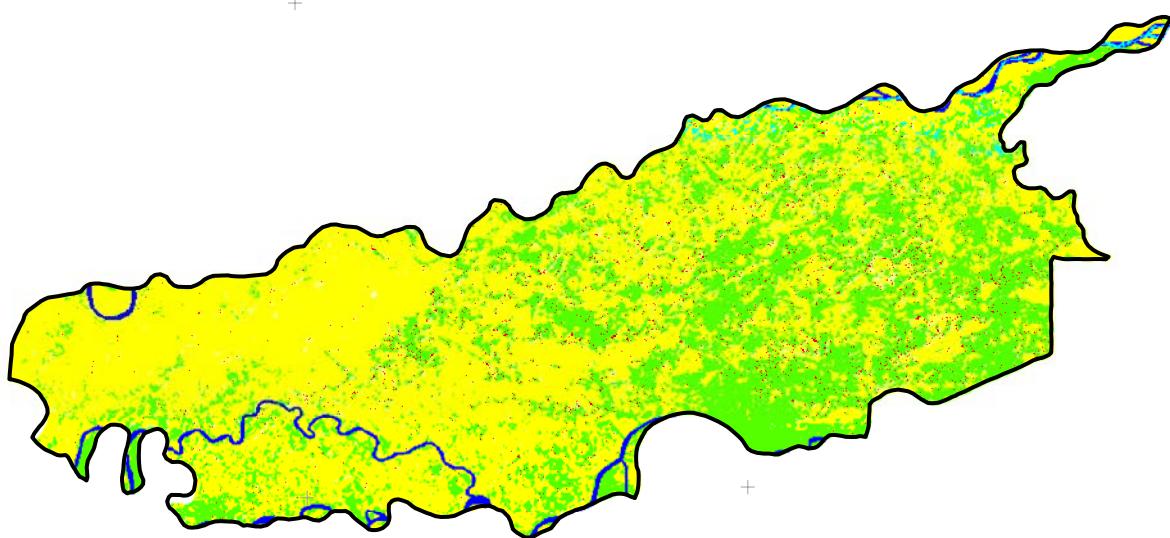
27°25'N

27°20'N

96°0'0"E

96°5'0"E

96°10'0"E



27°20'0"N

Total Geographical Area : 99.69 Sq.Km  
Total Bamboo Area : 1.05 Sq.Km

0 1 2 4 6 8 Kilometers

### Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

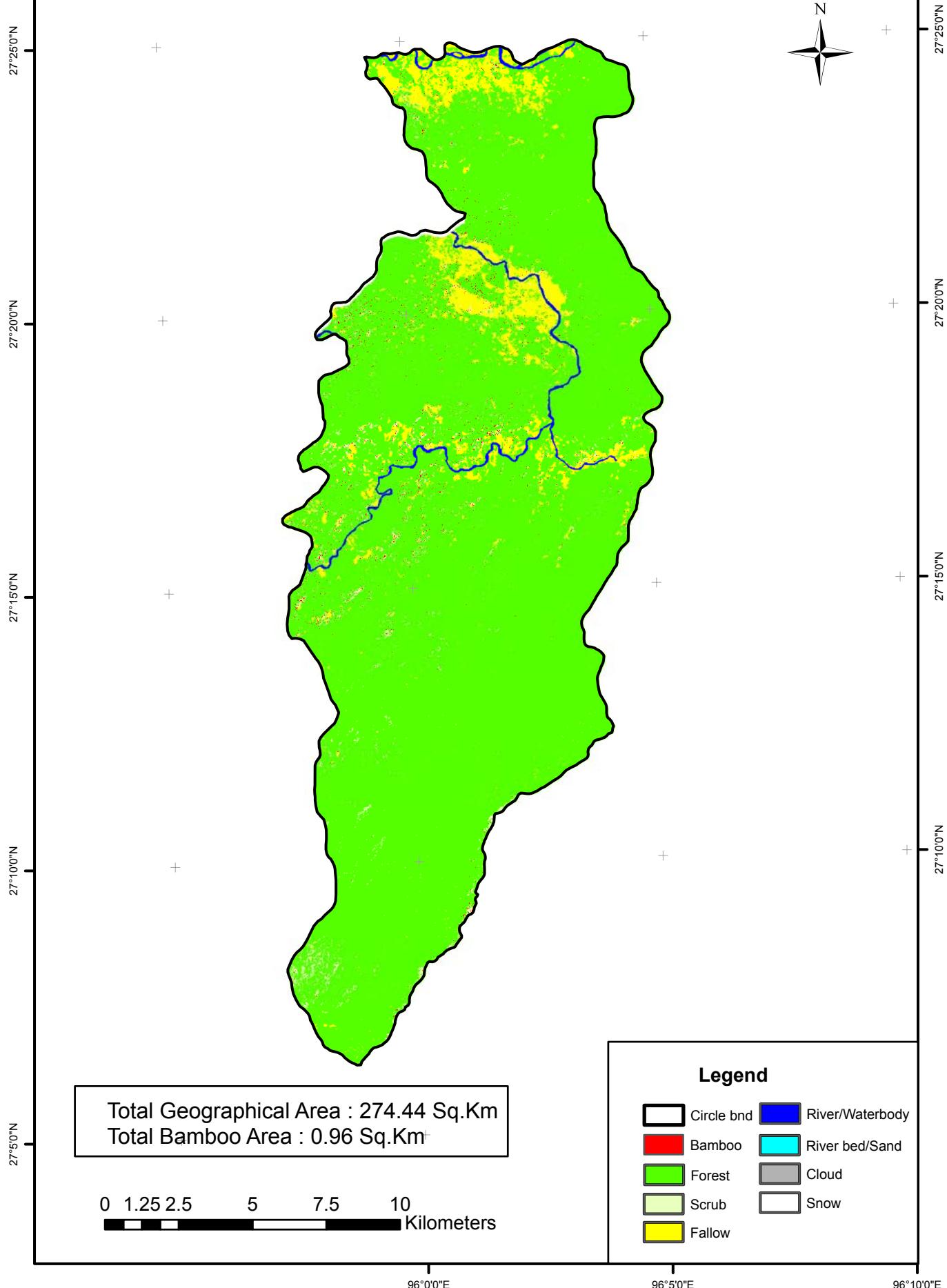
96°0'0"E

96°5'0"E

96°10'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## CHANGLANG DISTRICT : JAIRAMPUR CIRCLE



96°0'0"E

96°5'0"E

96°10'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

CHANGLANG DISTRICT : DIYUN CIRCLE



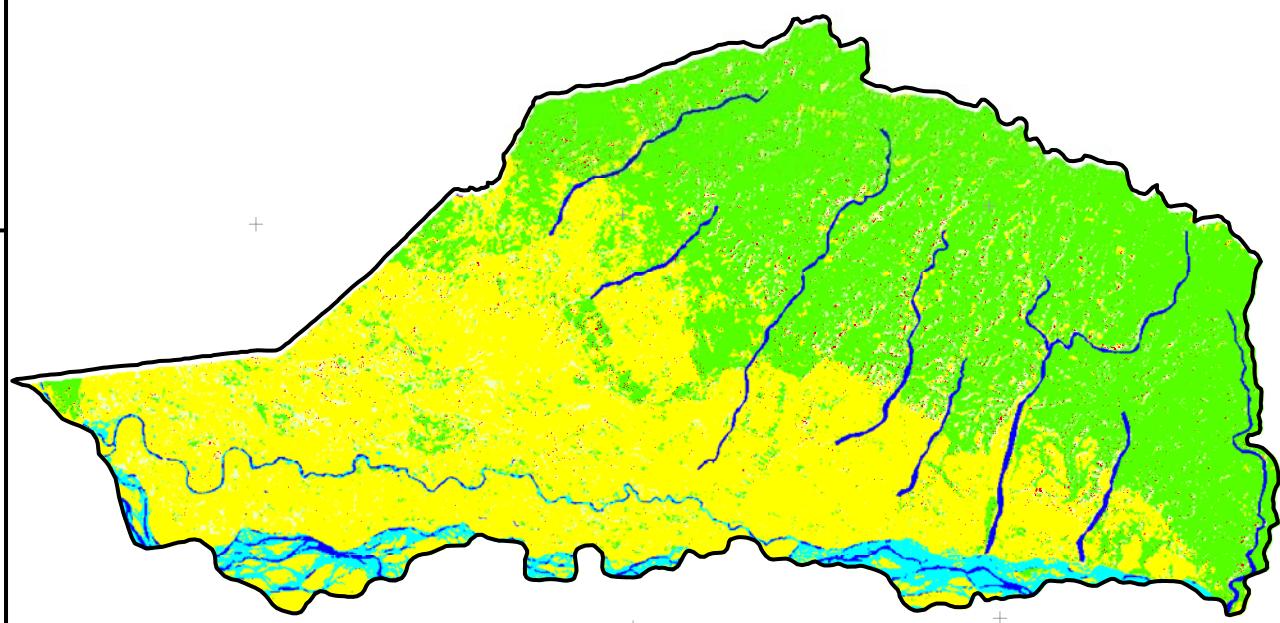
27°40'0"N

27°35'0"N

27°30'0"N

27°25'0"N

27°20'0"N



Total Geographical Area : 481.60 Sq.Km  
 Total Bamboo Area : 4.27 Sq.Km

0 1.25 2.5 5 7.5 10 Kilometers

## Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

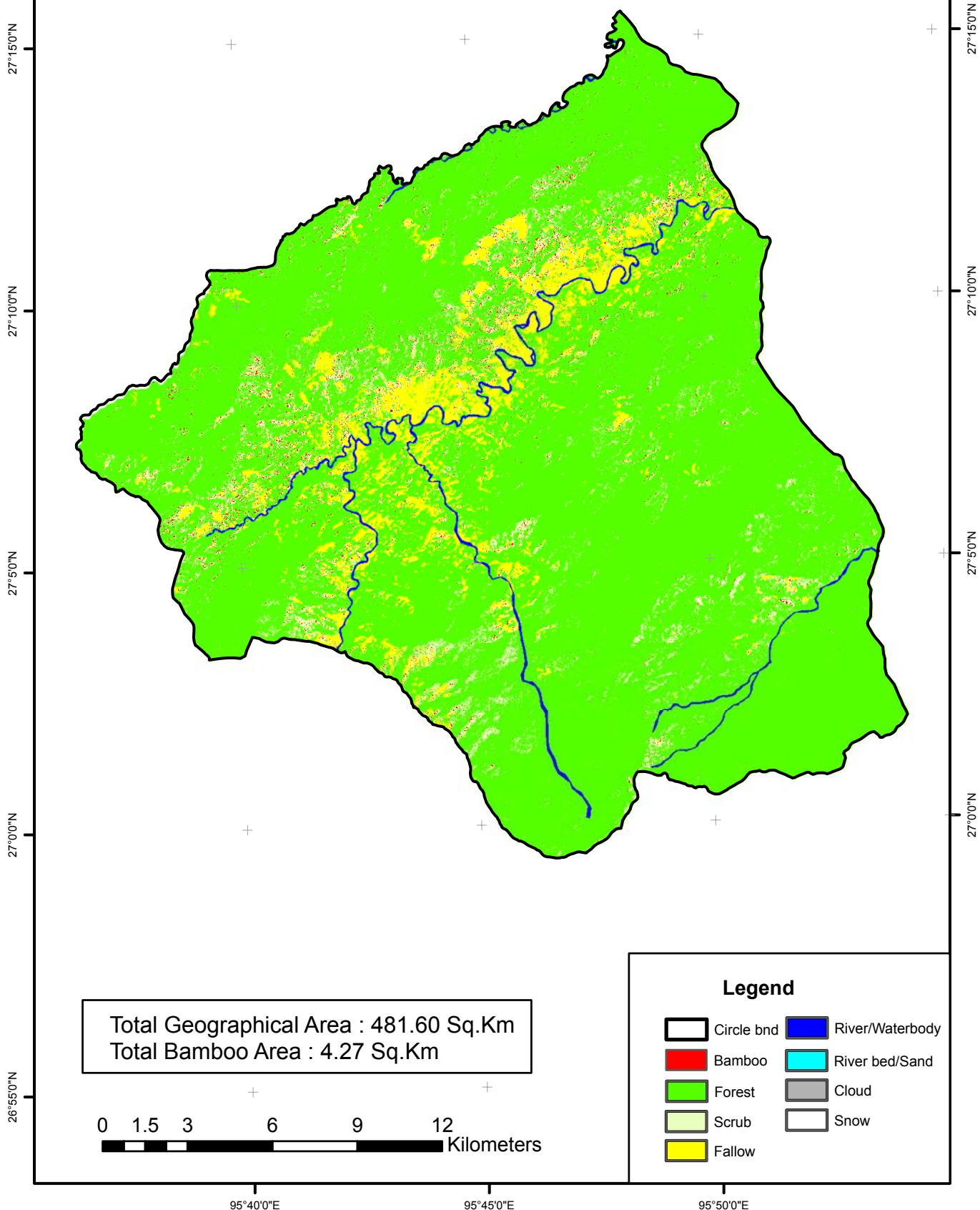
96°0'0"E

96°5'0"E

96°10'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## CHANGLANG DISTRICT : CHANGLANG CIRCLE



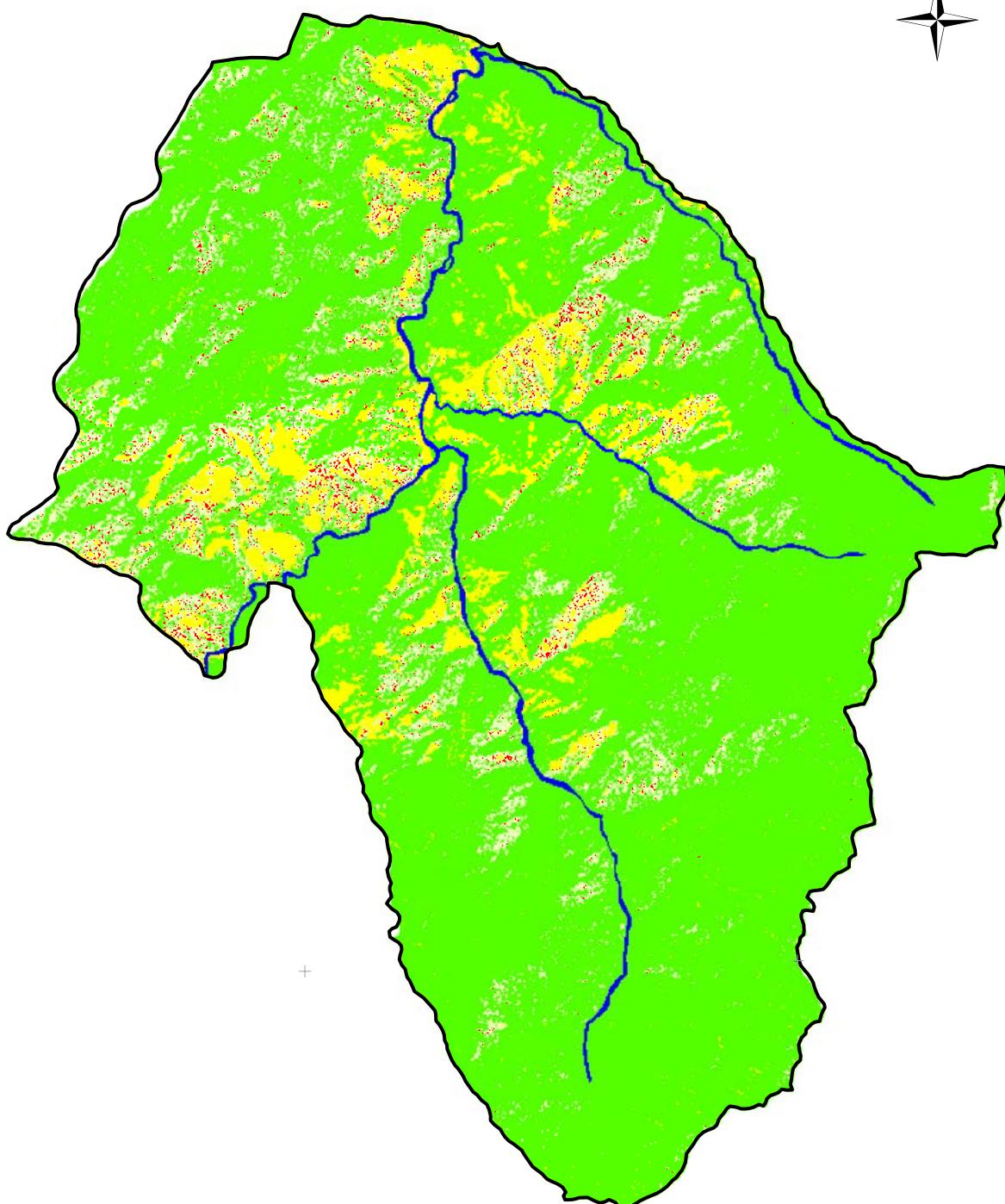
# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## CHANGLANG DISTRICT : KHIMIYONG CIRCLE



26°50'0"N  
26°55'0"N  
27°00'N  
27°50'N

95°40'0"E  
95°45'0"E



Total Geographical Area : 177.23 Sq.Km  
Total Bamboo Area : 1.74 Sq.Km

0 0.5 1 2 3 4 Kilometers

### Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

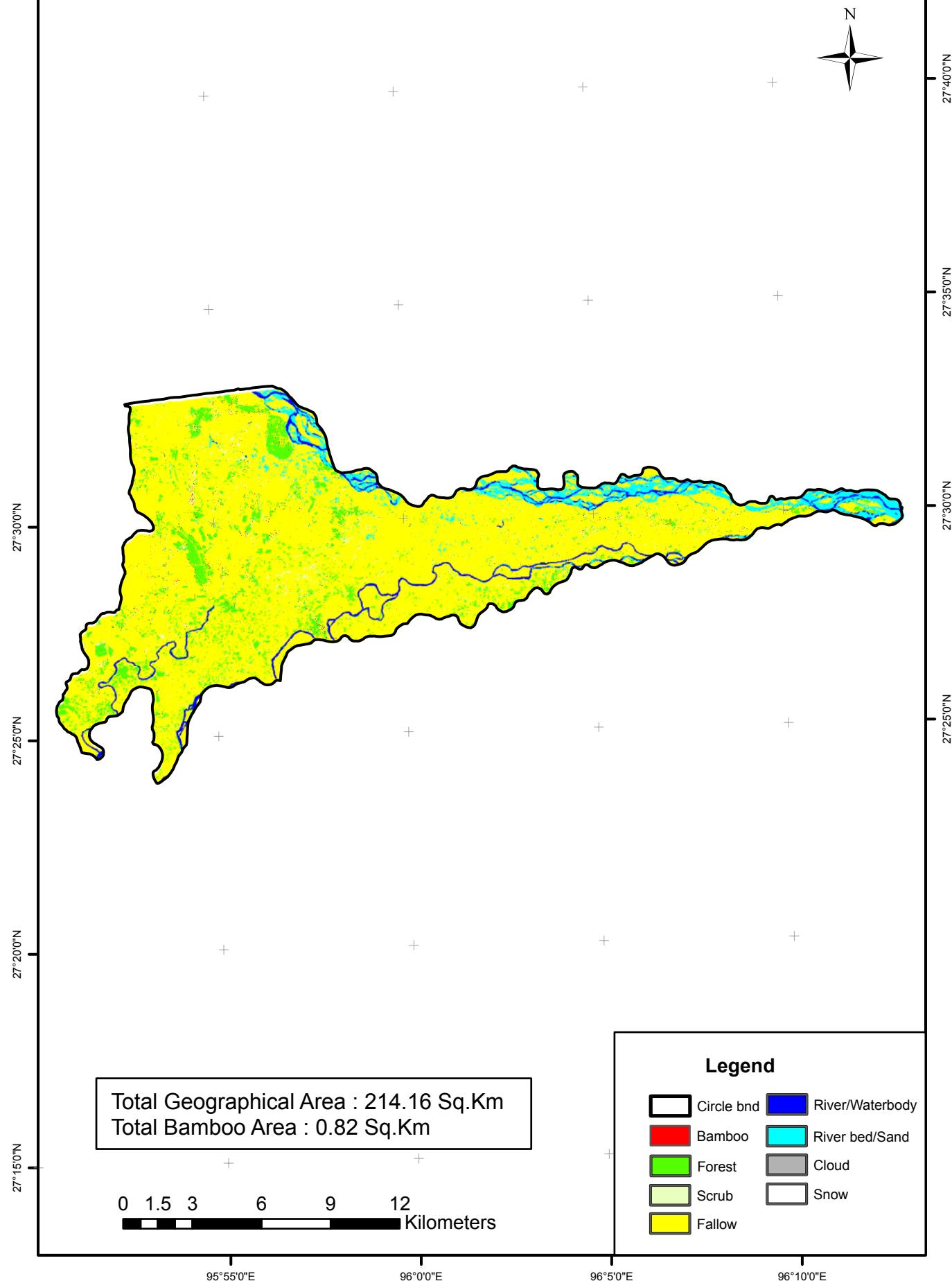
26°50'0"N  
26°55'0"N  
27°00'N  
27°50'N

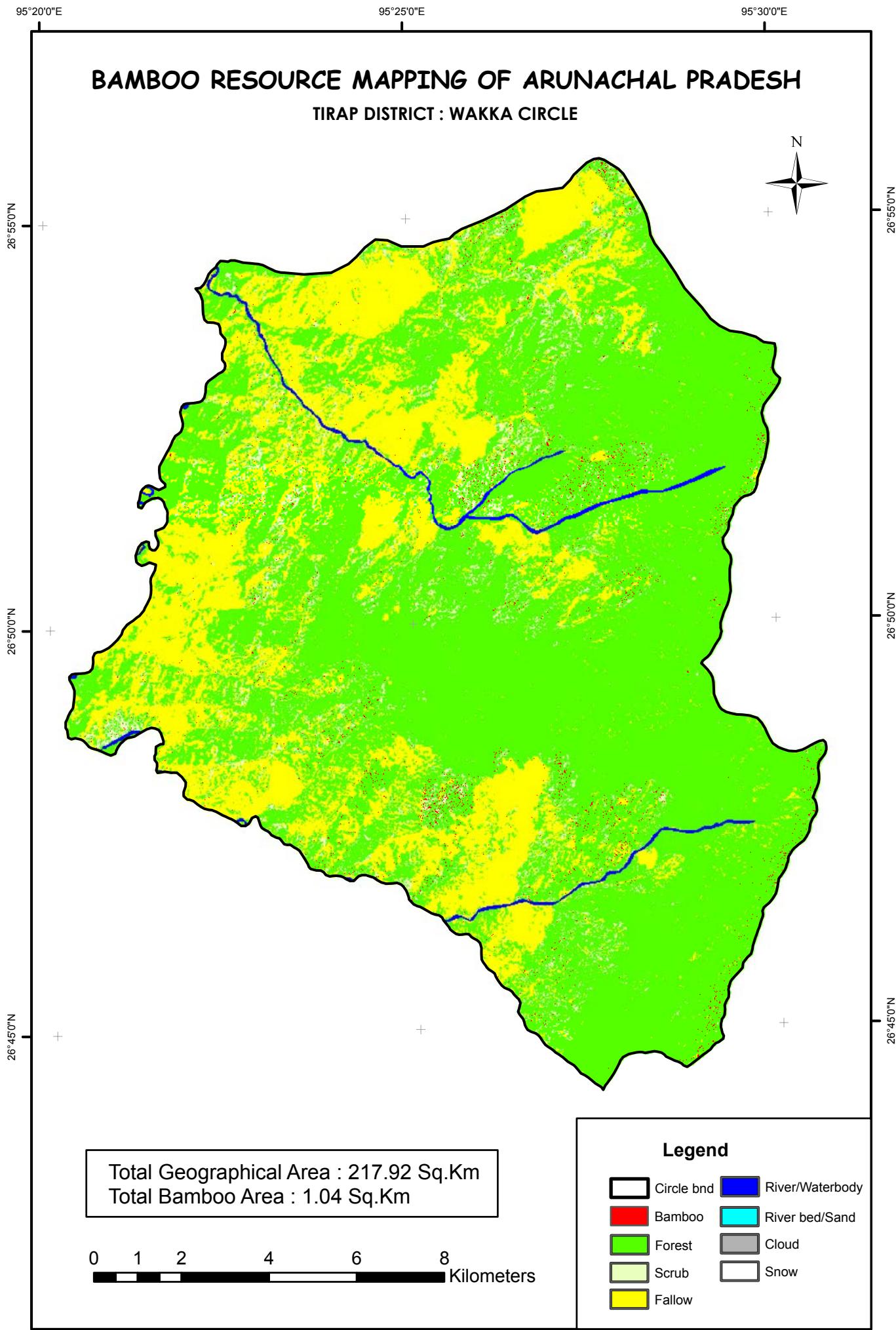
95°40'0"E

95°45'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

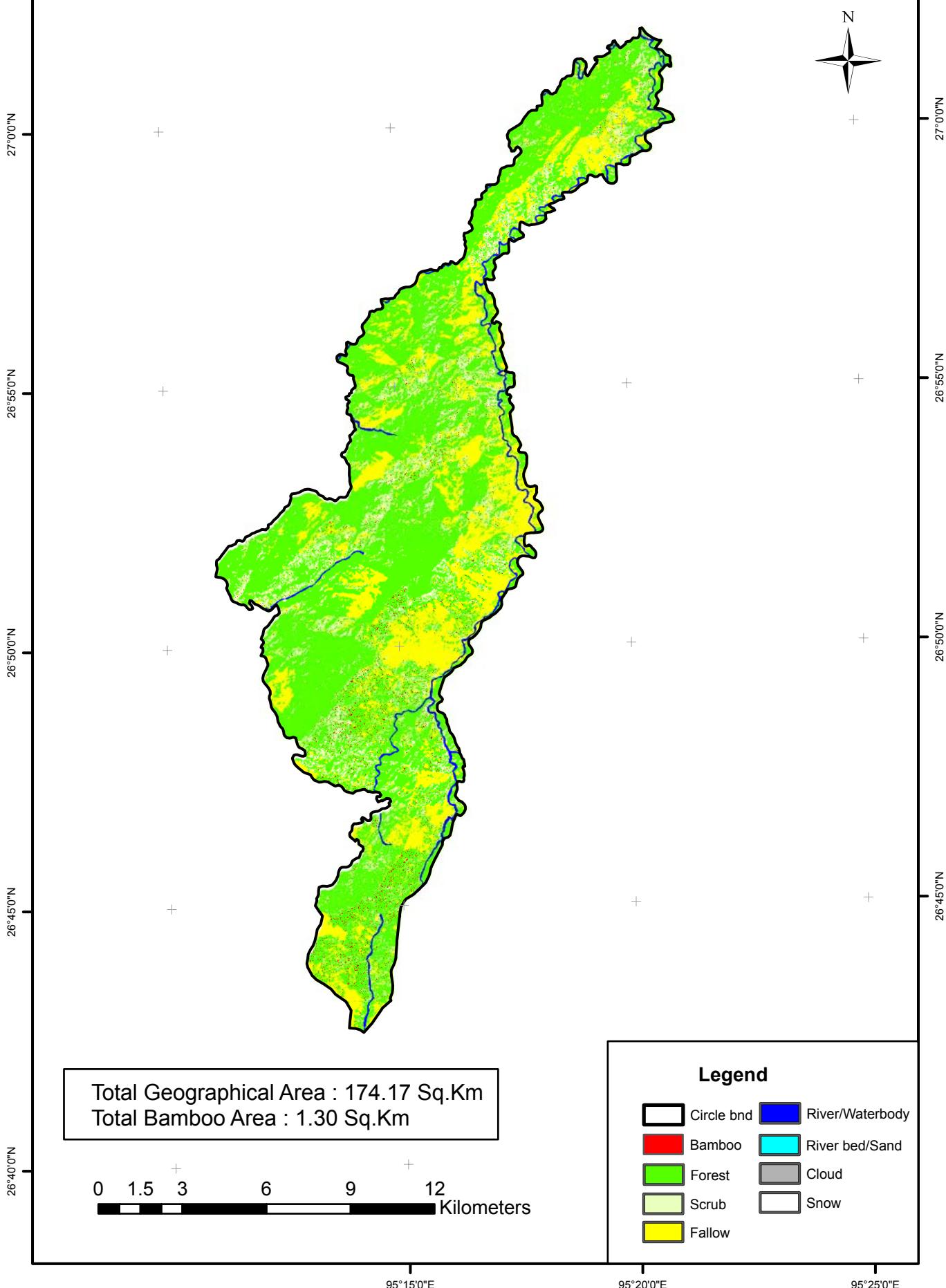
CHANGLANG DISTRICT : BORDUMSA CIRCLE





# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## TIRAP DISTRICT: PUMAO CIRCLE



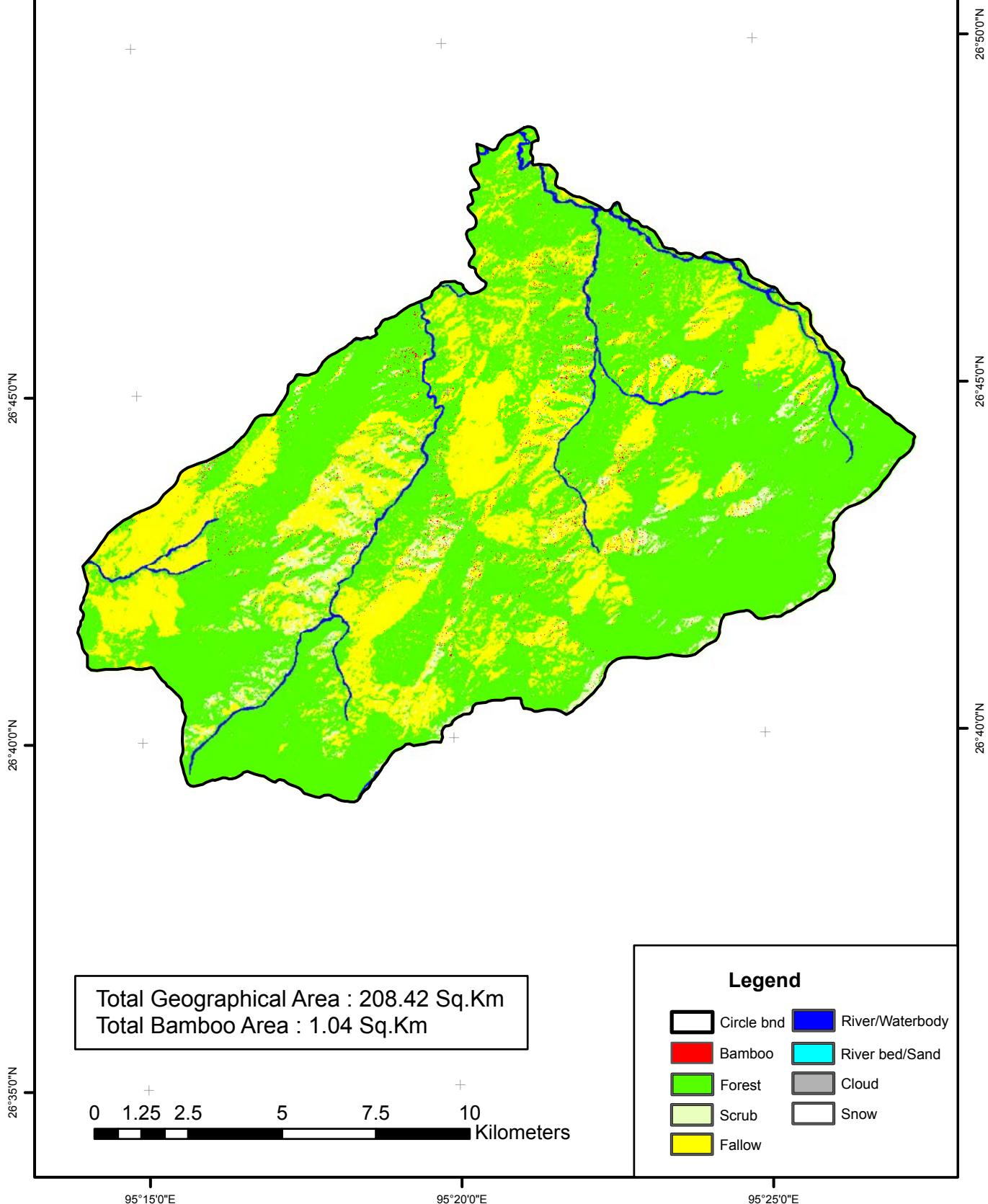
95°15'0"E

95°20'0"E

95°25'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

TIRAP DISTRICT : PANCHAO CIRCLE

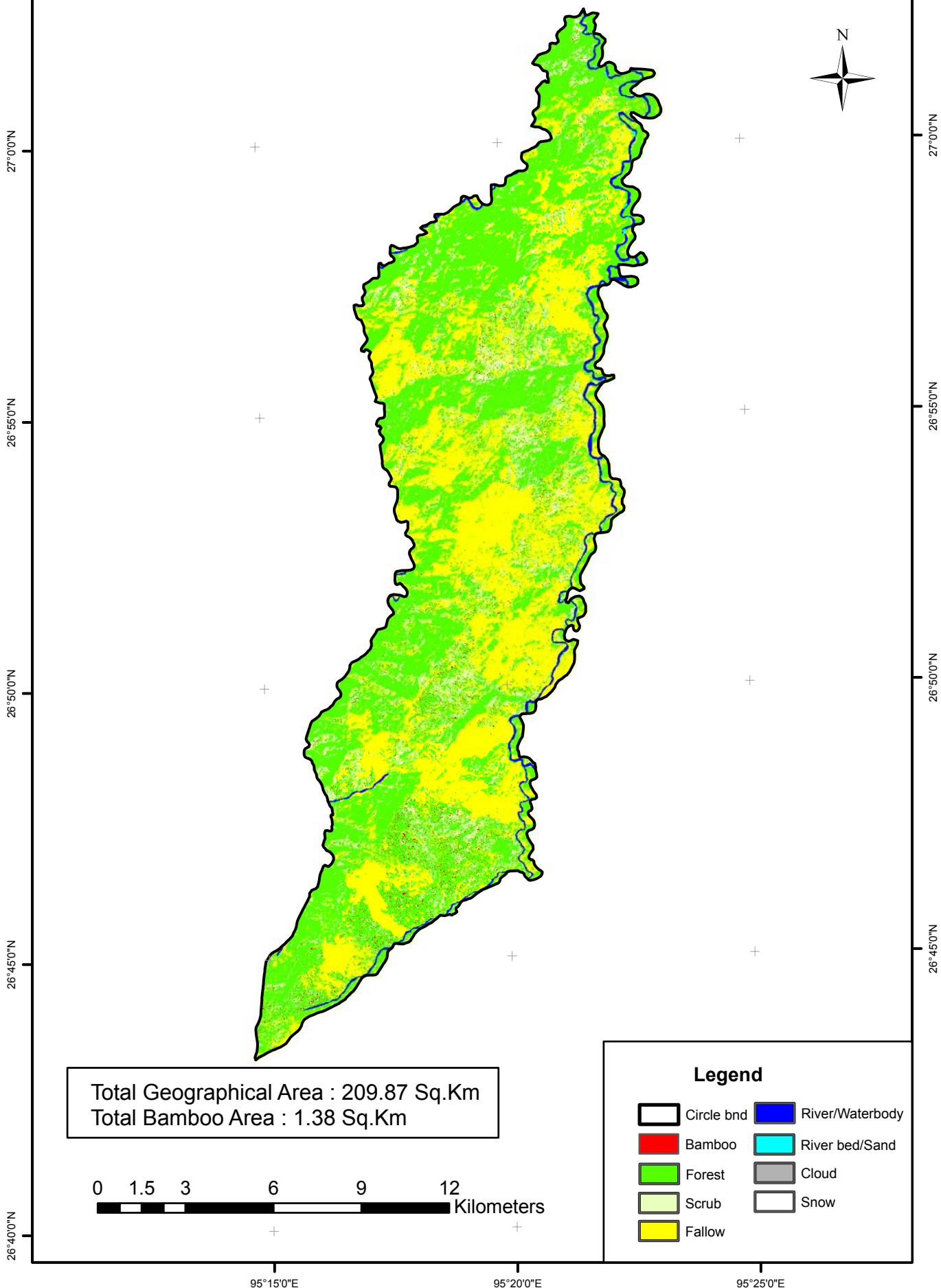


95°15'0"E

95°20'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

## TIRAP DISTRICT : LONGDING CIRCLE



**BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH**  
**TIRAP DISTRICT : LAJU CIRCLE**

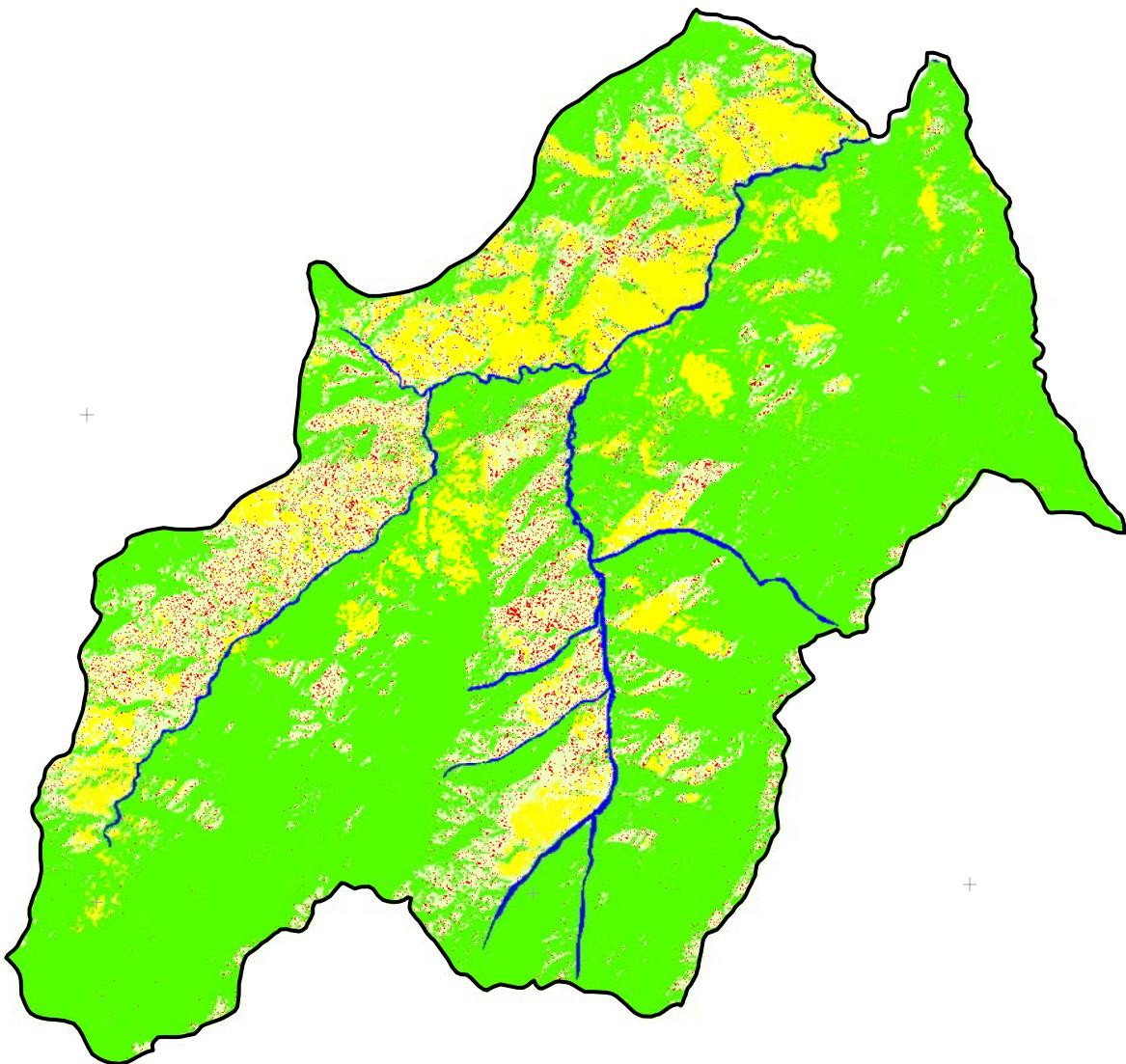


27°00'N

26°55'N

26°50'N

26°45'N



Total Geographical Area : 221.91 Sq.Km  
Total Bamboo Area : 4.93 Sq.Km

0 1.25 2.5 5 7.5 10 Kilometers

**Legend**

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

26°45'N

95°30'0"E

95°35'0"E

95°40'0"E

95°25'0"E

95°30'0"E

95°35'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

TIRAP DISTRICT : KHONSA CIRCLE



27°10'0"N

27°50'0"N

27°00'0"N

26°55'0"N

26°50'0"N

26°00'0"N

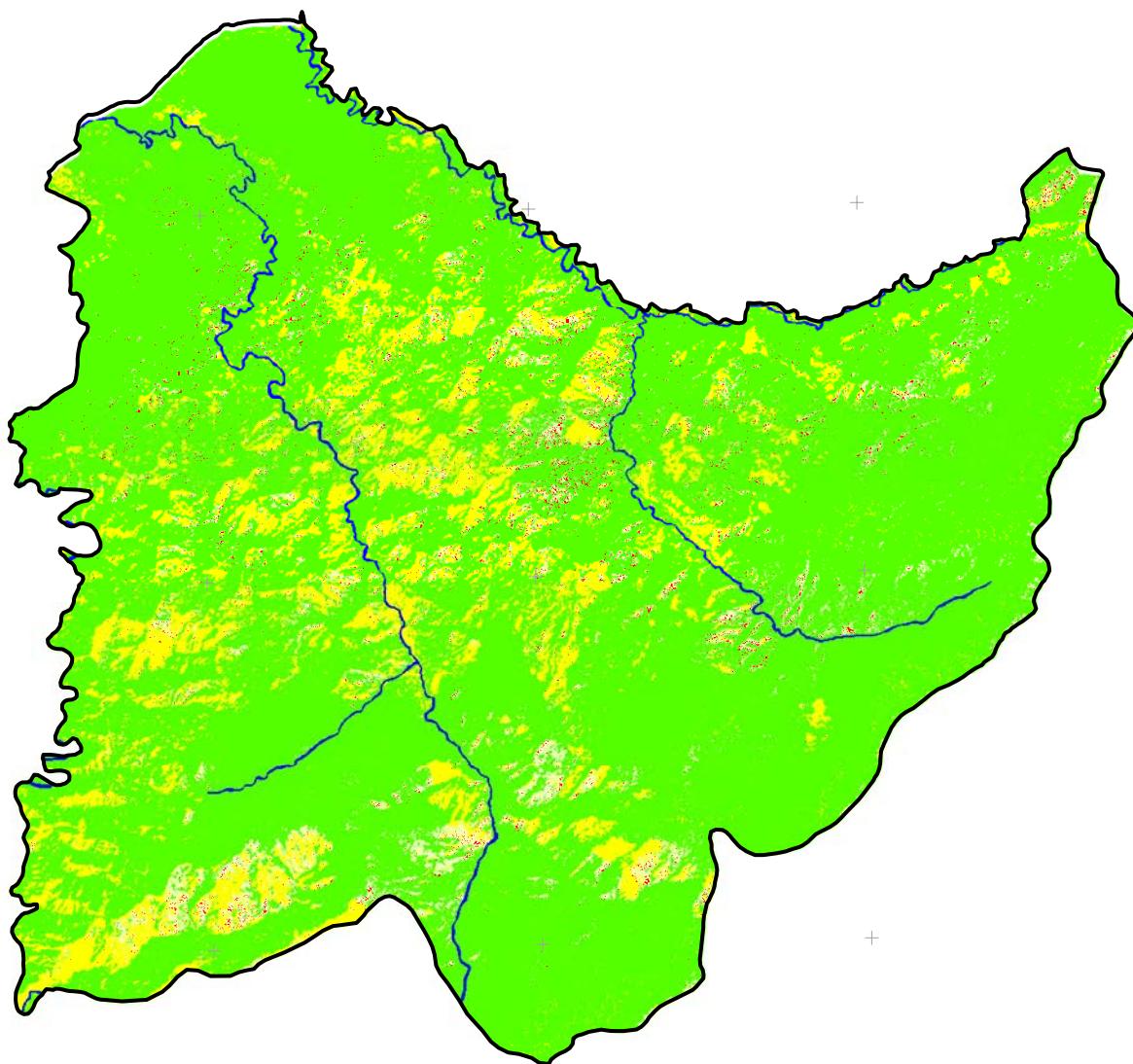
25°50'0"N

27°50'0"N

27°00'0"N

26°55'0"N

26°50'0"N



Total Geographical Area : 459.18 Sq.Km  
 Total Bamboo Area : 2.91 Sq.Km

0 1.5 3 6 9 12 Kilometers

## Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

95°25'0"E

95°30'0"E

95°35'0"E

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

TIRAP DISTRICT : KANUBARI CIRCLE



27°50'N

27°00'N

26°55'N

27°50'N

27°00'N

95°15'0"E

95°20'0"E

Total Geographical Area : 152.92 Sq.Km  
Total Bamboo Area : 0.54 Sq.Km

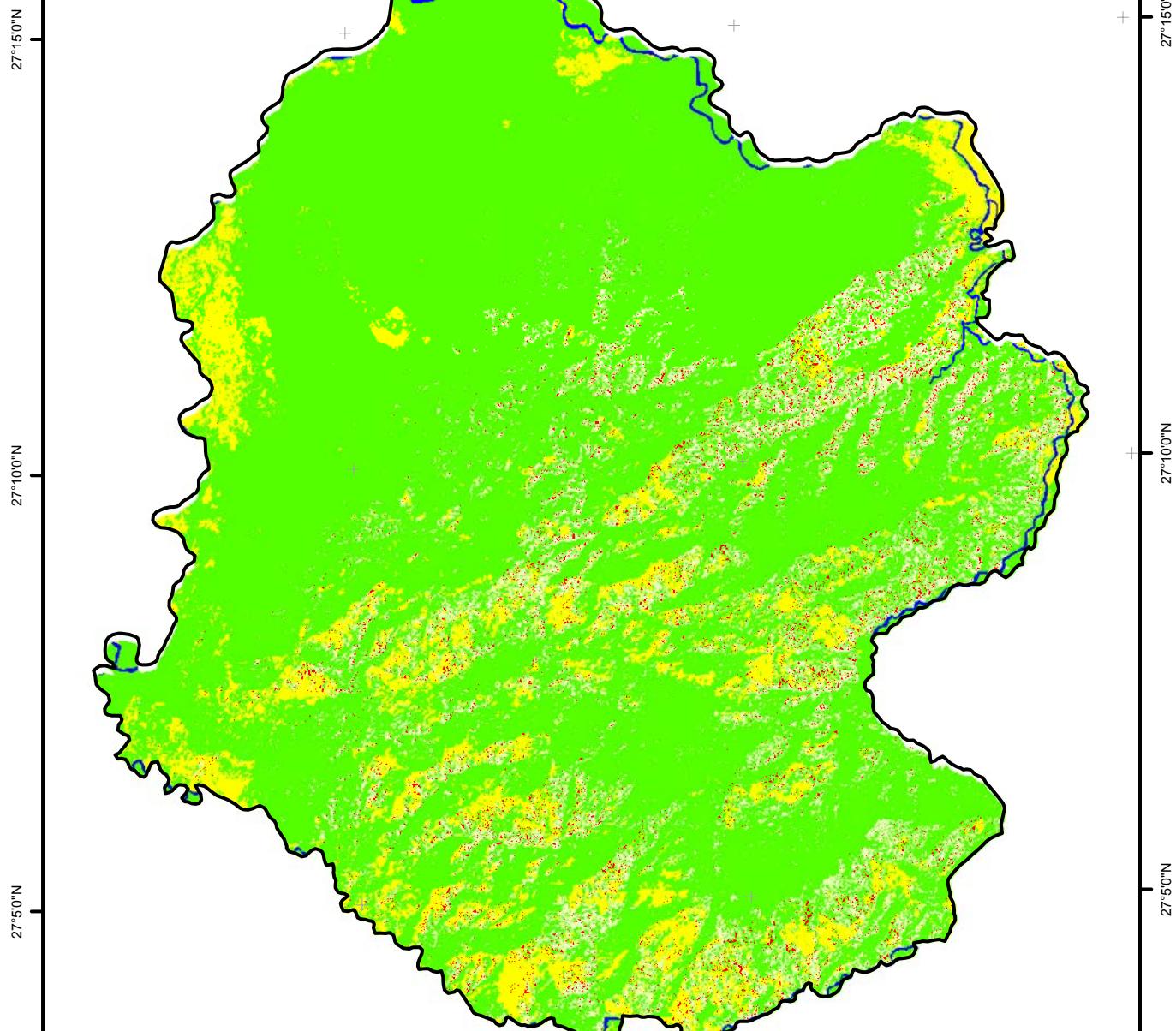
0 1 2 4 6 8 Kilometers

## Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	

# BAMBOO RESOURCE MAPPING OF ARUNACHAL PRADESH

TIRAP DISTRICT : DEOMALI CIRCLE



Total Geographical Area : 687.59 Sq.Km  
Total Bamboo Area : 3.51 Sq.Km

0 1 2 4 6 8 Kilometers

## Legend

Circle bnd	River/Waterbody
Bamboo	River bed/Sand
Forest	Cloud
Scrub	Snow
Fallow	