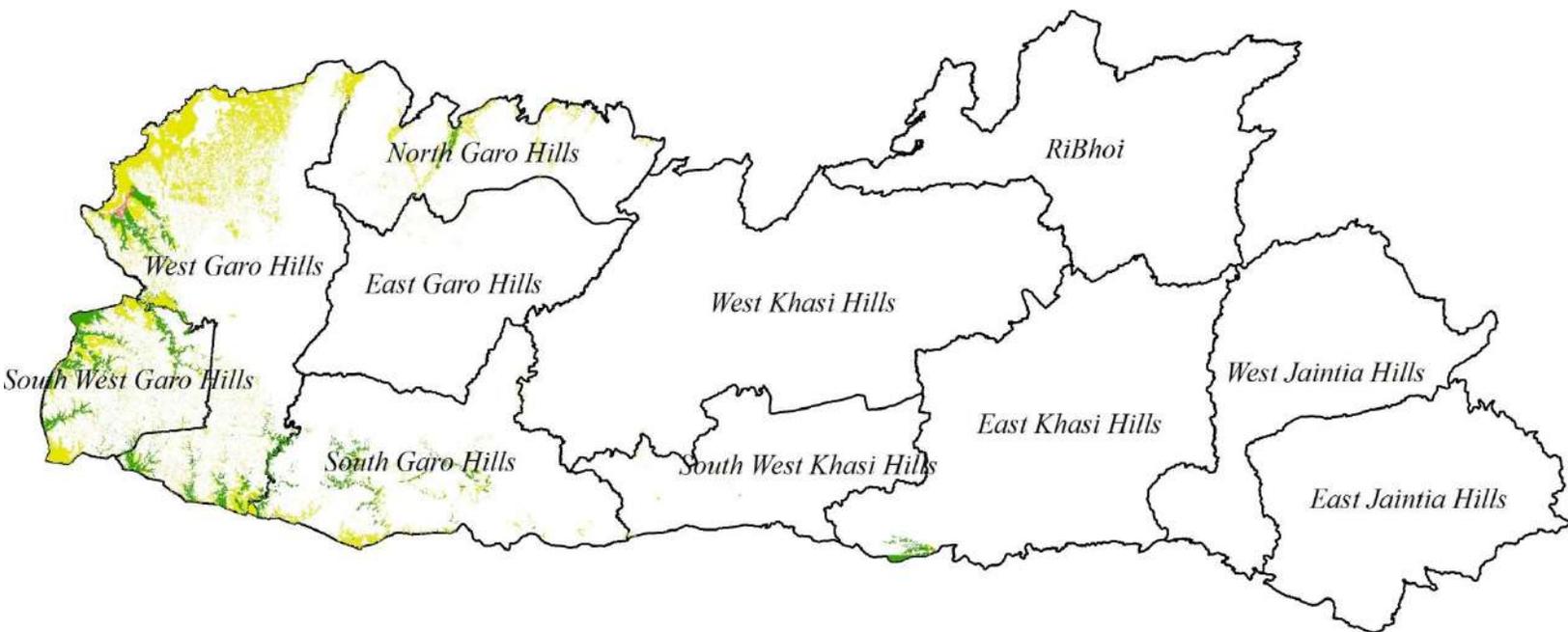


Identification of suitable areas for expansion of Boro rice in Meghalaya



North Eastern Space Applications Centre

Dept. of Space, Govt. of India

Umiam, Meghalaya

&

Directorate of Agriculture

Govt. of Meghalaya

Shillong, Meghalaya

North Eastern Space Applications Centre Document Control Sheet

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Abstract	<p>The project was undertaken at the instance of Directorate of Agriculture, Govt. of Meghalaya, Shillong, with three major i. Preparation of soil fertility map at 1:50,000 scale. ii. Mapping of areas suitable for expansion of areas under Boro rice. iii. Generation area statistics at district/block level. The project was carried out in collaboration with Directorate of Agriculture (DoA), Govt. of Meghalaya, Shillong, Meghalaya. The study gives an example that geospatial technology is very useful in identifying suitable areas for expansion of Boro rice cultivation with limited field visit. The study reveals that out of 4903 Sq. Km study area only 807 Sq. Km (16.5%) area is suitable for Boro rice cultivation in the state. Even though 16.5% area is suitable for Boro rice but it is found that only 0.8 % (635 ha) area is highly suitable which is found in West Garo hills district. It is observed that 581.74 Sq. Km areas are marginally suitable where as 219.07 Sq. Km area is moderately suitable in the state. It is also observed that maximum suitable areas are distributed in West Garo Hills, South West Garo Hills, South Garo hills and North Garo hills district that covers more than 98% suitable areas. Only 1287.3 ha area is found suitable in East Khasi Hills district that covers 1.6% of total suitable areas. In East Garo hills, South West Khasi Hills and West Khasi Hills suitable areas are found scattered and size of fields are less than 10 ha and that covers only 0.5% of total suitable areas. From the study it is observed that suitable areas are distributed in 20 blocks of 8 districts of the state. It is also observed that highest suitable areas are found in Selsella and Dadenggre block of West Garo Hills district followed by Betasing block of South West Garo hills. Lowest area is found in Nongstoin block of West Khasi Hills district.</p>
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Director

Message

It is a matter of great satisfaction that the project titled “Identification of suitable areas for expansion of Boro rice in Meghalaya” is taken up by NESAC, Department of Space, Government of India at the specific request of Directorate of Agriculture, Govt. of Meghalaya, Shillong has been completed successfully. The project demonstrated the use of geospatial technology in delineating the potential areas for expansion of Boro rice cultivation considering a number of parameters like slope, soil and climate. The assessment of suitability of land for Boro rice cultivation involves matching these parameters with the requirements of the crop. It needs interpretation and integration of soils, climatic parameters, land use and other aspects of land, elevation and slope using GIS. The project output from National Land Use Land Cover Mapping (LULC 50K) has provided the significant inputs in terms of delineating the culturable wastelands and agriculture land as the major inputs for the identification of suitable areas for Boro rice. Soil characteristics (soil depth and soil drainage) are obtained from soil map prepared by National Bureau of Soil Survey and Land Use Planning (NBSS & LUP). Information on soil fertility and soil texture are generated from soil sample analysis data and ground control points collected by Reseach Office, Shillong. Information on ground water availability is obtained from ground water prospect map already prepared under NRDB project and under Rajiv Gandhi National Drinking Water Mission. Application of geospatial techniques for mapping of potential areas for Boro rice cultivation has been attempted for the first time in the state. The project output will provide valuable information for the user department. This report contains the maps and statistics generated as the project output along with the description of methodology adopted, results and recommendations. I am sure the report will serve as a useful document for planning and expansion of Boro rice cultivation in the state of Meghalaya.

January 11, 2017

(PLN Raju)

ACKNOWLEDGEMENTS

The project team would like to extend its sincere gratitude and appreciate the initiatives of Directorate of Agriculture, Govt. of Meghalaya, Shillong who has entrusted the responsibility of executing this project on Identification of suitable areas for expansion of Boro rice in Meghalaya to North Eastern Space Applications Centre. The project team is indebted to Smt. D. Syiemiong, Director, Agriculture and Smt. S. Mihsil, Director MAMETI for their keen interests and whole-hearted support. Sincere appreciation extended to Shri PLN Raju, Director, NESAC for his support and guidance throughout the project period. Sincere support and help extended by Shri N.S. Nongbri, Joint Director of Agriculture (R&T), Research Officers of East Khasi Hills, West Jaintia Hills and West Garo Hills, Shri Ian Saiborne, Assistant Director of Agriculture (Soil Survey), Smt. V. Rynthlei, Horticulture Officer (FP), Smt. L. Kharkrang, Deputy Director of Agriculture (planning), Shri W. Pakyntein, District Agriculture Officer, Ri-Bhoi, Shri C.S. Shabong, Assistant Director of Agriculture (Info) is duly acknowledged. Finally the project team would like to thank all the Scientists/Engineers of NESAC and other staff members for their support and help in successful completion of the project.

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Identification of suitable areas for expansion of Boro rice in Meghalaya

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1. Introduction: Meghalaya Rice Mission is a programme to increase rice production and productivity in the state to meet the consumption requirement and to bridge the deficit between demand and availability to consumers. One major objective of the mission is to map the spatial distribution of rice ecosystem by using Remote sensing & GIS technique for prioritization and planning. In Meghalaya the rice crop is distributed in three rice ecosystems. They are low altitude rice that covers 70% of total rice growing areas (TRGA), mid altitude rice covers 25% of TRGA and high altitude rice that covers 5% of TRGA. Area wise, *Sali* rice constitute about 63000 hectares with an average yield of 1.9 MT/Ha, *Ahu* about 33,000 hectares with an average yield of 1.3 MT/Ha and *Boro* about 13,000 hectares with an average yield of 3.7 MT/Ha. Considering the fact that Boro rice has high yield and there scope of expansion of Boro rice, Government of Meghalaya has requested NESAC to take up the project on identification of areas suitable for expansion of Boro rice cultivation in the state with the following objectives:

- i) Preparation of soil fertility map at 1:50,000 scale.
- ii) Mapping of areas suitable for expansion of areas under Boro rice.
- iii) Generation of area statistics at district/block level.

2. Study area: The study is carried out in the state of Meghalaya. The study area includes areas below 200m elevation excluding forest, built up and barren rocky area (Figure 1). It covers about 4903 Sq.Km.

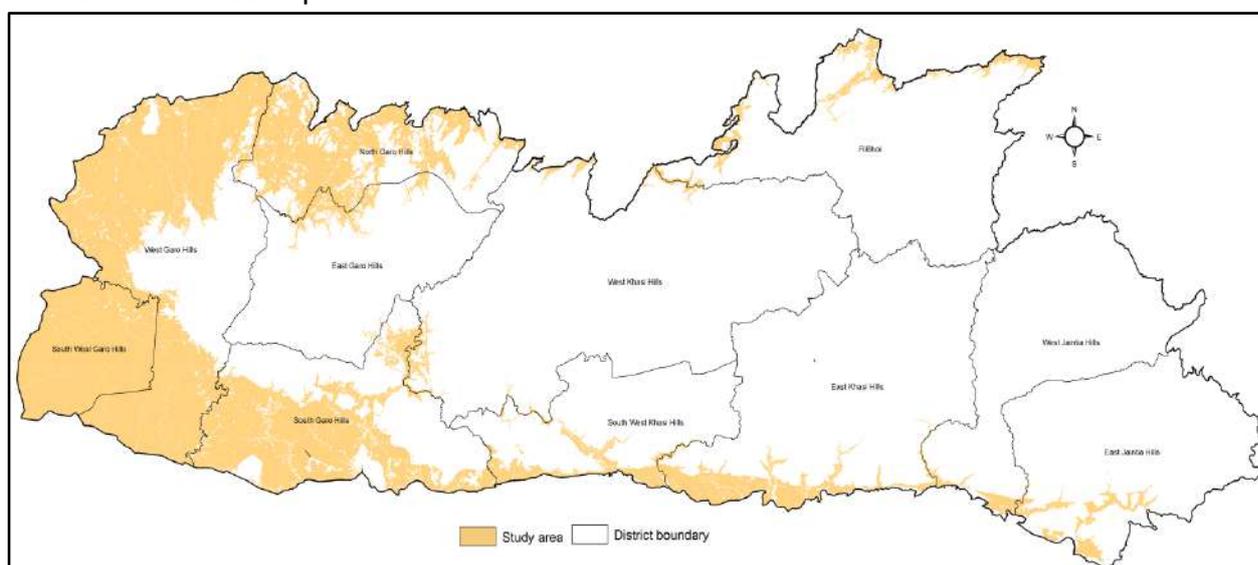


Figure 1: Extent of study area

3. Methodology and data used: Land evaluation for soil site suitability for Boro rice has been done as per FAO (1983) guidelines. The existing soil map of 1:250,000 scale prepared by National Bureau of Soil Survey and Land Use Planning (NBSS & LUP) was updated to 1:50,000 scale based on base maps prepared from Resourcesat 2 LISS III images of 2016-17. Different thematic maps namely; soil depth, drainage, flooding, texture, and gravel/stoniness were derived from the updated soil map. Land use map of 1:50K scale prepared by NESAC was used to extract the study area which includes all

land use classes except forest, built up and barren rocky area. Cartosat DEM generated at NESAC was used to prepare slope and elevation map. Composite surface soil samples were collected from 121 locations representing various physiography, slope and land use (Annexure I). Soil samples were analysed for pH, organic carbon, N, P, K and other micronutrients. Various fertility maps were generated by using interpolation tool of ArcToolbox (ArcGIS software). All these maps were transferred to GIS environment and overlaid and analysed to assess suitability of soil site for Boro rice cultivation by following FAO guidelines. Suitable areas are the potential area for expansion of Boro rice cultivation. The detailed methodology is given in Figure 2.

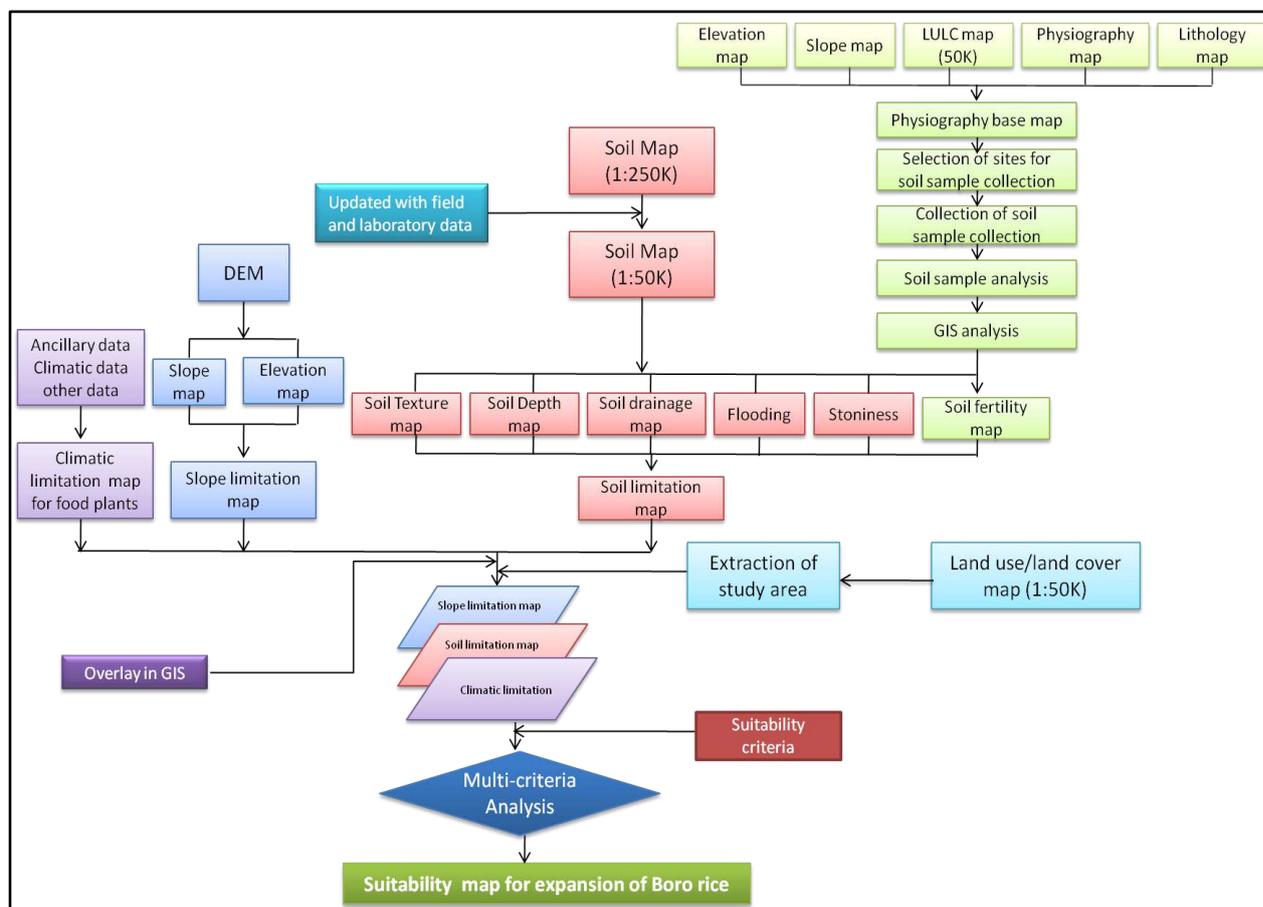


Fig.2: Flowchart of the Methodology

4. Result and discussion: From the study it is observed that out of 4903 Sq. Km study area only 807 Sq. Km (16.5%) is suitable for Boro rice cultivation in the state. Even though 16.5% area is suitable for boro rice but it is found that only 0.8 % (635 ha) area is highly suitable which is found in West Garo hills district. It is observed that 581.74 Sq. Km areas are marginally suitable where as 219.07 Sq. Km area is moderately suitable (Table 1 and Figure 3) in the state.

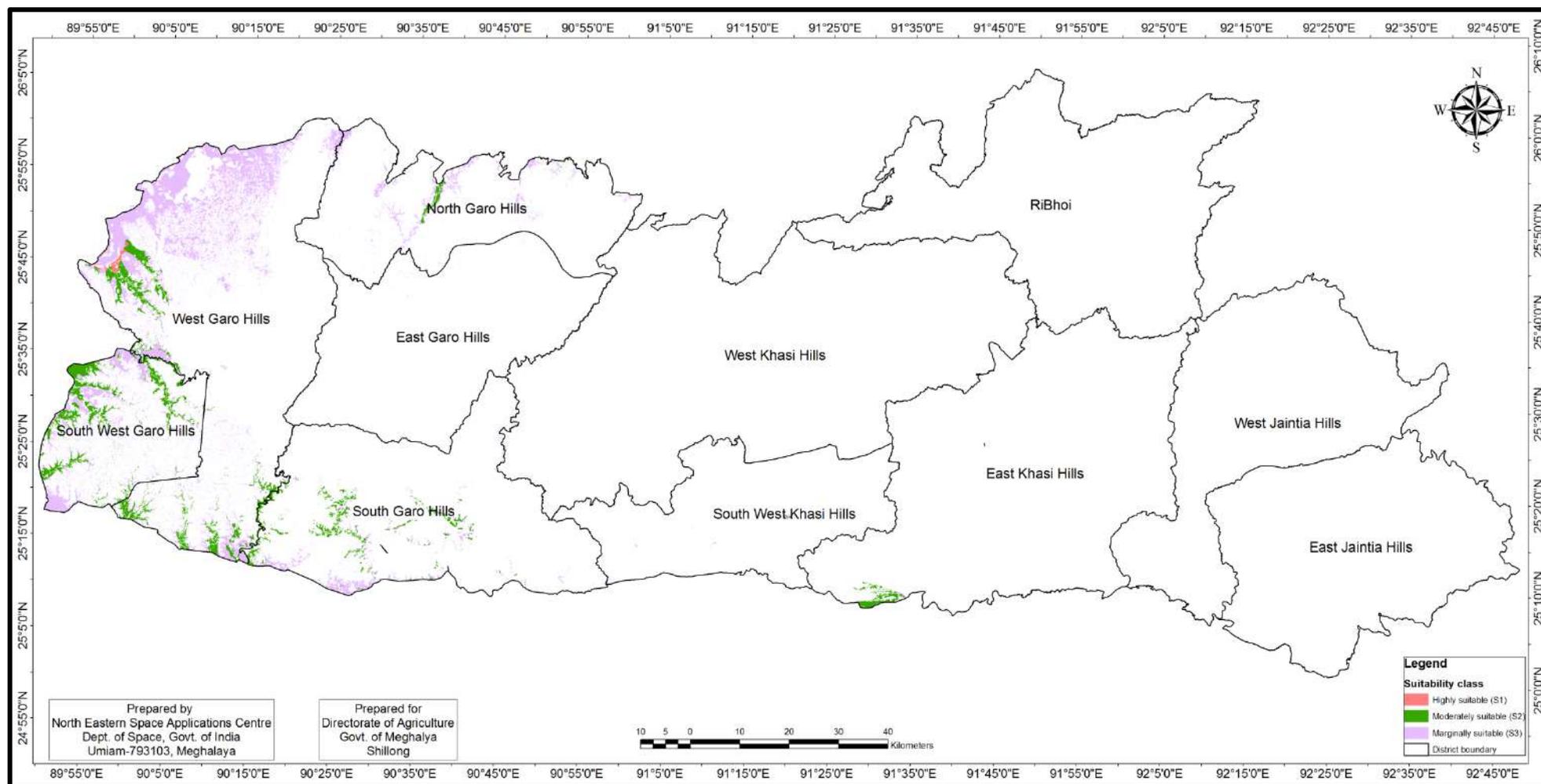


Figure 3: Suitable areas for expansion of Boro rice cultivation in Meghalaya

From the study it is observed that suitable areas are distributed in 20 blocks of 8 districts of the state. More than 50% suitable areas are found in West Garo hills that cover 484.3 Sq.Km where as only 0.7 Sq.Km area which is the lowest area are found in West Khasi hills district (Table 2). It is also observed that highest suitable areas are found in Selsella and Dadenggre block of West Garo Hills district followed by Betasing block of South West Garo hills. Lowest area is found in Nongstoin block of West Khasi Hills district (Table 2 and Figure 8 to 35). Name of villages falling under different suitability classes is given in Table 5 to 12.

Table 1: Area under different suitability classes

Suitability class	Area (Sq.Km)	% Area
Highly suitable (S1)	6.35	0.8
Moderately suitable (S2)	219.07	27.1
Marginally suitable (S3)	581.74	72.1
Total	807	100.0

Based on problems of soil and topography which causes various degrees of limitations for growing of boro rice, suitability classes are divided into 20 sub classes (Table 3). It is observed that slope, soil texture, soil fertility (acidity) and soil drainage are the major limiting factors/problems because of which maximum areas are found marginally and moderately suitable for Boro rice expansion (Figure 4 to Figure 7).

Slope map was generated from Digital Elevation Model (DEM) generated from Cartosat image. The slope map was reclassified into 4 classes viz. 0-1%, 1- 2%, 2-4% and >4% and considered as highly suitable, moderately suitable, marginally suitable and not suitable respectively. Ranges of slope percentage for suitability of Boro rice cultivation was decided in consultation with Research office, Shillong.

Soil samples were collected from 121 locations and analysed in the soil testing laboratory of Research office, Shillong. From the soil analysis it is observed that the soil texture of the study area varies from sandy loam, loamy sand, sand, sandy clay and sandy clay loam. Various studies showed that for paddy cultivation light texture soils like sandy soils are not suitable where as heavy texture like clay, sandy clay soils are suitable. From this study, it is observed that 0.5% area is having sandy soil which causes very severe limitation; therefore, these areas are not suitable for boro rice cultivation. In the study area soils with sandy loam and loamy sand texture covers 43.4 % area which are marginally suitable for boro rice cultivation. Sandy clay loam soils are moderately suitable for boro rice cultivation that covers 50.1% area. It is observed that only 6% area of the

study area is having sandy clay soil texture which is highly suitable for boro rice cultivation (Figure 5). The soil analysis results shows that soil pH of the study area varies from 4.9 to 5.9 which are moderately and highly suitable for boro rice cultivation respectively (Figure 6).

Soil drainage map was generated from soil map of 1:250K map prepared by NBSS & LUP. From the map it was observed that soil drainage varies from imperfectly drained to excessively drained. Imperfectly drained soils are highly suitable where as well drained and excessively drained soils are marginally suitable and moderately well drained soils are moderately suitable for boro rice cultivation (Figure 7).

Table 2: District wise suitable areas for expansion of Boro rice

Sl. No	District	Area (ha)			Total	% area
		Highly suitable (S1)	Moderately suitable (S2)	Marginally suitable (S3)		
1	West Khasi Hills		0.5	70.9	71.4	0.1
2	South West Khasi Hills		11.1	126.6	137.7	0.2
3	East Garo Hills			150.5	150.5	0.2
4	East Khasi Hills		1189.9	97.4	1287.3	1.6
5	North Garo Hills		664.2	4514	5178.1	6.4
6	South Garo Hills		3720.6	4390.3	8110.9	10
7	South West Garo Hills		7805.2	9547.2	17352.4	21.5
8	West Garo Hills	635.2	8516	39277.1	48428.3	60
	Total	635.2	21907.4	58174.2	80716.7	100.0

Table 3: Different suitably sub classes and limitations/problems of the soil site

Suitability class	Suitability sub class	Area (ha)	% Area	Limitation/problems
S1	S1	635.2	0.8	No limitation
S2	S2f	736.5	0.9	Soil fertility
	S2s	3772.7	4.7	Soil texture
	S2sf	13933.9	17.2	Soil texture and soil fertility
	S2sw	520.2	0.6	Soil texture and soil drainage
	S2swf	771.3	1.0	Soil texture, soil drainage and soil fertility
	S2tf	23.5	0.0	Slope and soil fertility
	S2ts	6.6	0.0	Slope and soil texture
	S2tsf	196.9	0.2	Slope , soil texture and soil fertility
	S2tsw	57.3	0.1	Slope , soil texture and soil drainage
	S2tw	13.5	0.0	Slope and soil drainage
	S2twf	38.8	0.0	Slope, soil drainage and soil fertility
	S2w	490.3	0.6	Soil drainage
	S2wf	1360.0	1.7	Soil drainage and soil fertility
S3	S3s	9211.2	11.4	Soil texture
	S3sw	18195.3	22.5	Soil texture and soil drainage
	S3t	2274.3	2.8	Slope
	S3ts	1555.4	1.9	Slope and soil texture
	S3tsw	5620.1	7.0	Slope, soil texture and soil drainage
	S3tw	5340.7	6.6	Slope and soil drainage
	S3w	16069.8	19.9	Soil drainage
Total		79465	100	

Table 4: Block wise area under different suitability sub classes

Sl.No	Blocks	S1	S2f	S2s	S2sf	S2sw	S2swf	S2tf	S2ts	S2tsf	S2tsw	S2tw	S2twf	S2w	S2wf	S3s	S3sw	S3t	S3ts	S3tsw	S3tw	S3w	Total	%area
1	Nongstoin																	14.6					14.6	0.0
2	Mawshynrut									0.5						0.2		49.2	7				56.8	0.1
3	Rongjeng															9.9			16	31.5			57.4	0.1
4	Songsak															0.7	11.5		0.3	80.7			93.1	0.1
5	Rongram				20.5					6.7	0.2		0.0			0.0		44.0	30.0	0.0			101.3	0.1
6	Ranikor				7.9					3.2						46.8	0	53.1	0.6	0.7	25.5		137.7	0.2
7	Rongara				149.9					0.7						342.4			15.2				508.1	0.6
8	Kharkutta					29.3	8.2				15.6		1.9			539.7		133.1	369.8	0.8			1098.5	1.4
9	Mawsynram					48.7	107.2				5.7	13.4	1.1	487.9	525.8	96.6		0.8					1287.3	1.6
10	Gambegre				542.3					18.6								126.6			459.8	326.1	1473.4	1.8
11	Baghmara				558.4					34.1						721.9		148.2	31.4				1494	1.9
12	Chokpot			3.9	1176					29.1						368.6		55.8	14.6				1648	2.0
13	Resubelpara					441	132.8				35.3					1870.3	250	120.7	853.4	376.2			4079.6	5.1
14	Gasuapara				1741.9					26.6						849.7	1023.8	38.4	14.5	8.7	48.2	709	4460.8	5.5
15	Dalu				3438.5					11.5						763.6	81.2	261.7	9.9	1.8	485.1	2064.9	7118.2	8.8
16	Zikzak		465.2		2253.7			15.3		34.6						0.5		619.3			810.4	3239.6	7438.6	9.2
17	Tikrikilla															790.2	5652.7		181.9	1320.1			7945	9.8
18	Betasing		259.7		3373.9		514.8	8.2		10.5	0		35.4		833.8	600.7	699.8	375.4	5.3	12	437.2	2746.9	9913.8	12.3
19	Dadenggre																3359.8			3654.7	2082.7	1829.2	10926.3	13.5
20	Selsella	635.2	11.2	3768.7	661.9		8.1		6.6	20.9	0		0.3			2165.6	7079.2	233.1	5.4	132.9	991.3	5143.6	20864	25.8
	Total	635.2	736.2	3772.7	13924.8	519.1	771.1	23.5	6.6	196.9	56.8	13.4	38.8	487.9	1359.6	9167.4	18157.9	2274.1	1555.2	5620.1	5340.2	16059.3	80716.7	100.0

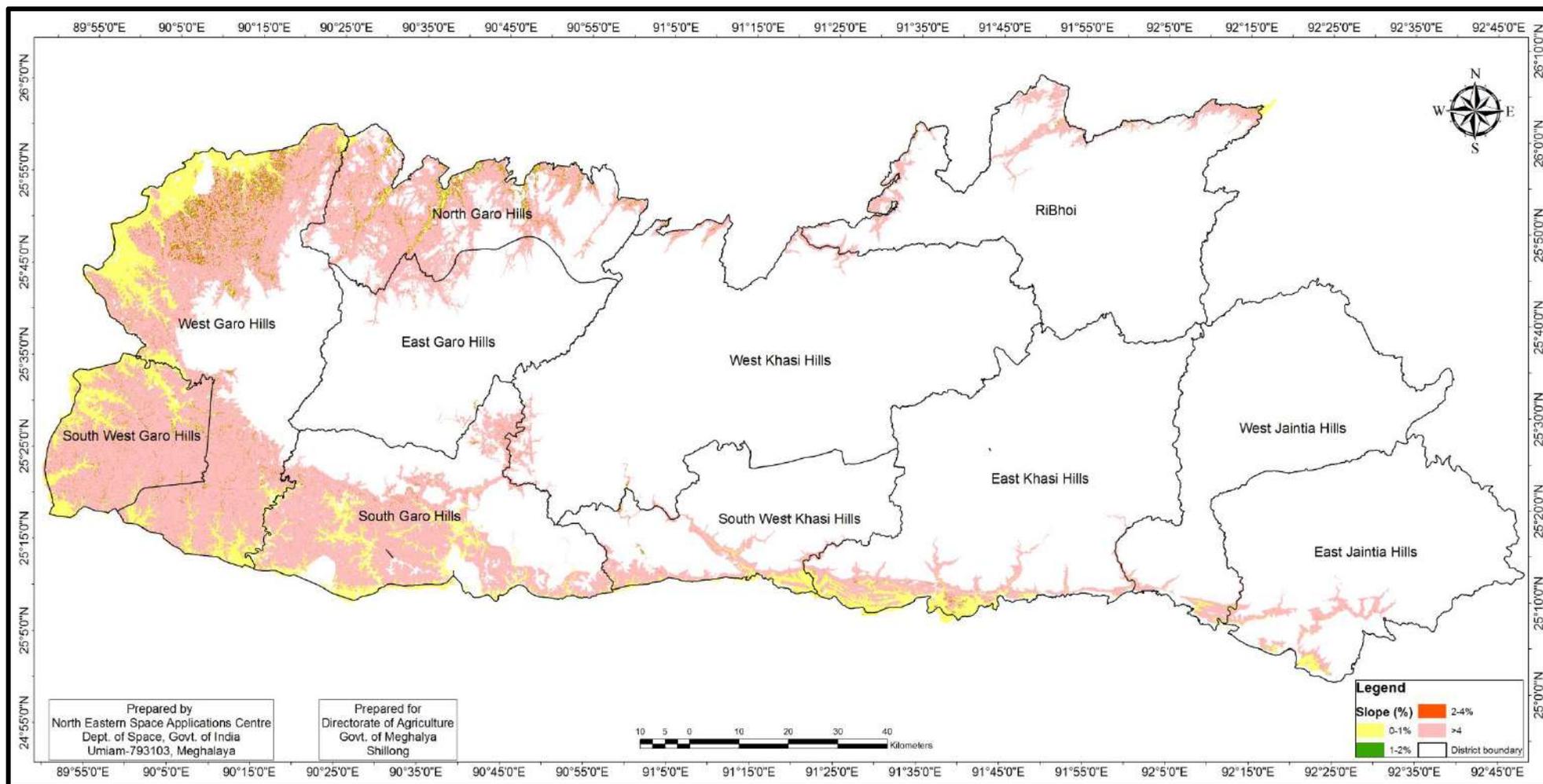


Figure 4: Slope map of the study area

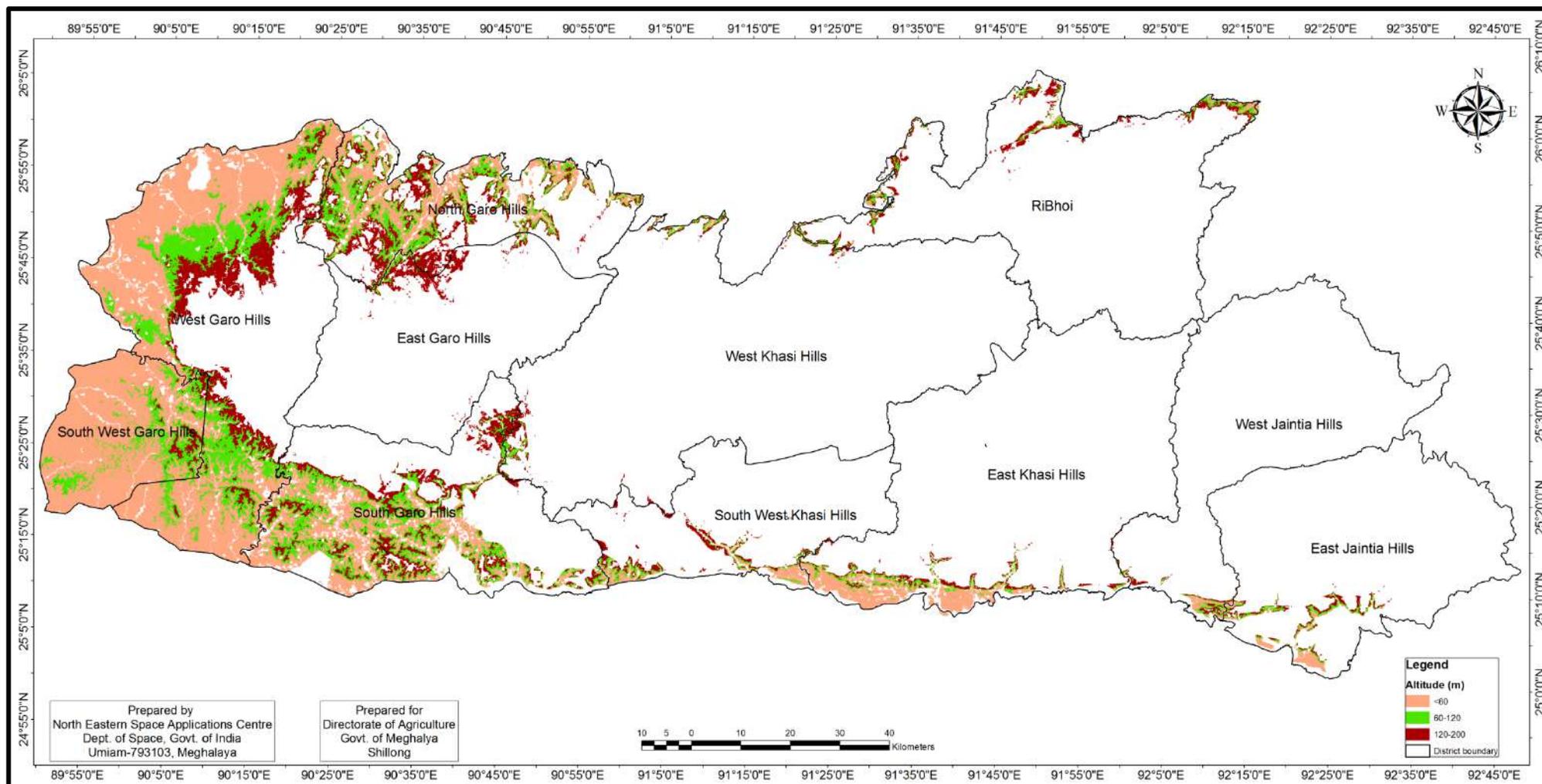


Figure 5: Elevation map of the study area

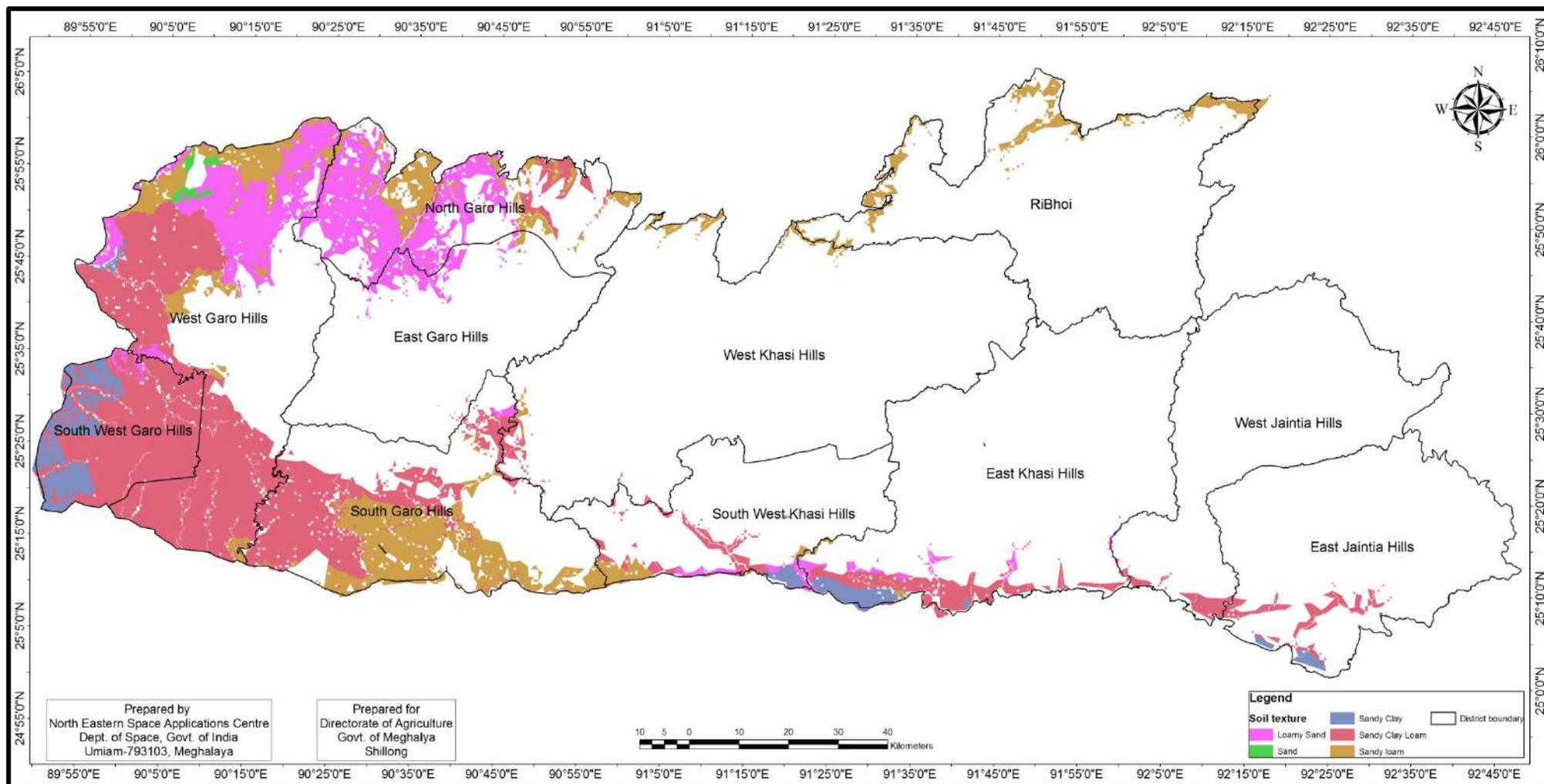


Figure 6: Soil texture map of the study area

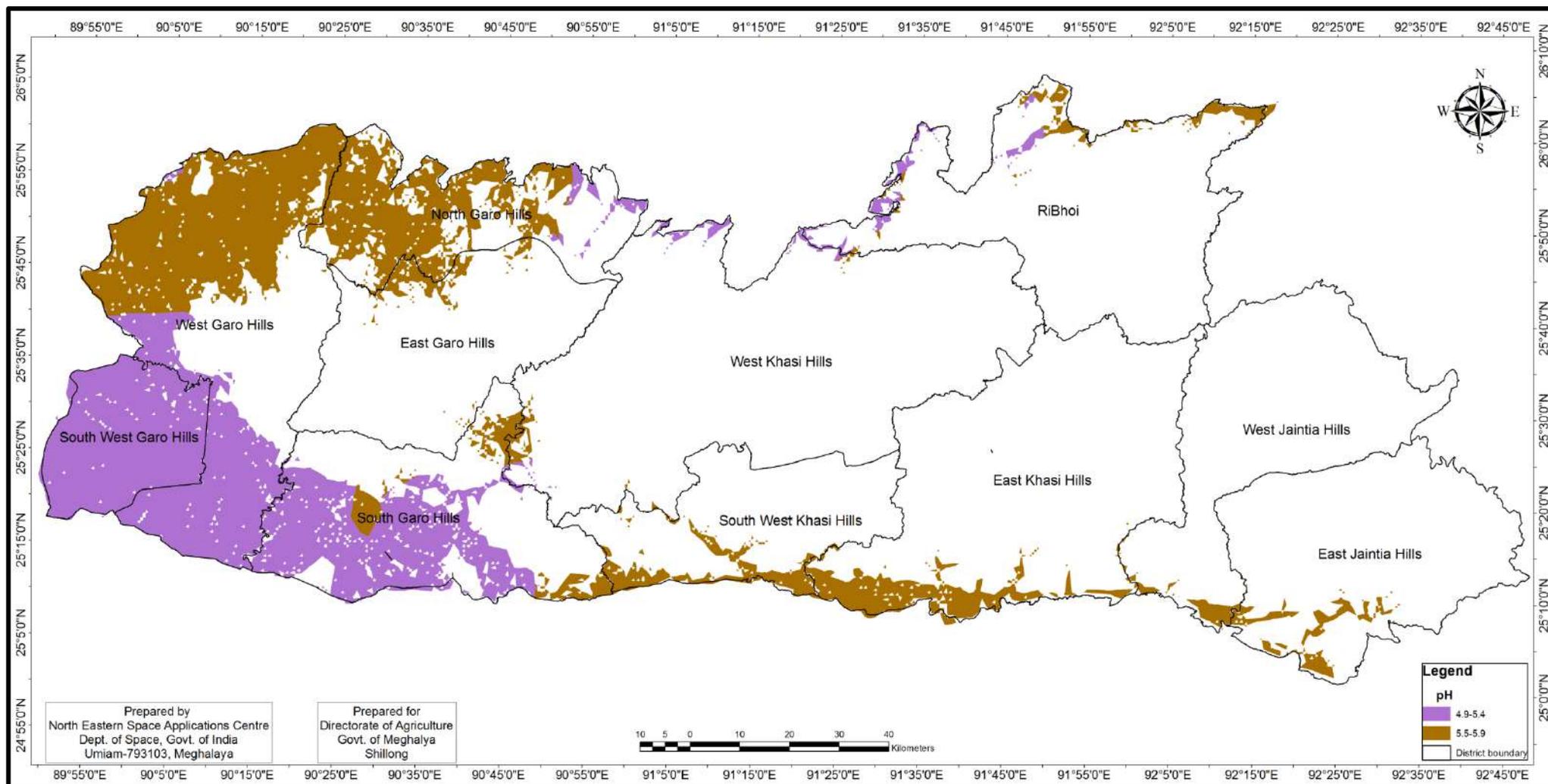


Figure 7: pH map of the study area

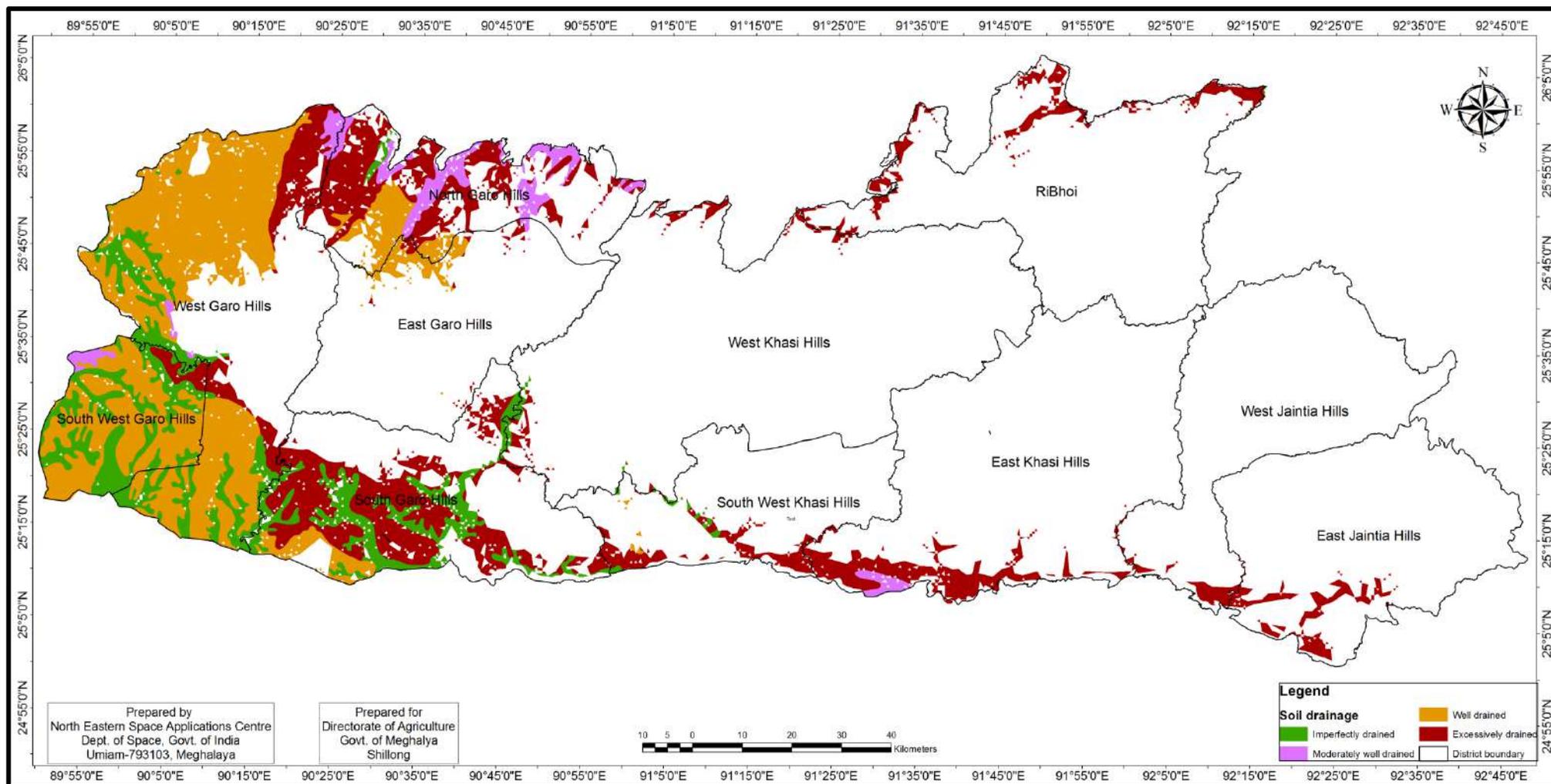


Figure 8: Soil drainage map of the study area

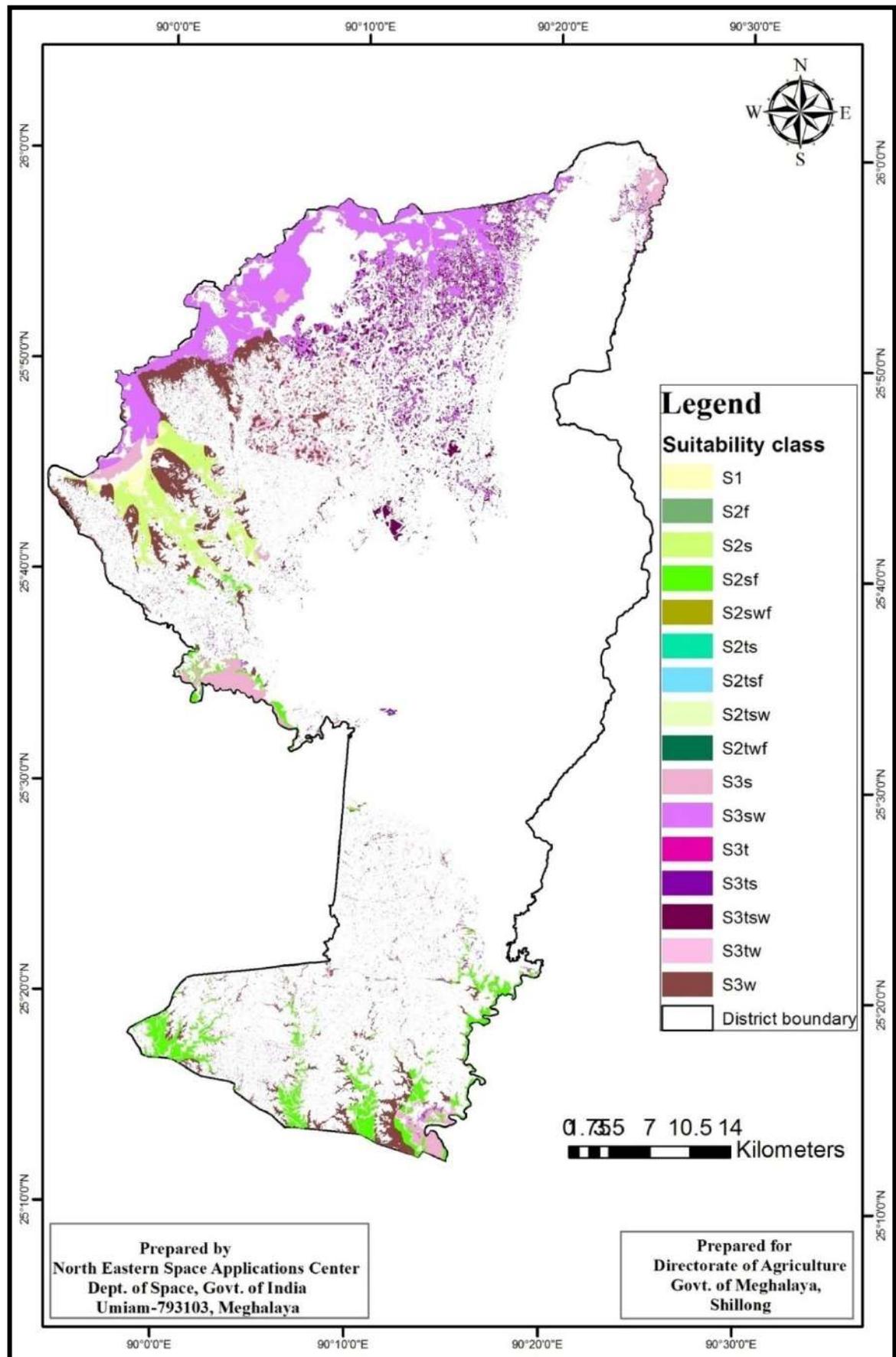


Figure 9: Suitable areas for expansion of Boro rice in West Garo Hills district

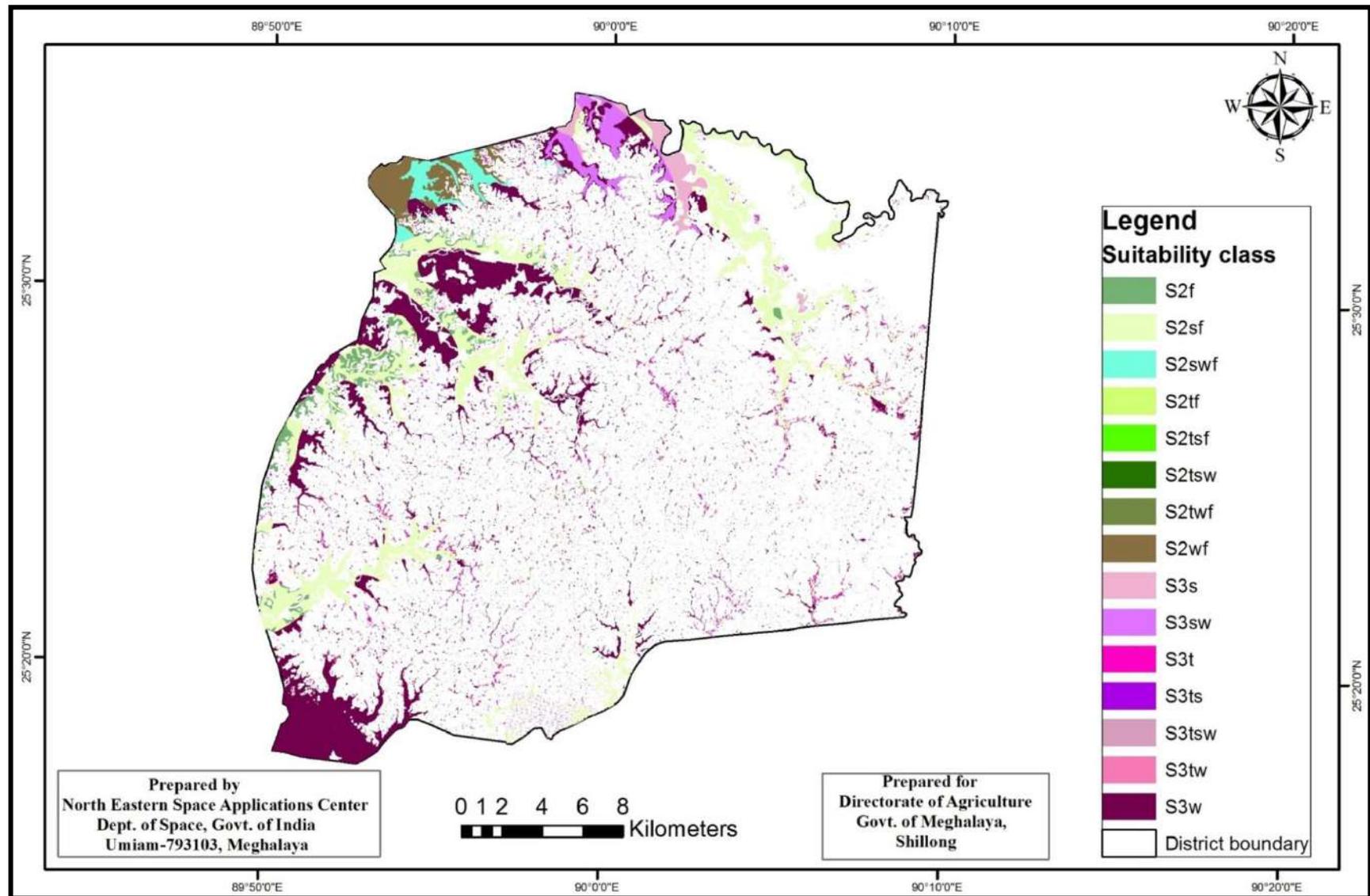


Figure 10: Suitable areas for expansion of Boro rice in South West Garo Hills district

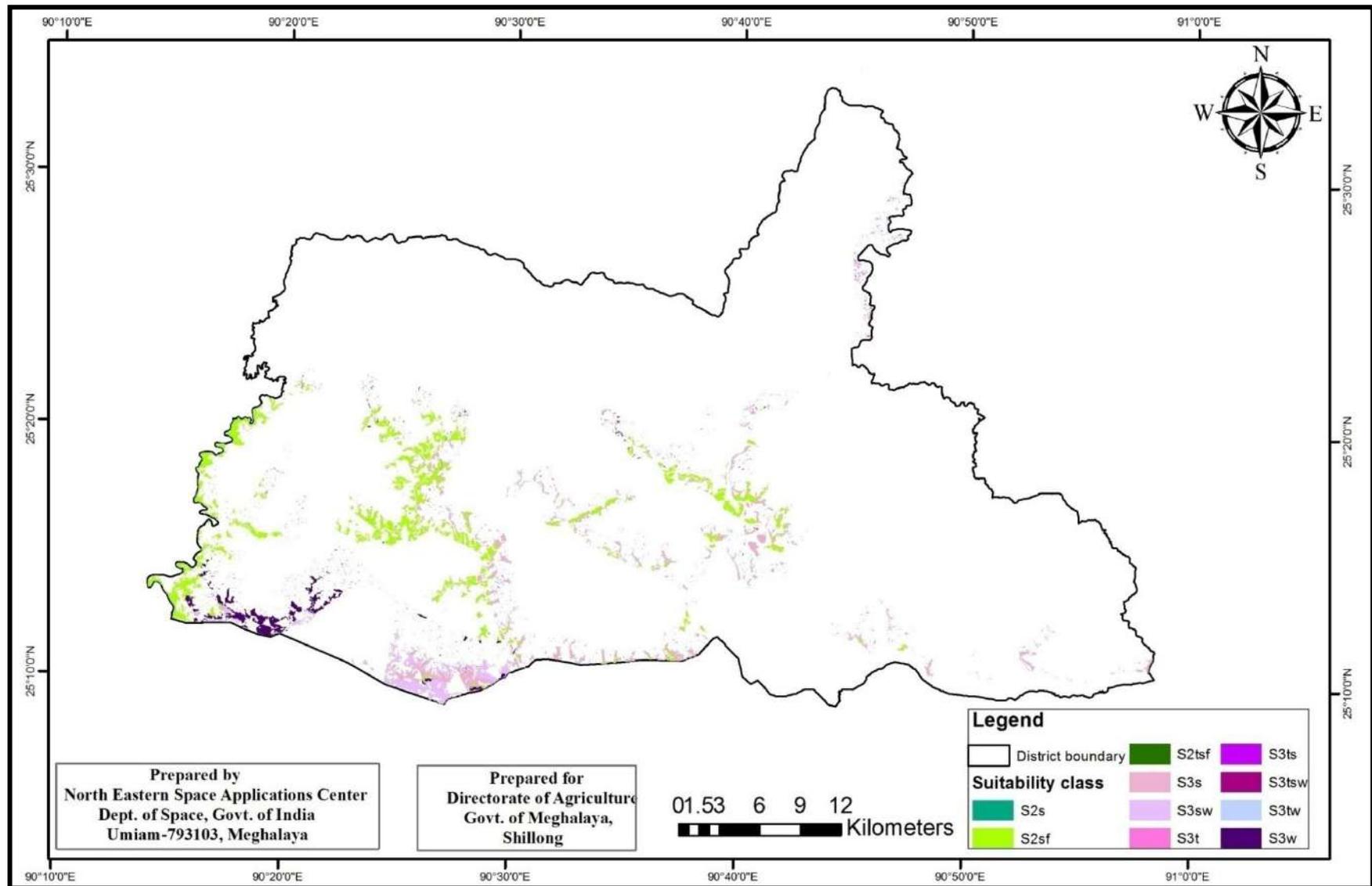


Figure 11: Suitable areas for expansion of Boro rice in South Garo Hills district

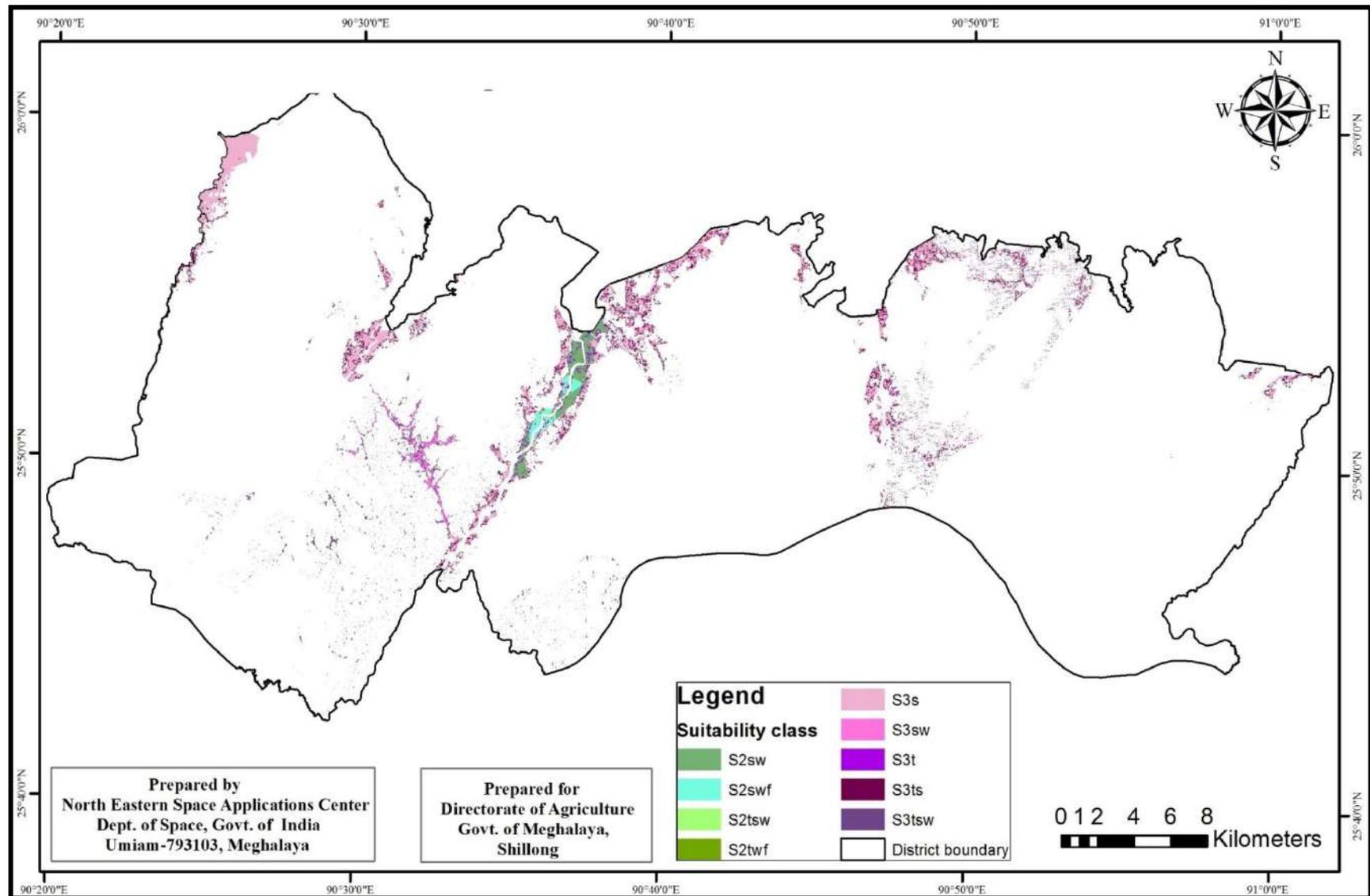


Figure 12: Suitable areas for expansion of Boro rice in North Garo Hills district

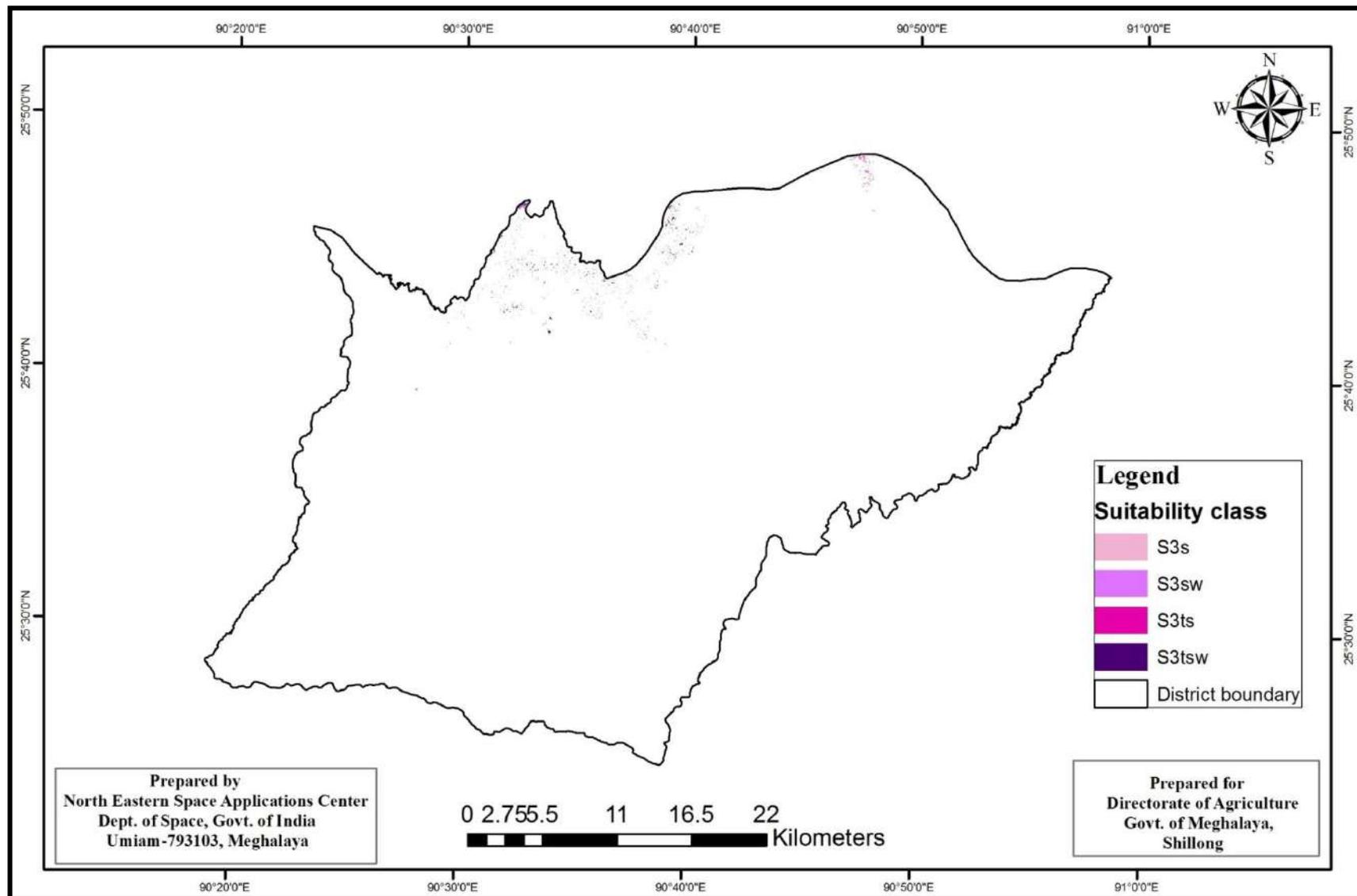


Figure 13: Suitable areas for expansion of Boro rice in East Garo Hills district

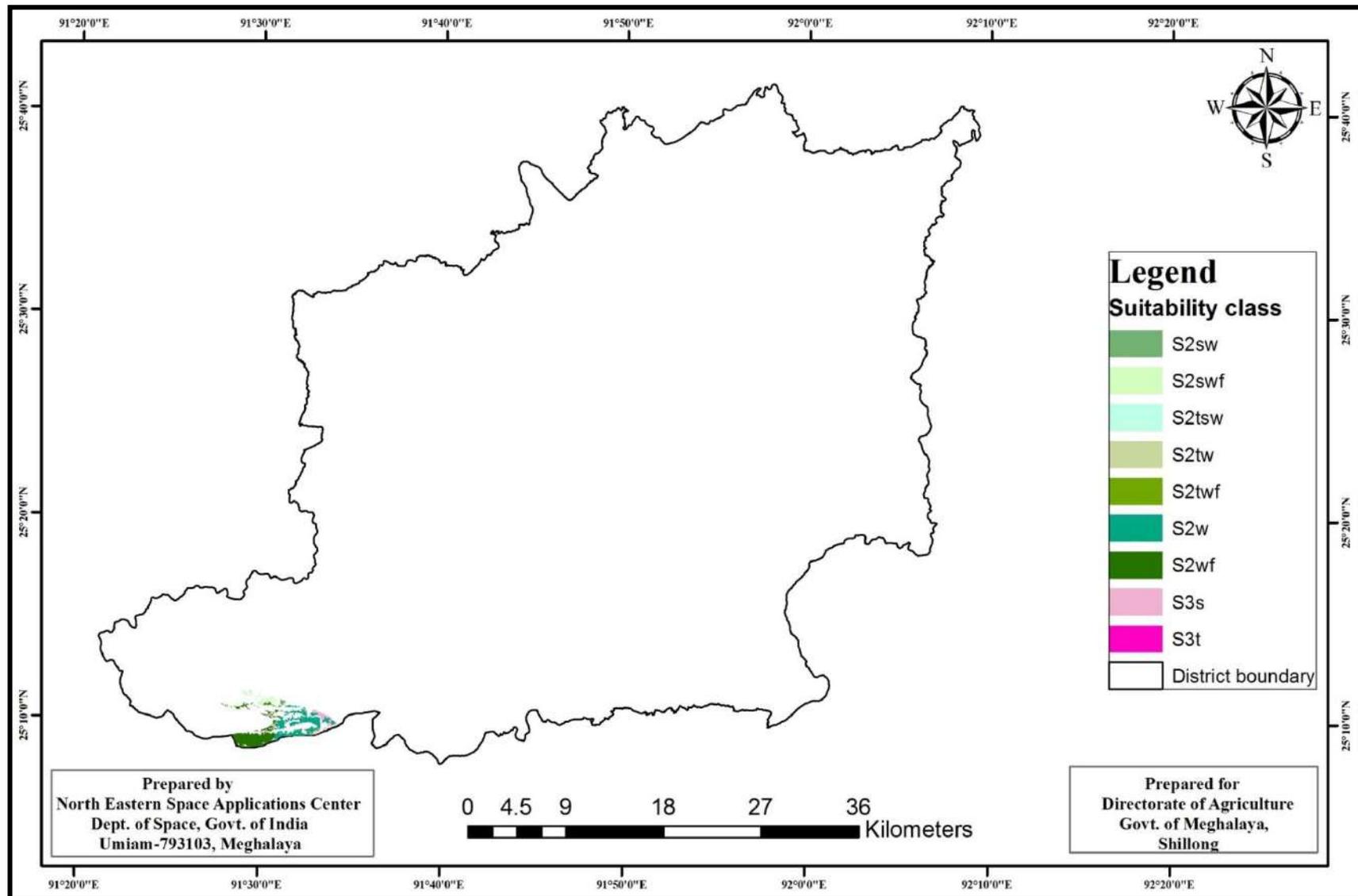


Figure 14: Suitable areas for expansion of Boro rice in East Khasi Hills district

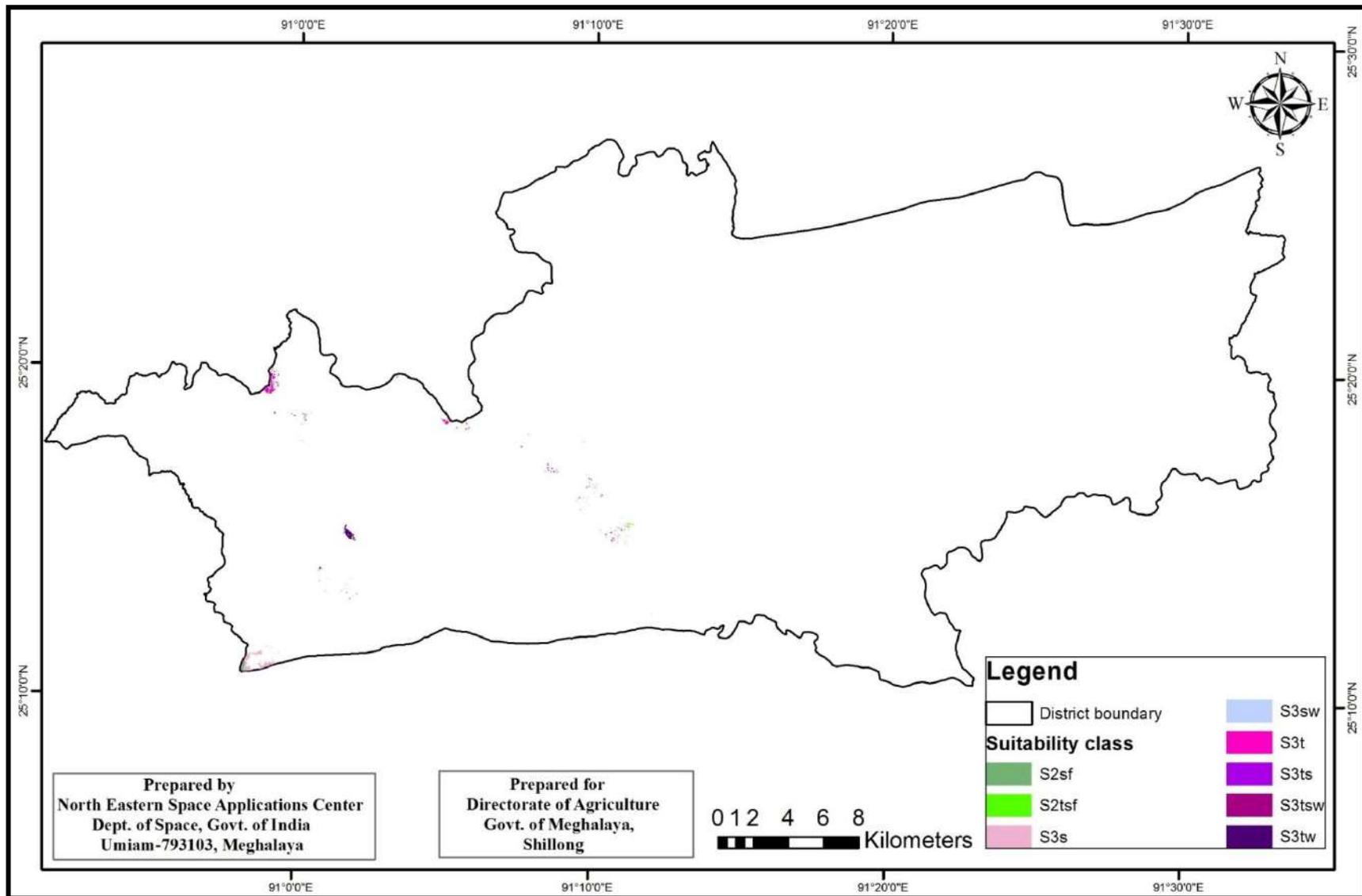


Figure 15: Suitable areas for expansion of Boro rice in South West Khasi Hills district

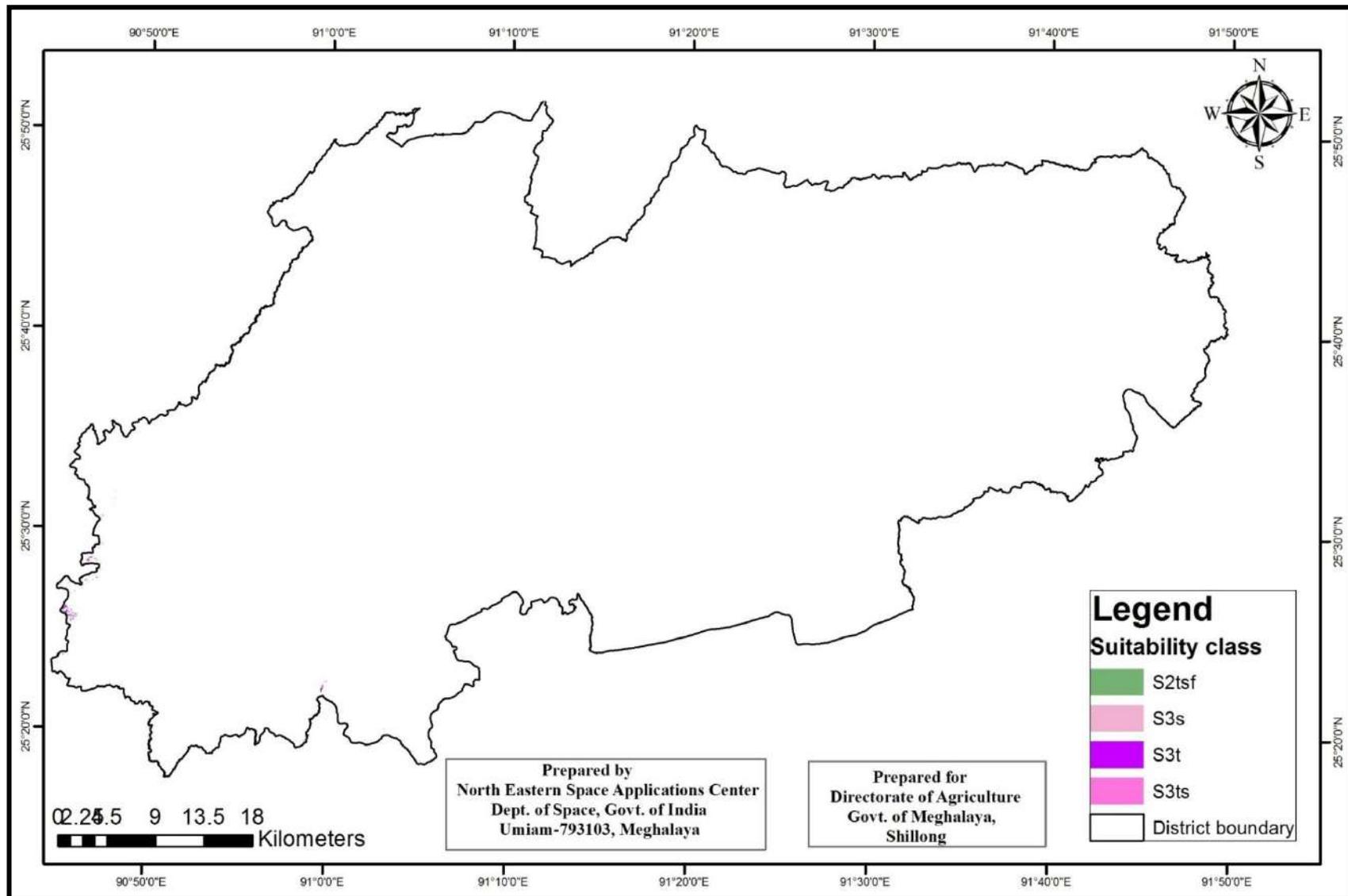


Figure 16: Suitable areas for expansion of Boro rice in West Khasi Hills district

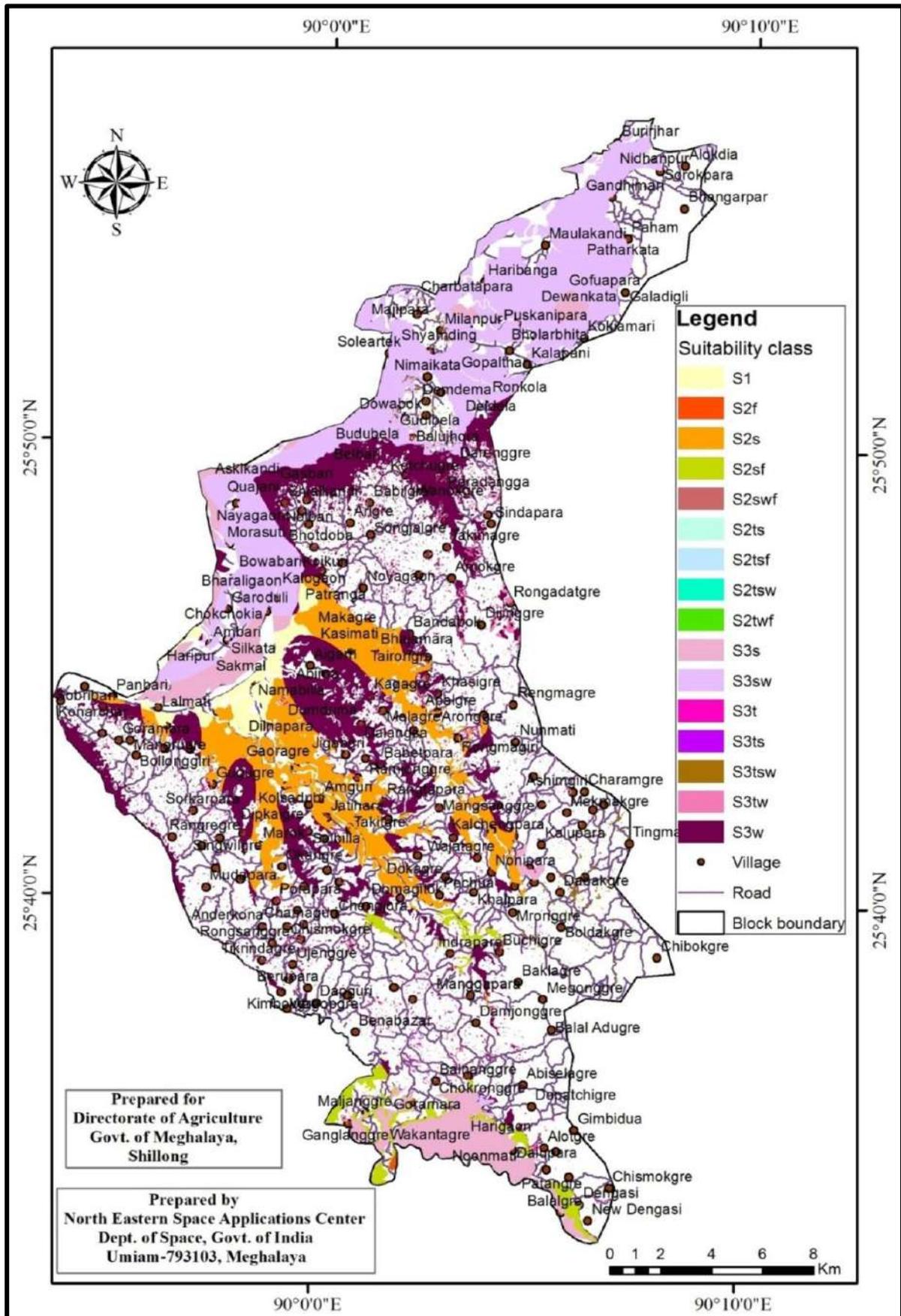


Figure 17: Suitable areas for Boro rice in Selsela block of West Garo Hills district

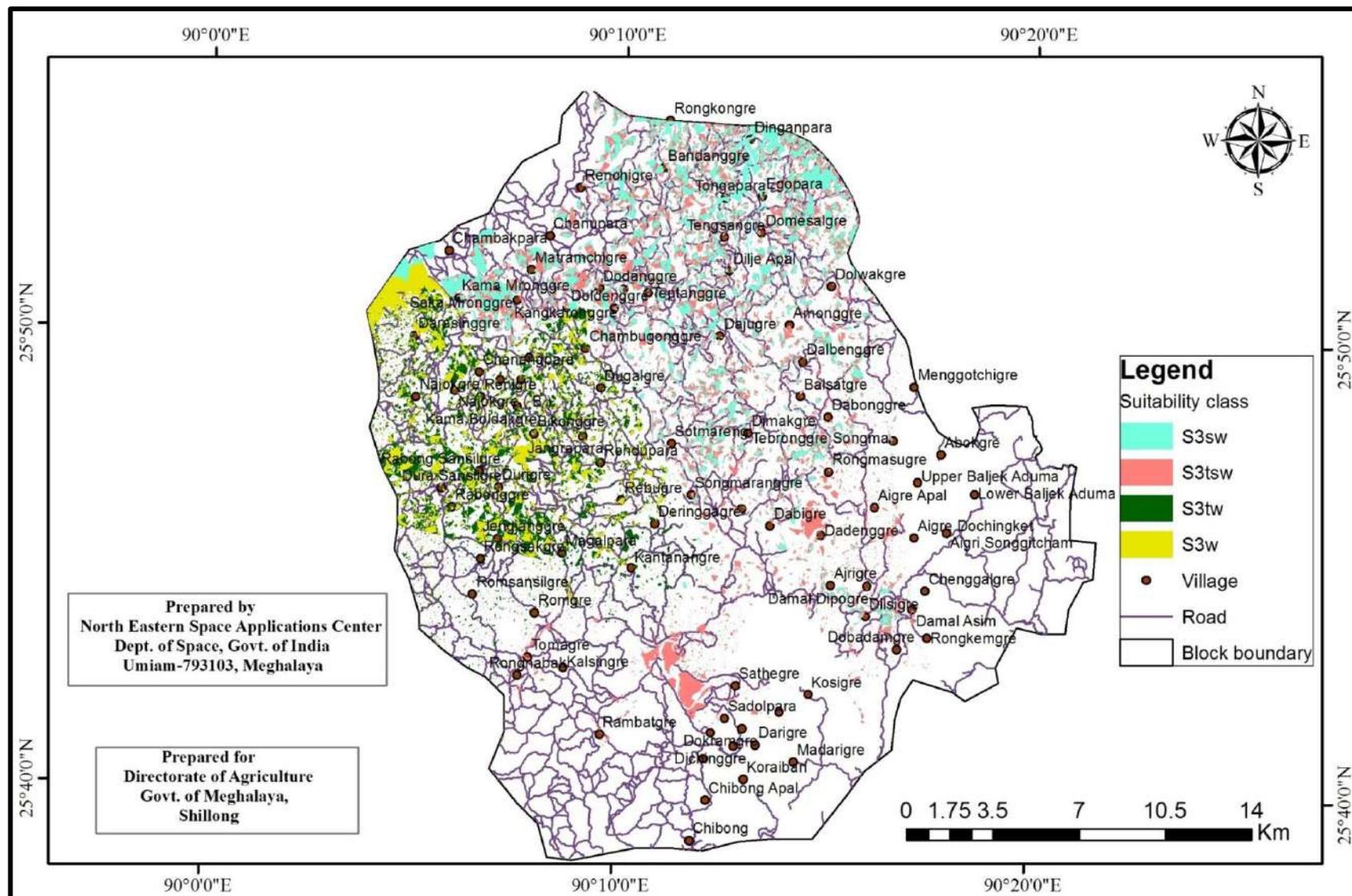


Figure 18: Suitable areas for Boro rice in Dadengre block of West Garo Hills district

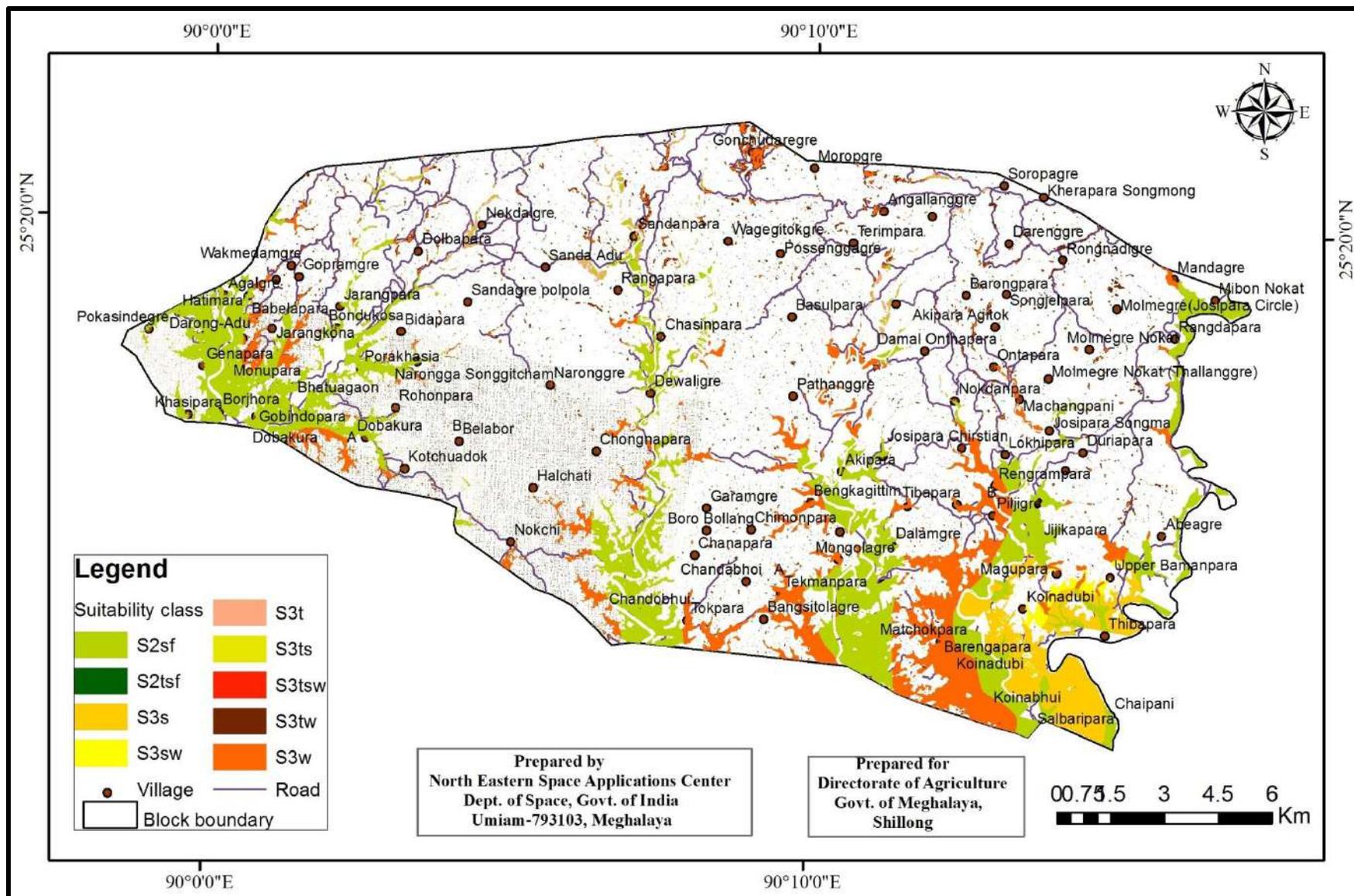


Figure 19: Suitable areas for Boro rice in Dalu block of West Garo Hills district

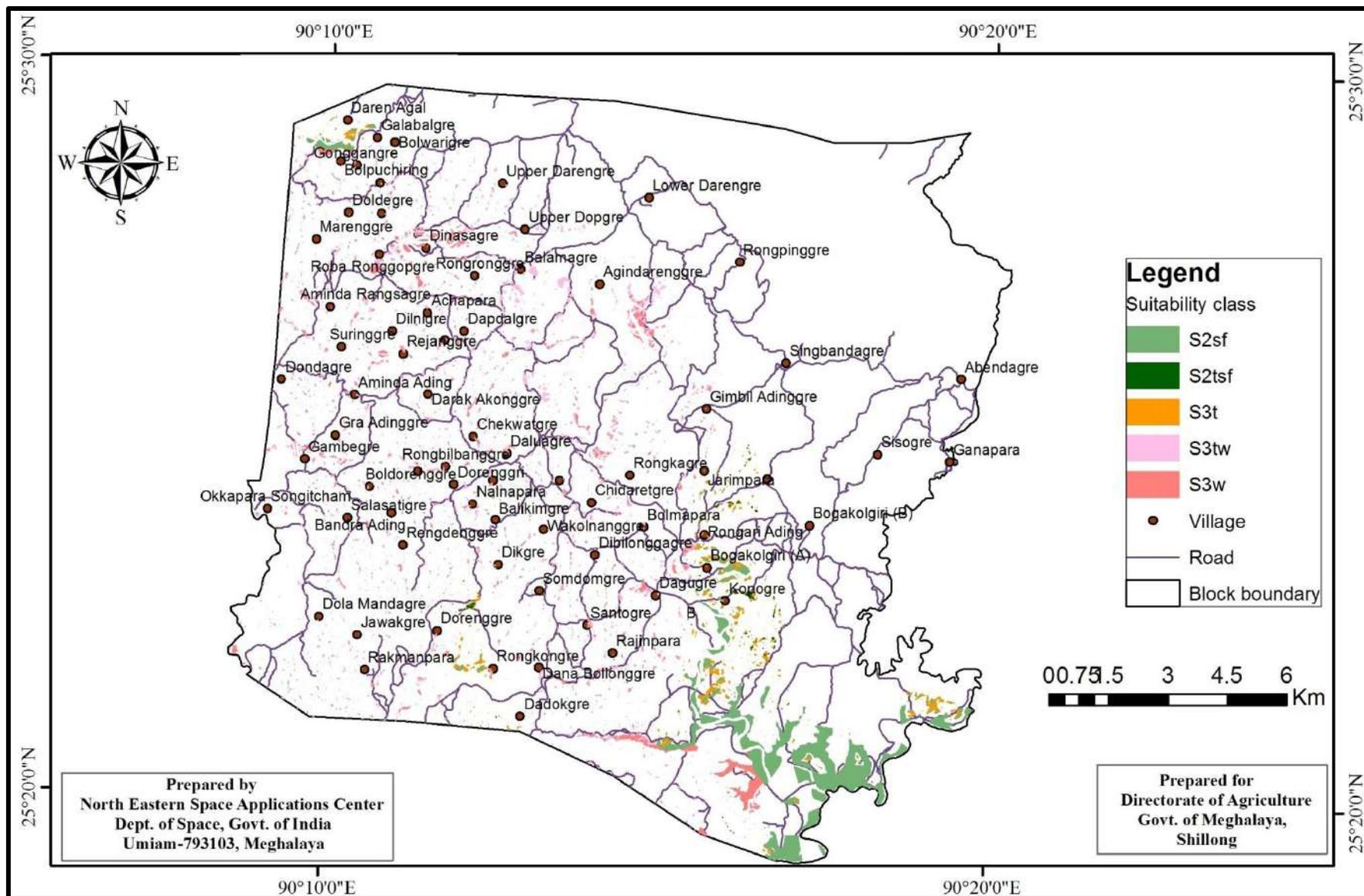


Figure 20: Suitable areas for Boro rice in Gambegre block of West Garo Hills district

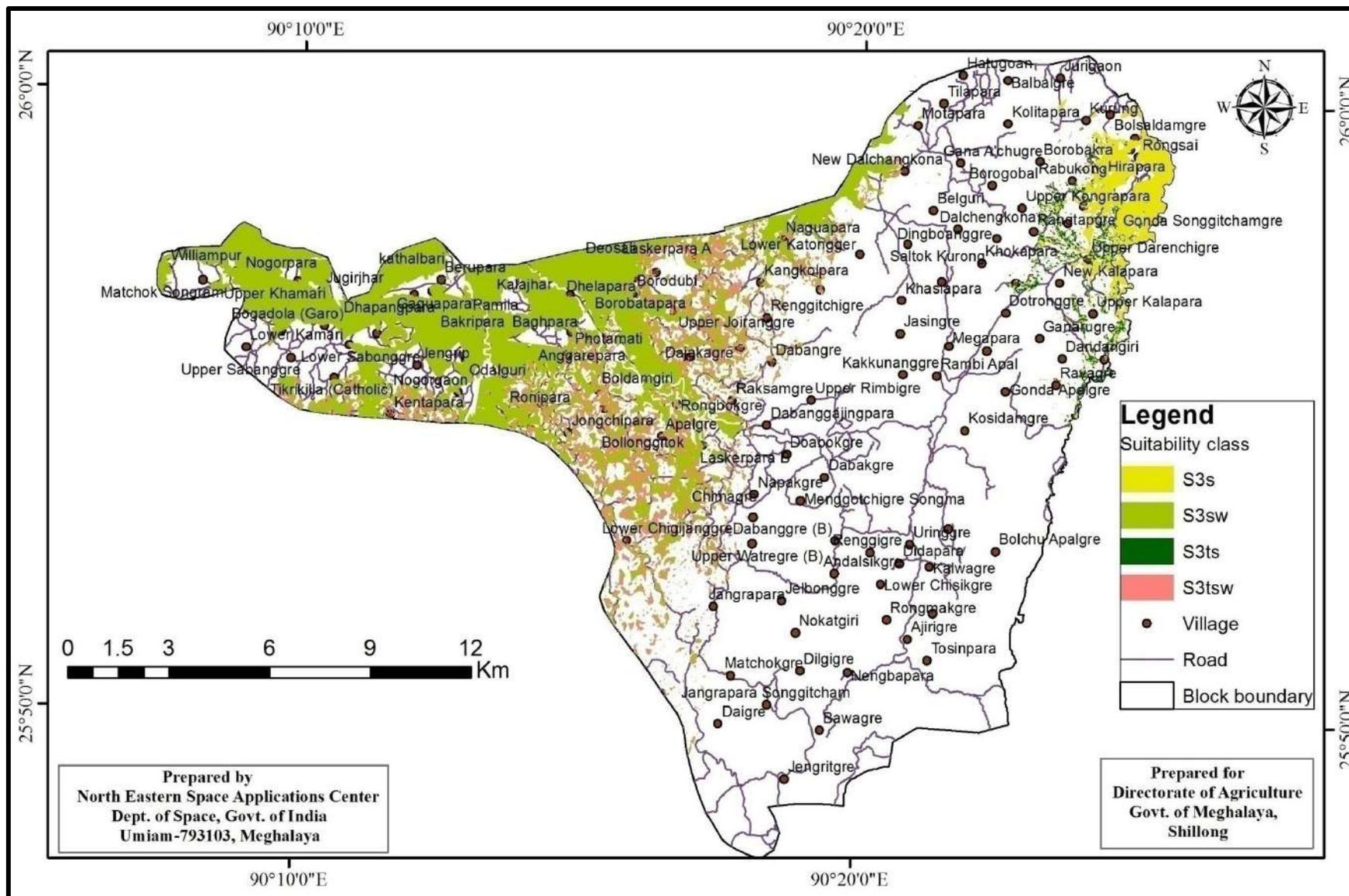


Figure 21: Suitable areas for Boro rice in Tikrikilla block of West Garo Hills district

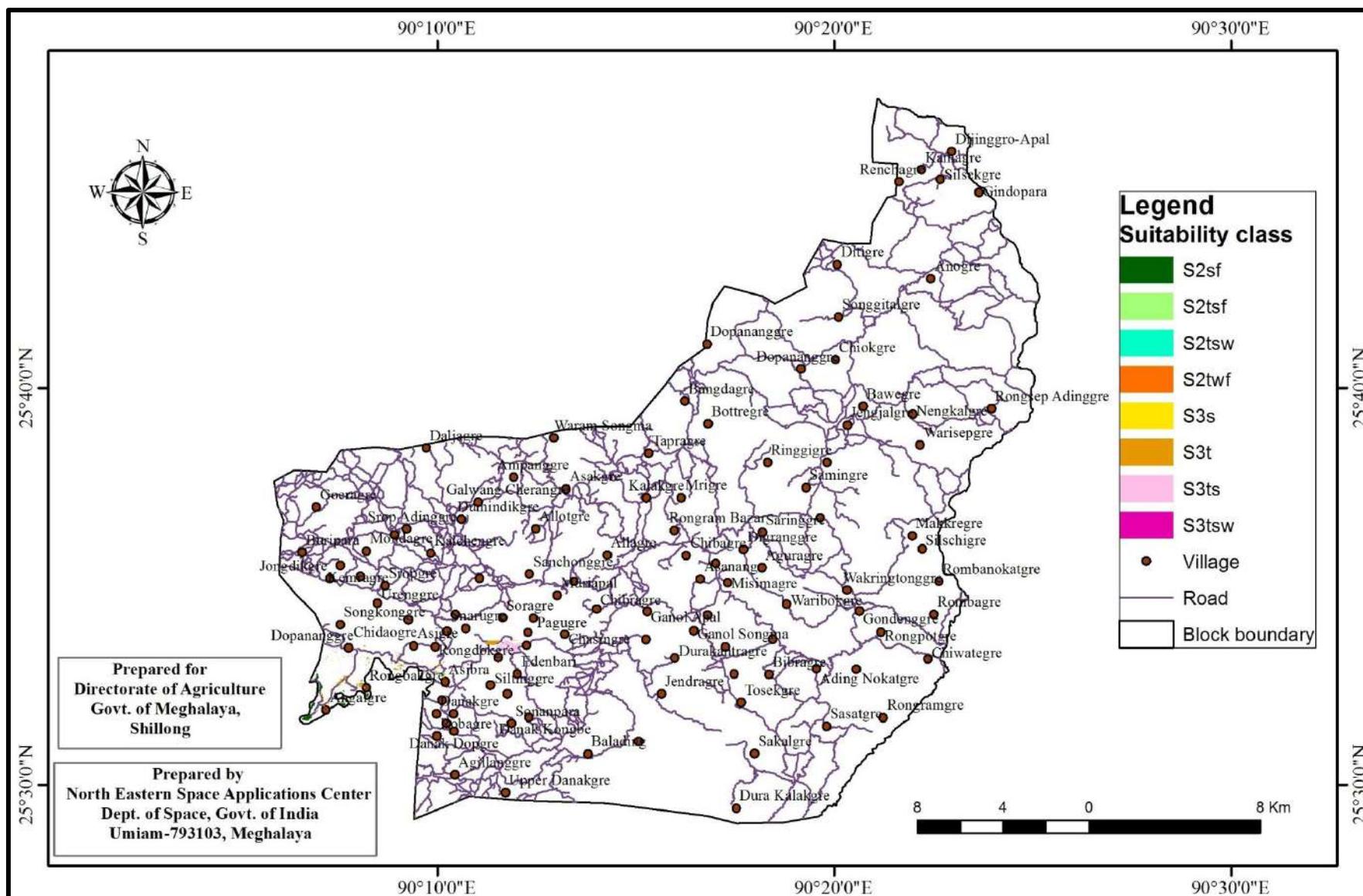


Figure 22:: Suitable areas for Boro rice in Rongram block of West Garo Hills district

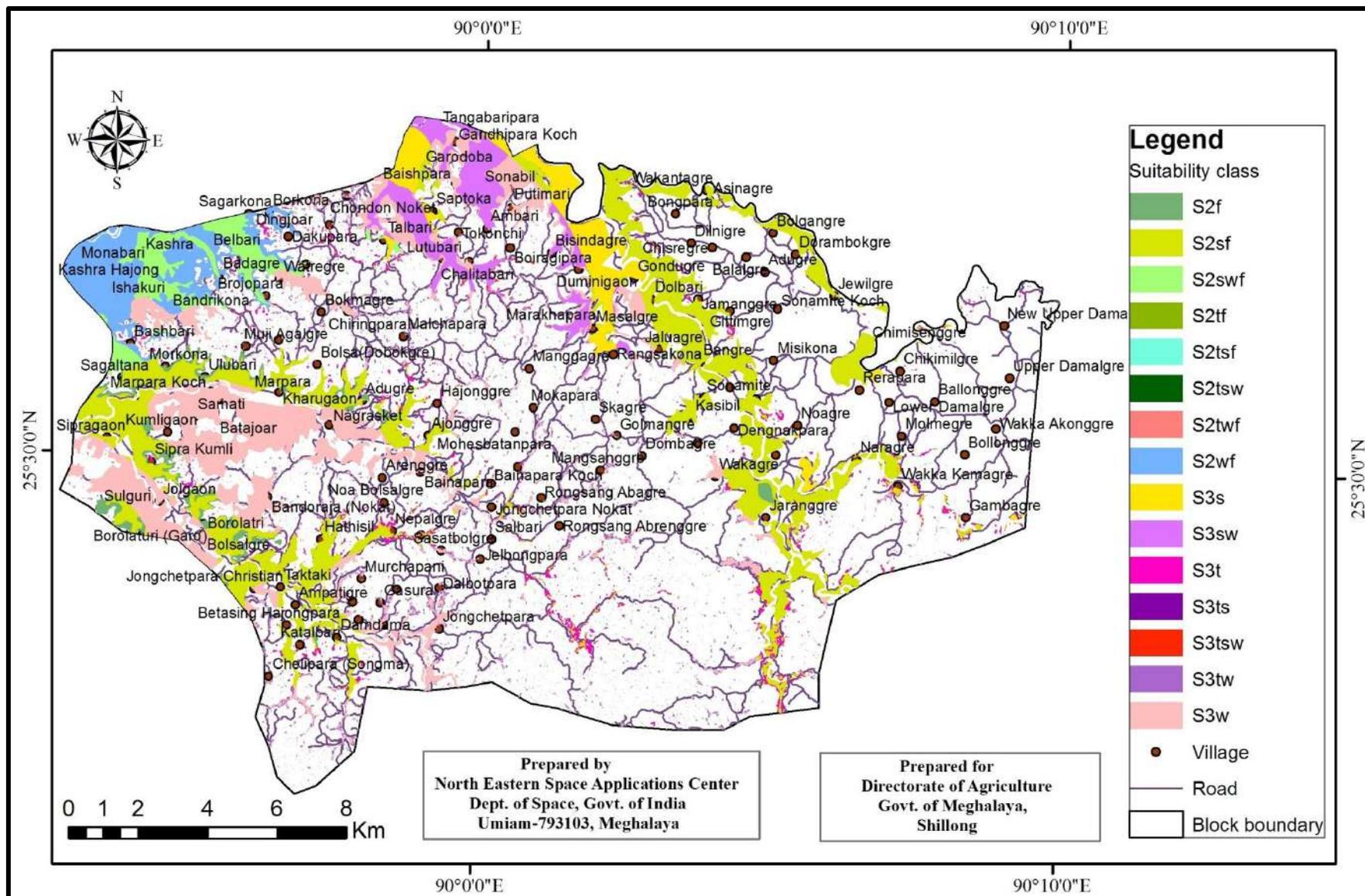


Figure 23: Suitable areas for Boro rice in Betasing block of South West Garo Hills district

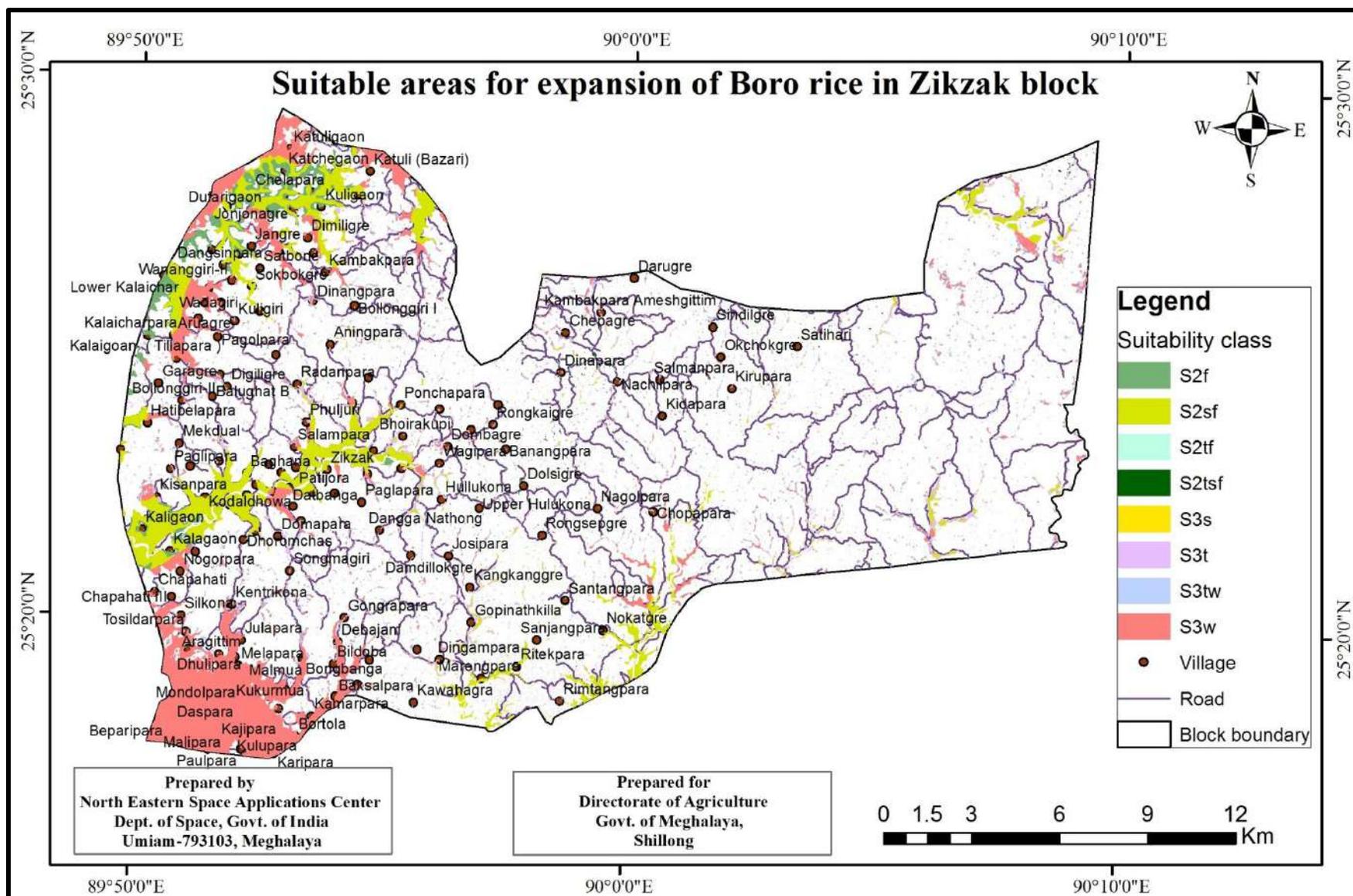


Figure 24: Suitable areas for Boro rice in Zikzak block of South West Garo Hills district

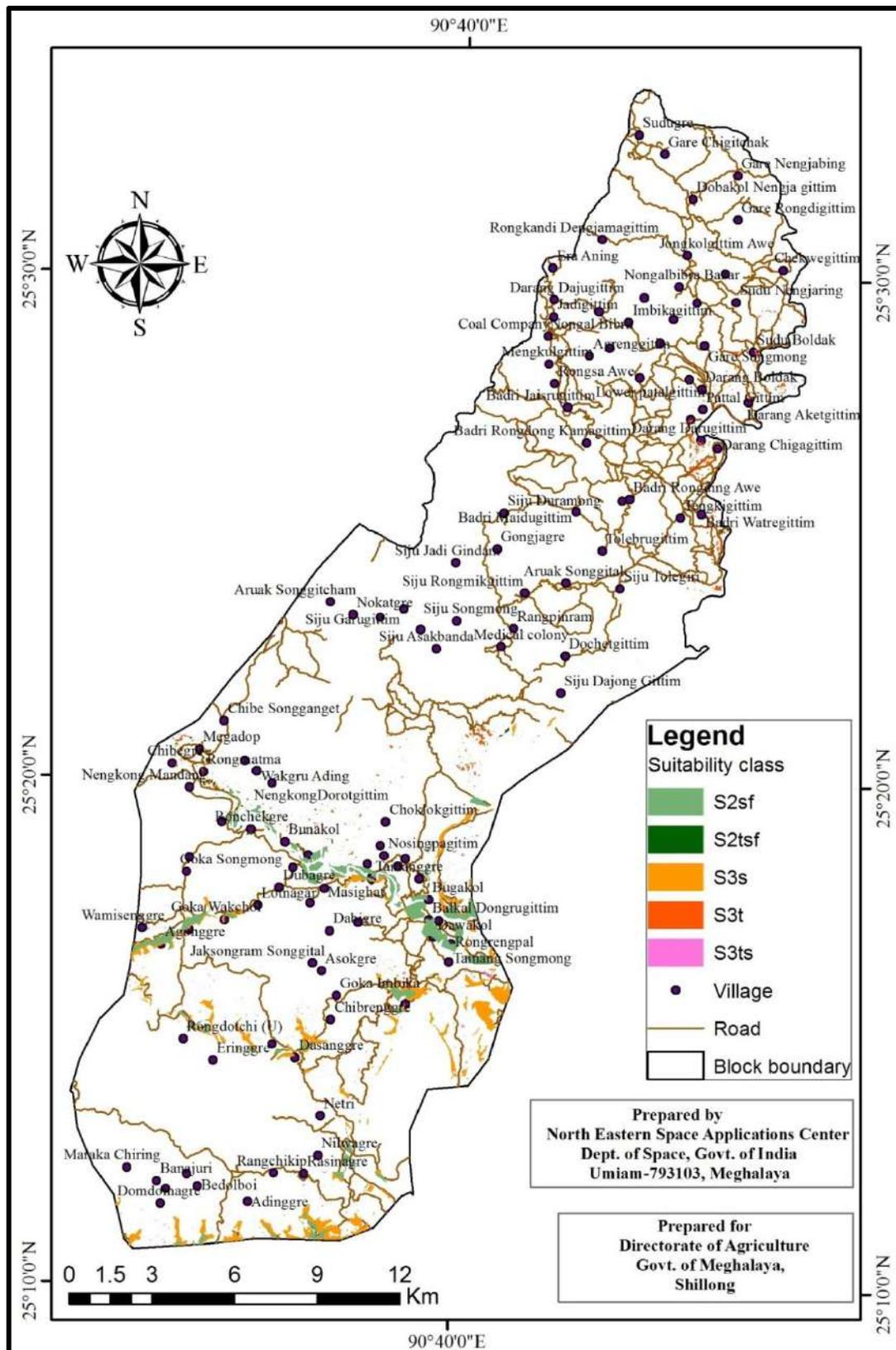


Figure 25: Suitable areas for Boro rice in Baghmara block of South Garo Hills district

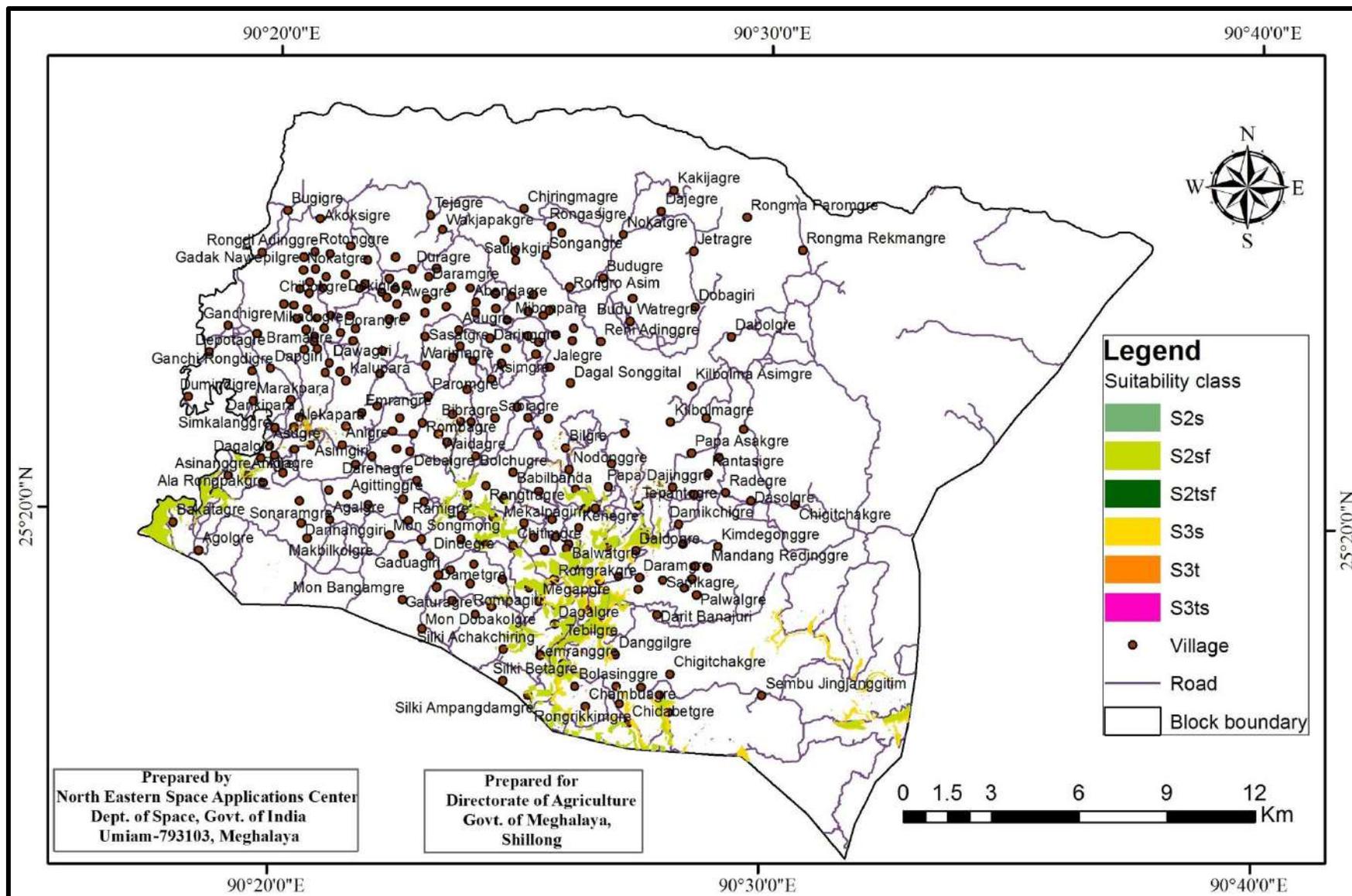


Figure 26: Suitable areas for Boro rice in Chokpot block of South Garo Hills district

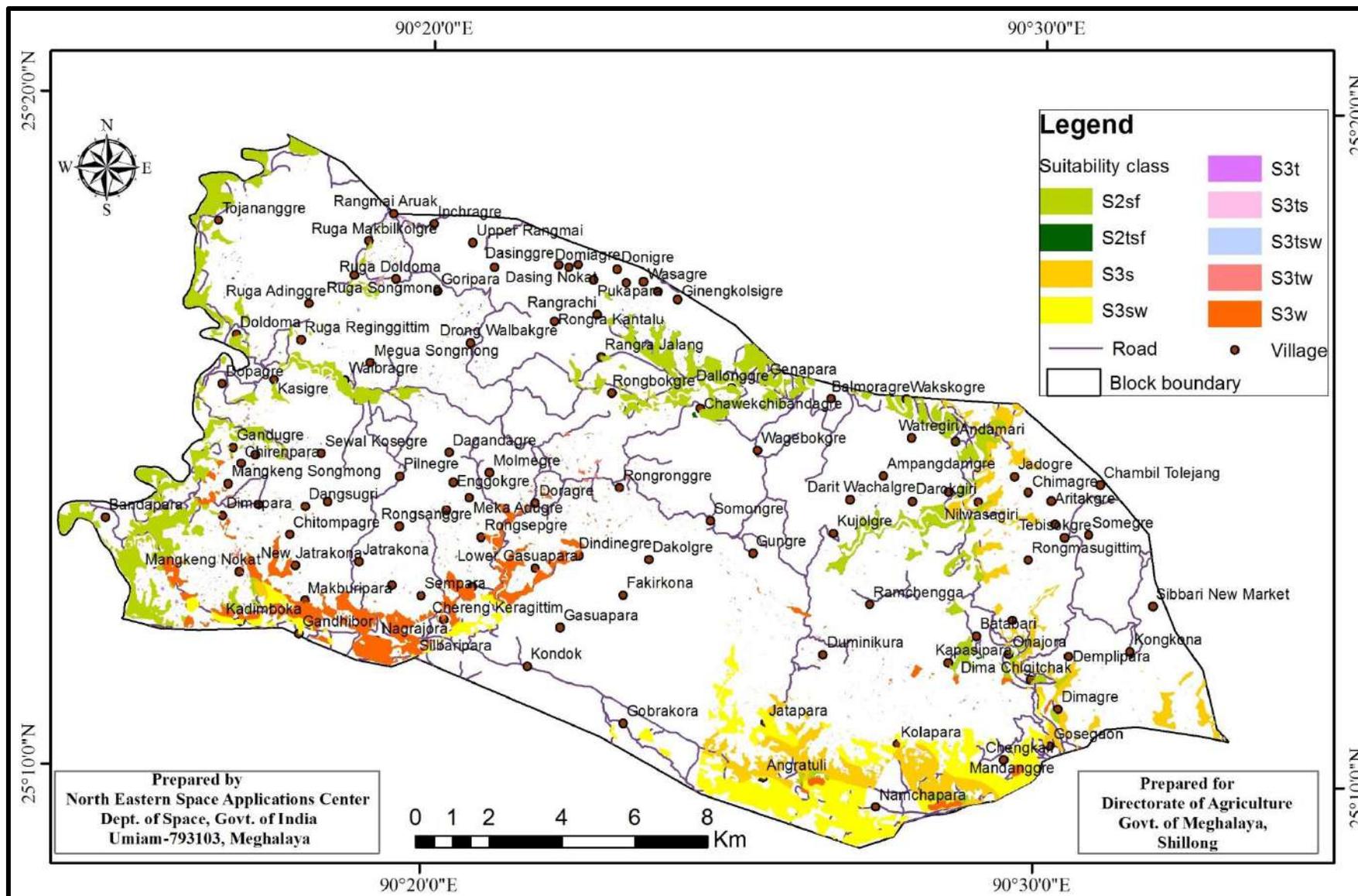


Figure 27: Suitable areas for Boro rice in Gasuapara block of South Garo Hills district

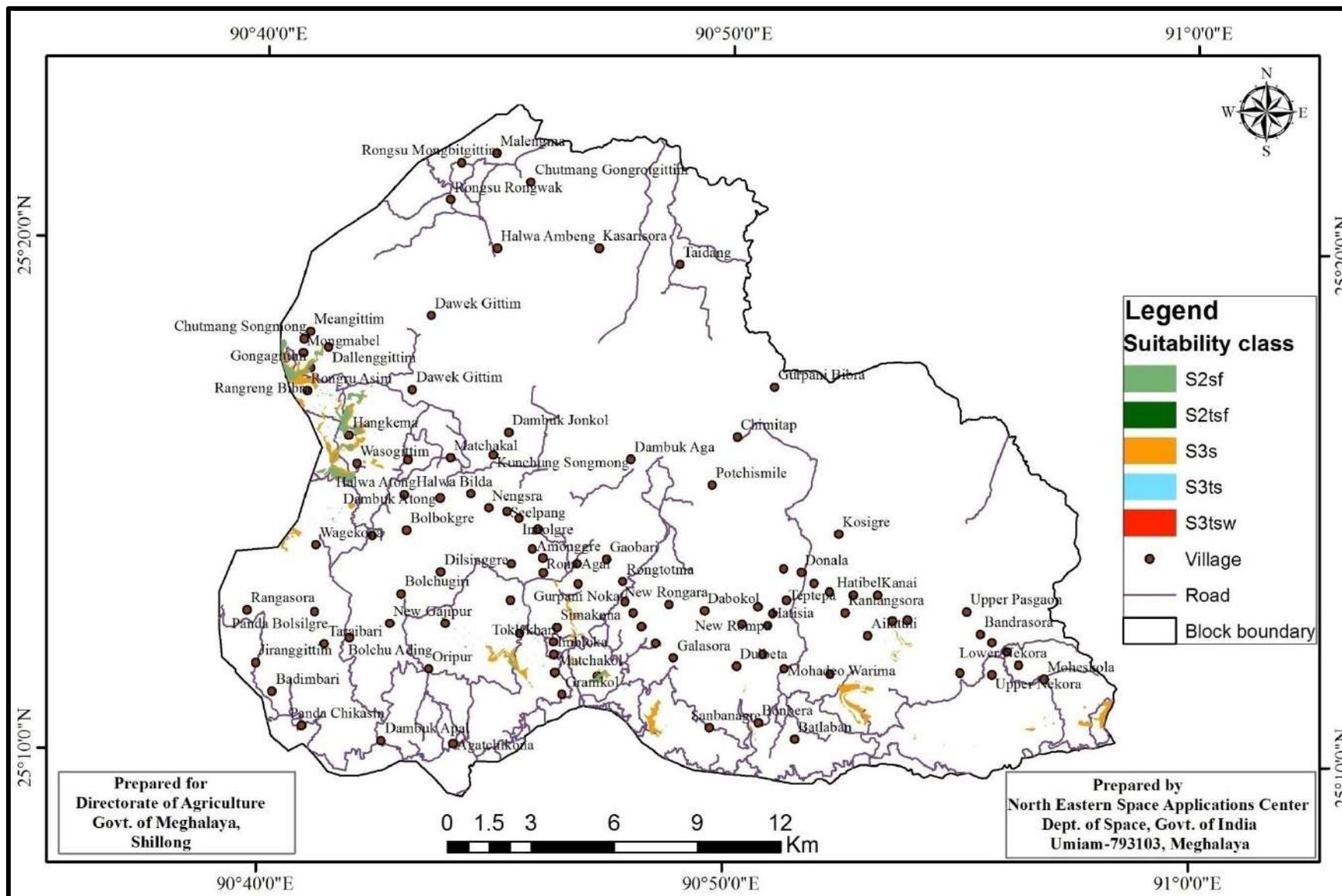


Figure 28: Suitable areas for Boro rice in Rongara block of South Garo Hills district

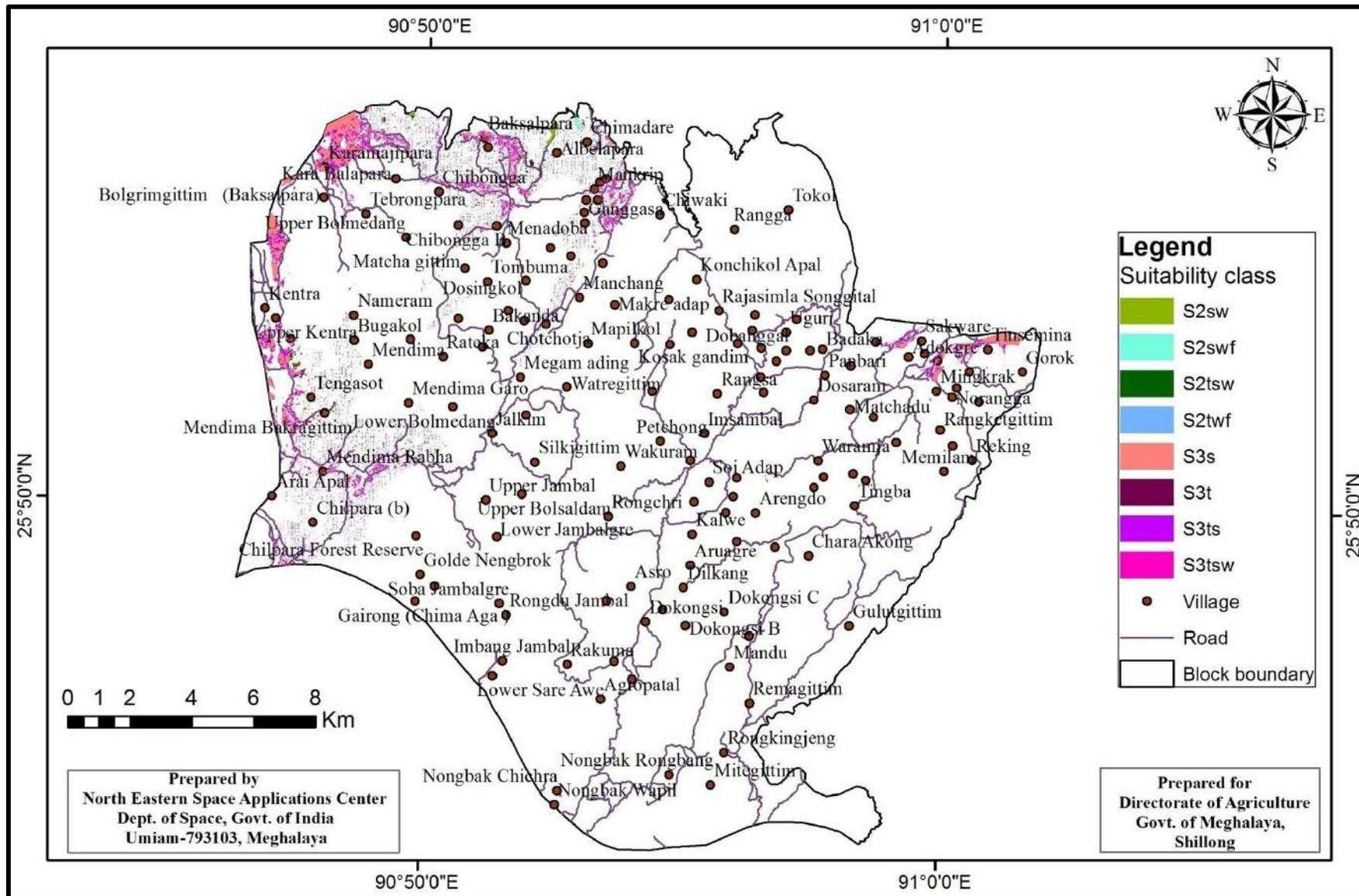


Figure 29: Suitable areas for Boro rice in Kharkutta block of North Garo Hills district

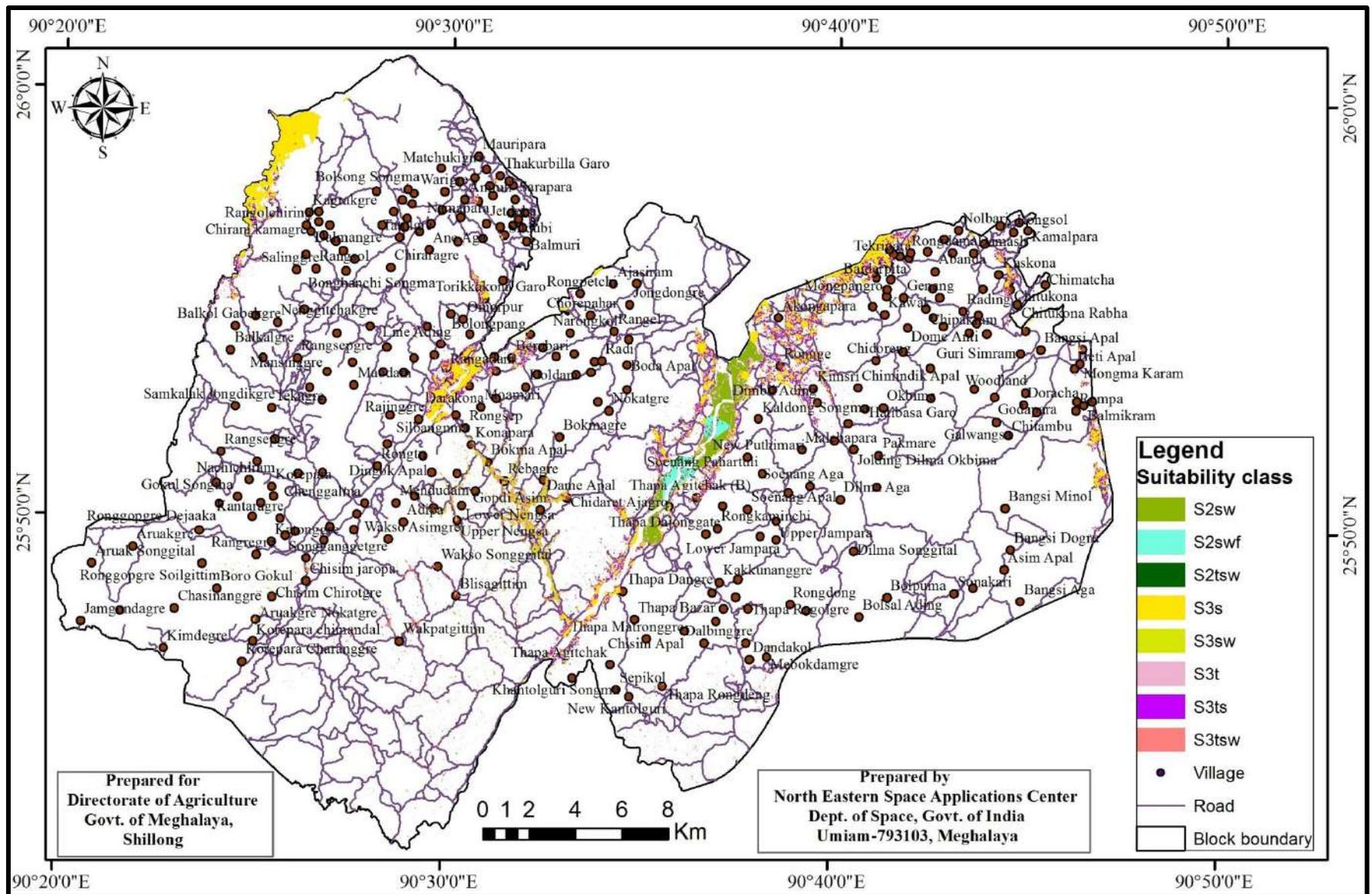


Figure 30: Suitable areas for Boro rice in Resubelpara block of North Garo Hills district

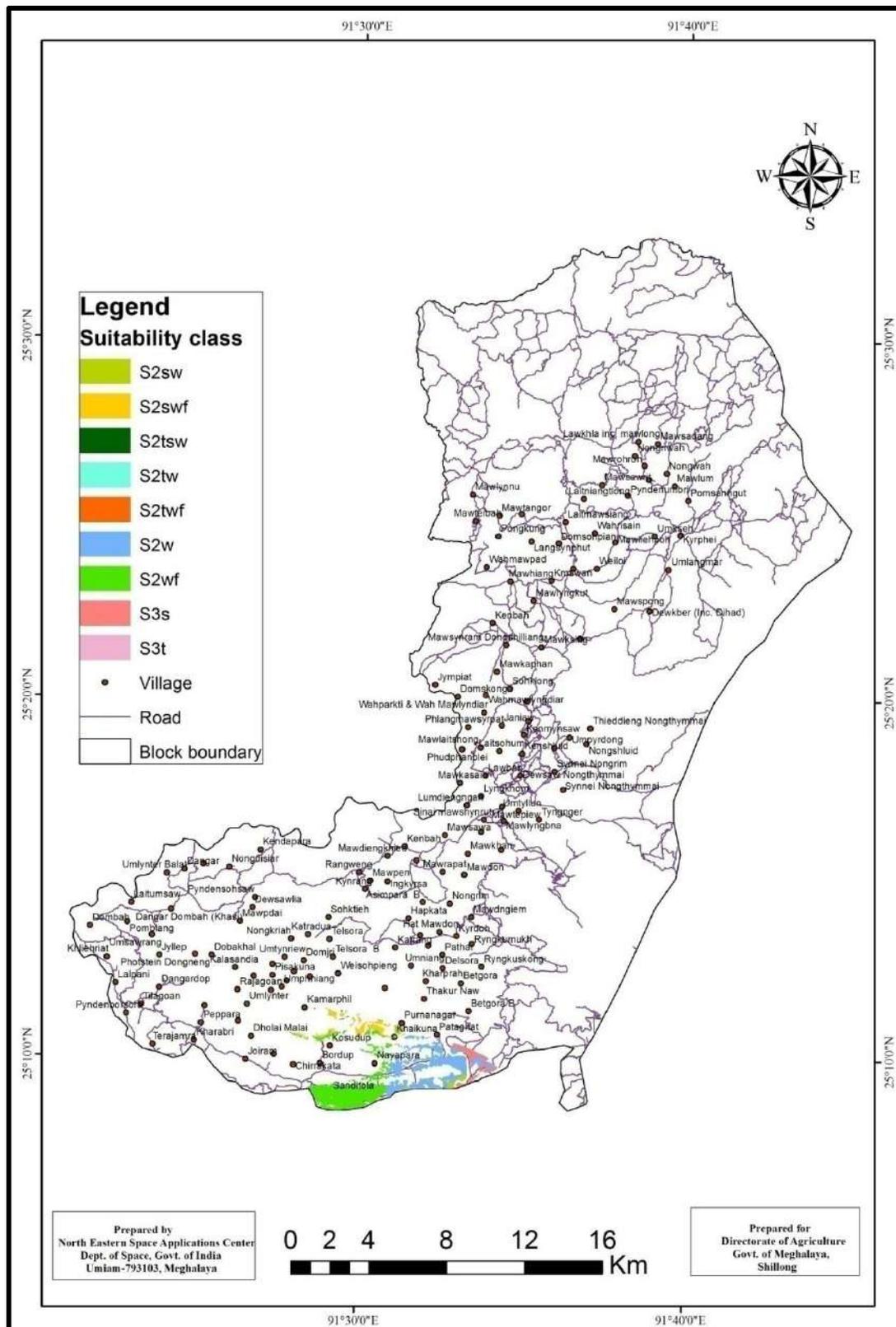


Figure 31: Suitable areas for Boro rice in Mawsynram block of East Khasi Hills district

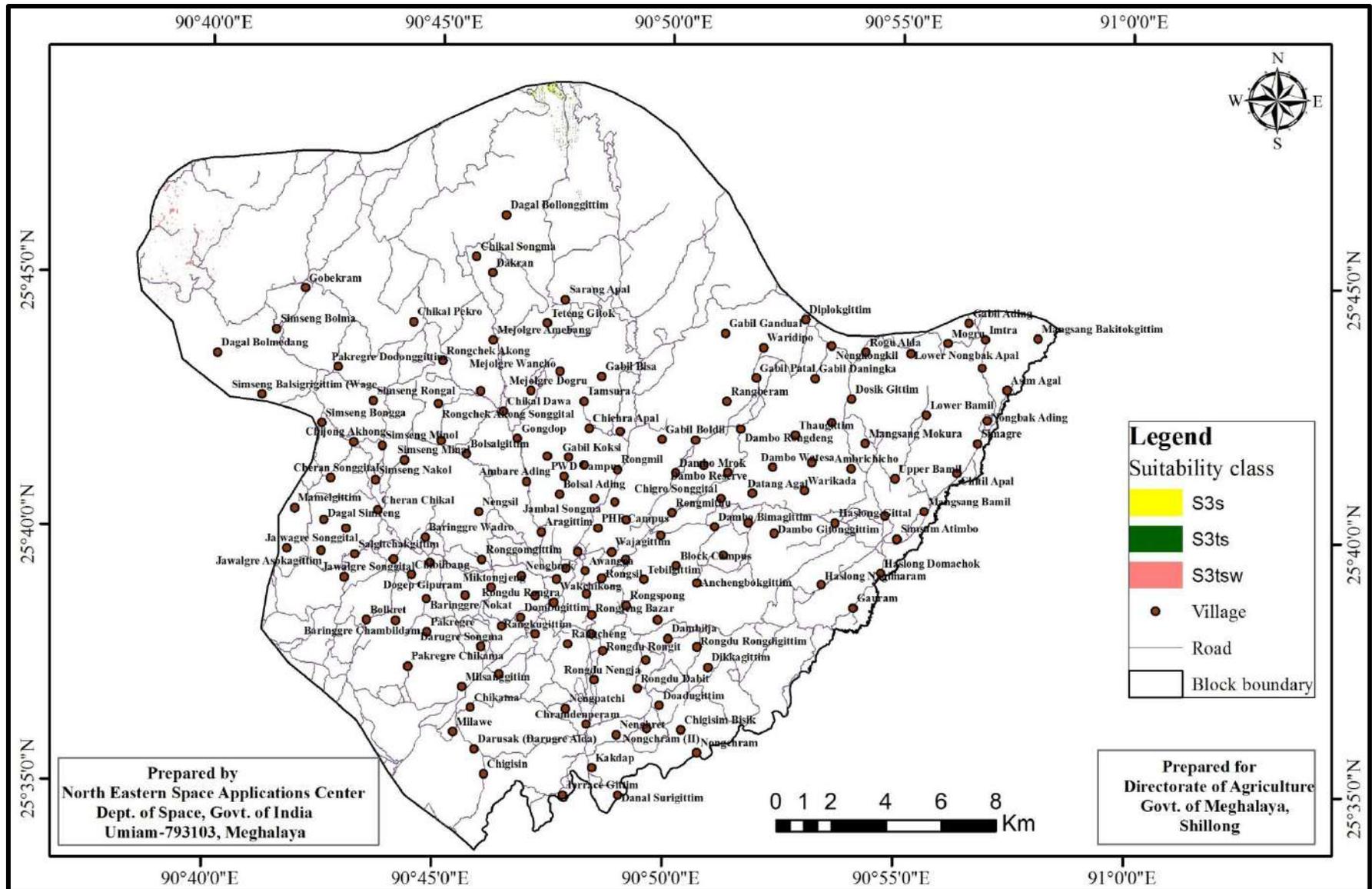


Figure 32: Suitable areas for Boro rice in Rongjeng block of East Garo Hills district

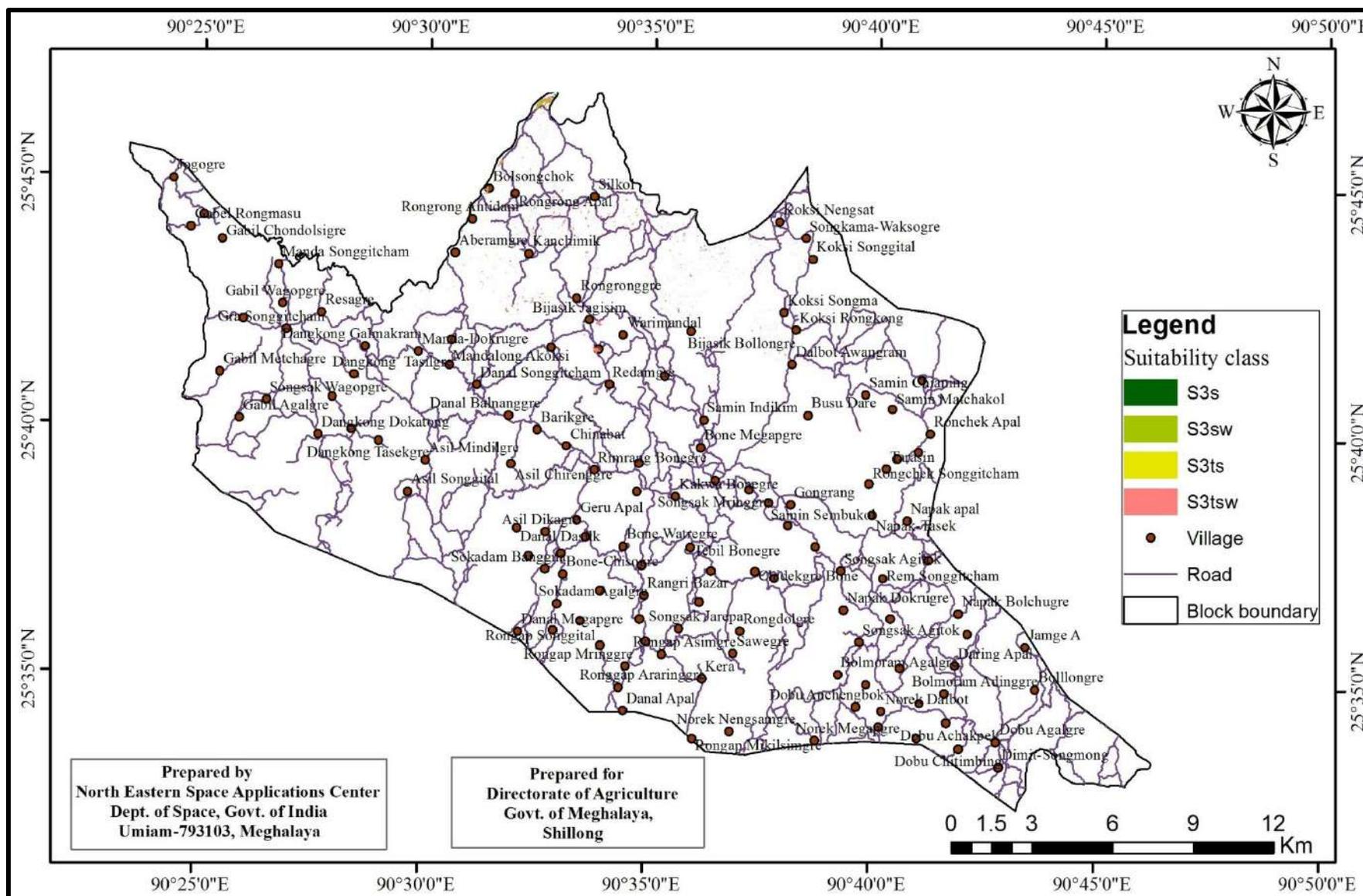


Figure 33: Suitable areas for Boro rice in Songsak block of East Garo Hills district

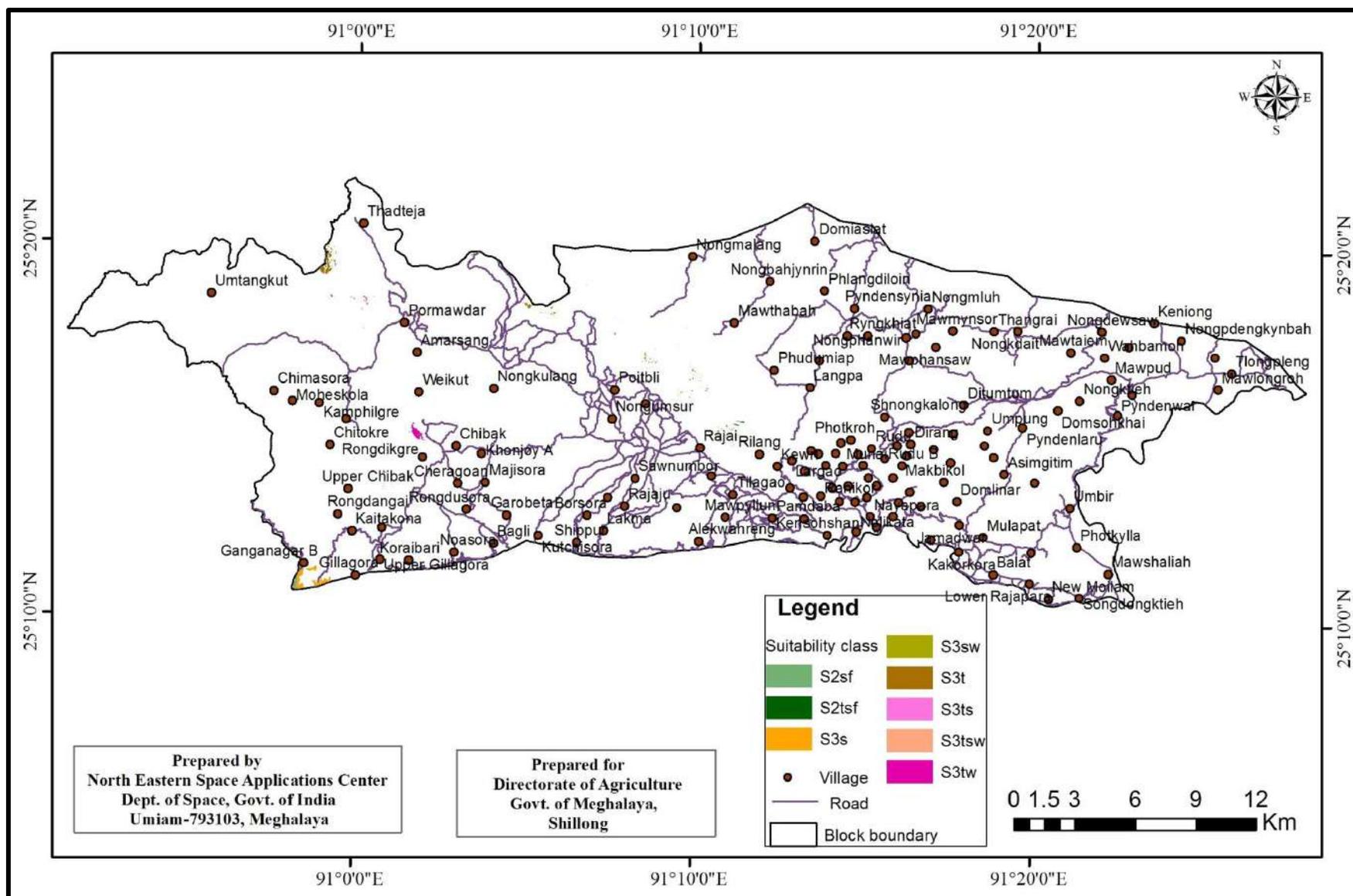


Figure 34: Suitable areas for Boro rice in Ranikor block of South West Khasi Hills district

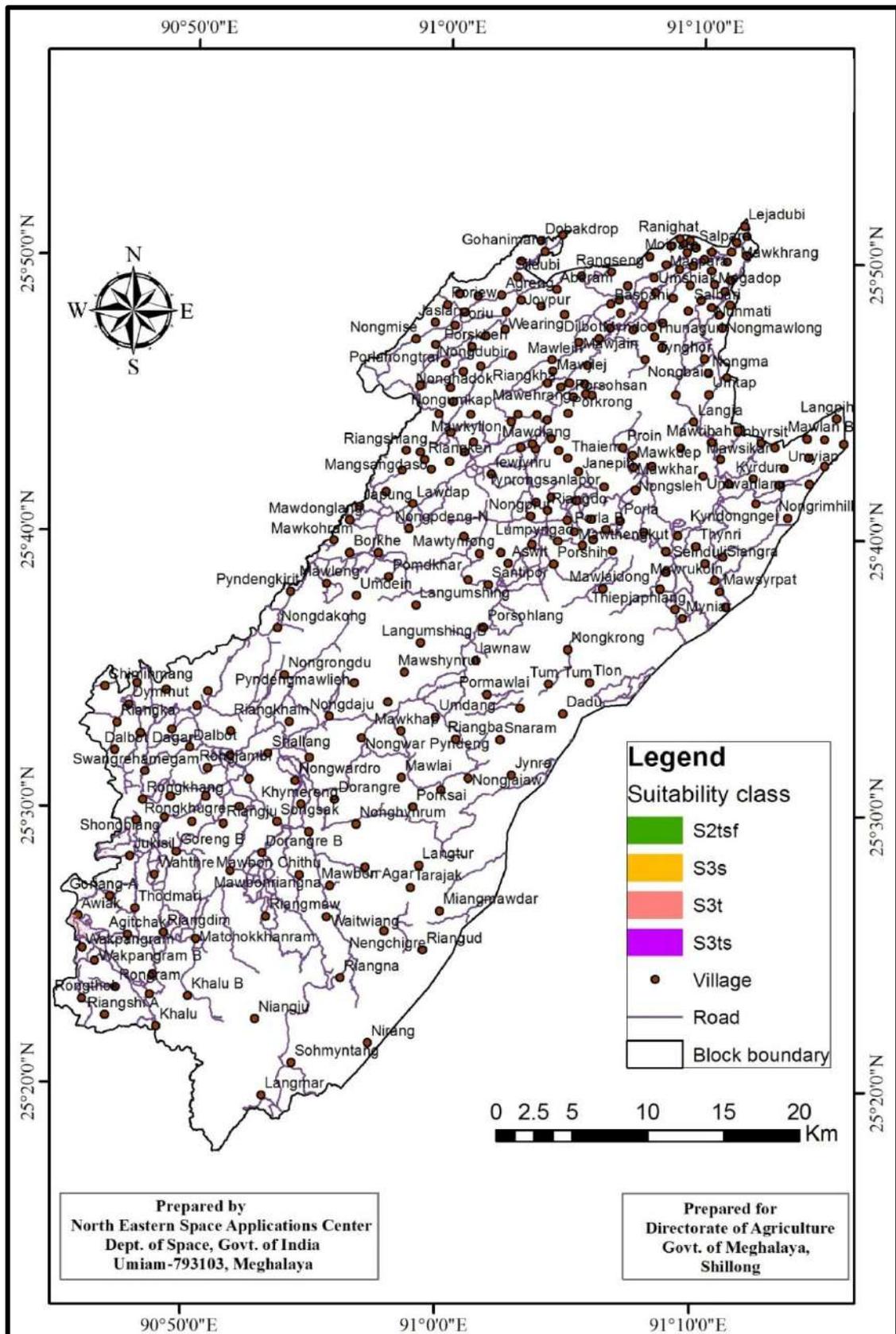


Figure 35: Suitable areas for Boro rice in Mawshynrut block of West Khasi Hills district

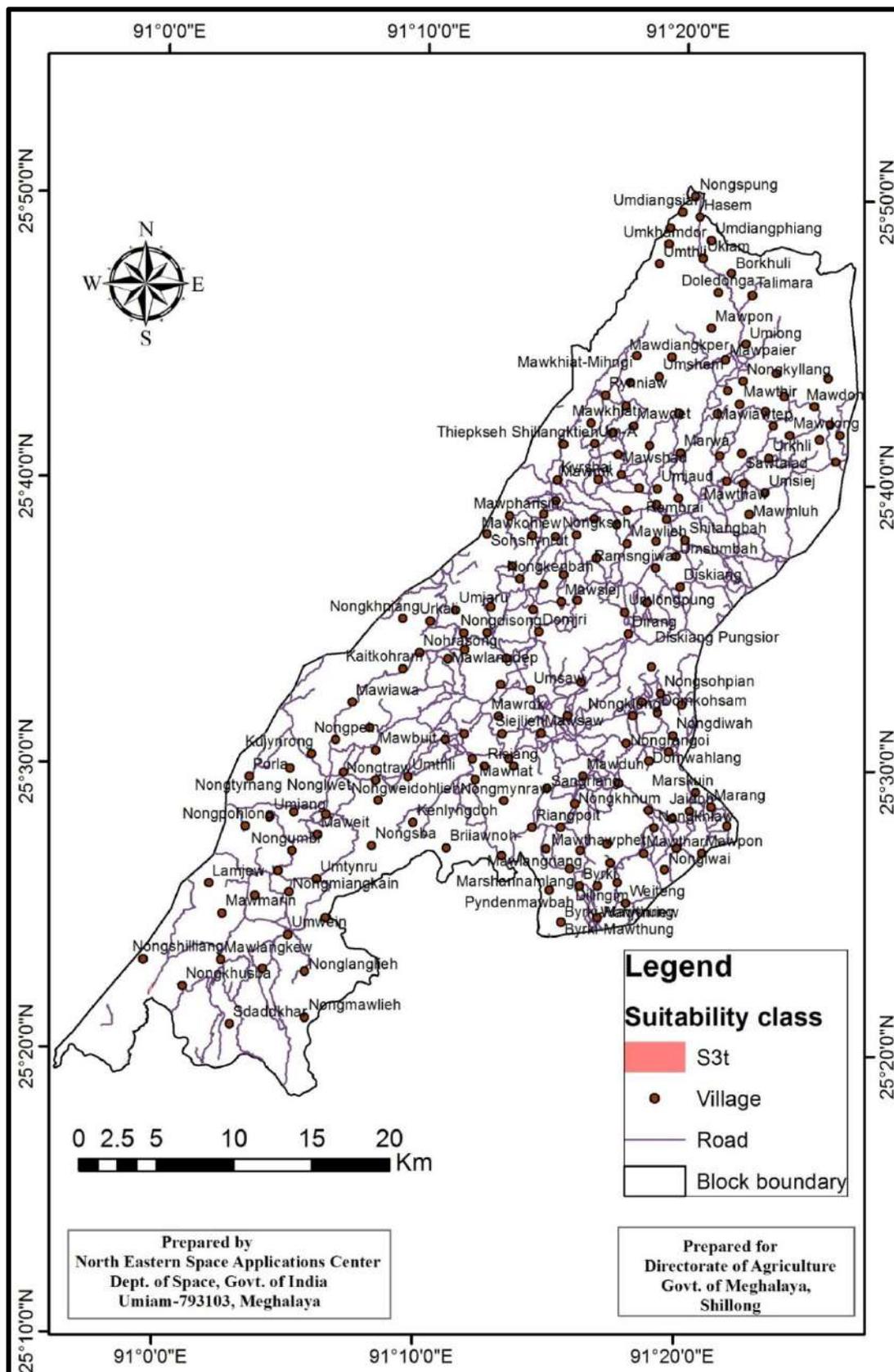


Figure 36: Suitable areas for Boro rice in Nongstoin block of West Khasi Hills district

Table 5: Name of villages falling under different suitability classes in Zikzak block

S2f	S2sf	S3w		
Dufrigaon Koch	Agongittim	Aruagre	Dhulipara	Kulupara
Jangre Samalchiring	Baghana	Babupara	Gegapara	Mahendraganj Bazar
Lower Kalaichar	Boldam - Akonggre	Baksalpara	Jigatalpara	Majherchar
S3t	Datbanga	Basya Raypara	Kajipara	Malidaspara
Banangpara	Gandigiri(Barman)	Beparipara	Kalaichar Bazaar	Malipara
Satbone	Marengpara	Bhoirakupi(Beltuli)	Kalaigaon Katabaripara	Malmua
Songmagiri	Noonmati Gofrai	Bhoirakupi(Marahali)	Kamarpara	Mondolpara
S3tw	Ponchapara	Boldam Songgital	Kambakpara Songgitchm	Mothergaon
Gongrapara	Silbaripara	Bongbanga	Karipara	Nandichar II
	Sokbokgre	Bortola	Kongbangpara	Nandirchar
	Tongnapara	Daspara	Kukurmua	Paulpara
	Wadagiri	Debajani	Kuligiri	Rabidaspara - I
		Tungrurchar	Ulubaripara	Robidaspara
				Silghaguri

Table 6: Name of villages falling under different suitability classes in Selsella block

S1	S2sf		S3t	
Chiranggre	Dengasi	Gumaijhora (Garo)	Ganglanggre	Khasigre
Dilnapara	Maljanggre	Haripur	Mangchimgre	Khillboi
Namabilla	Patangre	Kaimbatapara	Ramdenggagre	Korakona
Patranga	S3s	Kalogaon	S3tsw	Kotchugre
S2s	Balalgre	Kandargaon	Balujhora	Matchinanggre
Apalgre	Goramara	Koikuri	Boldakgre	Matkolgre
Aronggre	Harigaon	Kokiamari	S3tw	Naginipara
Balachanda	Karaitolla	Lower Nalbari	Chambagre	Nayapara (Aighar)
Batabari	New Harigaon	Lower Shyamnagar	Chengjora	Nolbari
Bhalukmari	Noonmati	Majipara	Dijinggre	Poradangga
Chamaguri (Hajong)	Pershakandi	Masangpani	Jigabari	Rabhakona
Chandraphatar	Sakmal	Morasuti	Melagre	Rajabala
Dokagre	Wakantagre	New Bhaitbari	S3w	Rajpur (Garo)
Dotoretgre	S3sw	Nidhanpur	Askikandi	Rangmalgre
Dublamari	Ambari	Paham Tilapara	Babetpara	Rangtapara
Dumduma	Bharaligaon	Patharkata	Bandabok	Simbukolgre
Gugugre	Bholarbhita	Phulbari (Islampur)	Belbari	Sobribari
Holdibari	Bholarbhita (W)	Purno Nagar	Chandakona	Songkapara
Kalchengpara	Bhotdoba	Puskanipara	Chirakawa	
Kharigaon	Bowabari	Quajani	Dipkaipara	
Kolsadubi	Broshibanda	Ronkola	Dolguri	
Lower Chidinagre (A)	Budubela	Shyamding	Galwangre	
Makagre	Burirjhar	Shyamnagar	Gaoragre	
Marok	Charbatapara	Sidakandi	Gasbari	
Nisinipara	Darenggre	Silkata	Gimbil Ading	
Ramjonggre (R)	Deldela	Soleartek	Jongnagiri	
Tairongre	Dewankata	Songshamgiri	Kagagre	
Upper Sasatgre	Gofuapara	Upper Nalbari	Kamilapara	
	Gudibela	Upper Shyamnagar	Kasimati	

Table 7: Name of villages falling under different suitability classes in Tikrikilla block

S3s	S3sw			S3ts
Bolsaldamgre	Abhirampara	Dajakagre	Nogorpara	Lower Darengchigre
Gonda Songgitchamgre	Aitibi Deosali	Damachiga	Odalguri	
Hirapara	Anggarepara	Dhapangpara	Pamila	S3tsw
Lower Rengsinpara	Apalgre	Dhelapara	Photamati	Lower Joiranggre
Rongsai	Baghpara	Gaguapara	Ronipara	Raksamgre
	Bakripara	Haribhanga	Tikrikilla (A)	Rongbokgre
	Bogadola (Garo)	Jongchipara	Tikrikilla(B)	
	Bogilarbitha	Jugirjhar	Upper Damachiga	
	Boldampitbari	Kalajhar	Upper Kamari (Garo)	
	Bollonggitok	kathalbari	Upper Khamari	
	Bondukmali	Laskerpara A	Williampur	
	Borobatapara	Laskerpara B		
	Borodoldonga	Lower Damachiga		
	Chamaguri	Lower Sabonggre		
	Chimagre	Nogorgaon		

Table 8: Name of villages falling under different suitability classes in Betasing and Ranikor block

Betasing			Ranikor
S2f	S2swf	S3w	S2sf
Borolaturi (Garo)	Belbari	Baishpara	Ganganagar B
Morkona	Deokashra	Bandoraja (Nokat)	S3s
Sagaltana	Kashra	Batajoar	Ganganagar B
Sulguri	Kashra Hajong	Betasing Bazar	Gillagora
Ulubari	S2wf	Bolsalgre	S3t
S2sf	Badagre	Borolatri	Rajai
Adugre	Bandrikona	Chiringpara	S3ts
Ajonggre	Bashbari	Jolgaon	Ganganagar B
Asinagre	Borkona	Jolgaon Songsarek	Gillagora
Bangre	Dingjoar	Jongchetpara Christian	Pamdaba
Betasing Kongpara	Ishakuri	Marpara Koch	S3tw
Chimisenggre	Monabari	Purasingga	Rongdikgre
Chipra Kama	Sagarkona	Putimari	
Dolbari	S3sw	Samati	
Garodoba	Bisindagre	Sasatbolgre	
Gittinggre	Marakhapara	Wakagre	
Jewilgre	Sonabil		
Jongdikgre	Tangabaripara		
Kasibil	S3tw		
Marpara	Chondon Noket		
Murchapani (Koch)	Gasura		
Naragre			
Sipragaon			
Sonamite			
Wakantagre			

Table 9: Name of villages falling under different suitability classes in Dadenggre, Dalu, Gembegre and Mawshynrut block

Dadenggre	Dalu		Gembegre	Mawshynrut
S3sw	S2sf	S3s	S2sf	S2tsf
Dajugre	Babelapara	Salbaripara	Jarimpara	Awiak
Nalsa Mronggre	Bhatuagaon	S3t	S3tw	Badri Watregittim
Rongkongre	Bondukosa	Sandanpara	Bolmapara	Darang Chigagittim
Songmaranggre	Borjhora	S3tw	Chekwatgre	Jukisil
Tongapara	Chaipani	Ontapara	Rongronggre	Sudu Boldak
S3tsw	Chandobhui	Rongnadigre	S3w	Wakpangram
Cheran Songmagre	Chotto-Bolang	S3w	Daluagre	S3s
Damal Asim	Dalamgre	Barengapara		Chekwegittim
Dilsigre	Darong-Adu	Bengkagittim		Swangre Nongrim
Doldenggre	Dobakura A	Duriapara		S3t
Kangkaronggre	Hatimara	Gonchudaregre		Awiak
S3tw	Jijikapara	Koinabhui		Badri Watregittim
Renigre	Karonggre	Koinadubi		Darang Aketgittim
Romsansilgre	Khasipara	Magupara		Darang Chigagittim
Rondupara	Koinabhoi C	Mongolagre		Darang Darugittim
S3w	Matchokpara	Nokdan Nokat		Darang Nengsranggittim
Bikonggre	Monupara	Rengrampara		Goriang-A
Rabong Sansilgre	Narongga Songgitcham	Tekmanpara		Jukisil
Rabonggre	Nokdanpara	Tibapara B		Pattal Gittim
Rebugre	Pokasindegre	Tokpara		Sudu Boldak
	Porakhasia			Wakpangram
	Tekmanpara Sangsarek			Wakpangram B
				S3ts
				Chekwegittim
				Rongkhang
				Swangre Nongrim
				Swangrehamegam

Table 10: Name of villages falling under different suitability classes in Resubelpara, Baghmara, Chokpot and Gasuapara block

Resubelpara	Baghmara	Chokpot	Gasuapara
S3s	S2sf	S2sf	S2sf
Bakenang Nalsa	Balkal Dongrugittim	Ala Rongpakgre	Dallonggre
Boro Miapara	Dawakol	Balwatgre	Genapara
Dajonggre Songgital	Rongrengpal	Gonganggre	Rangra Jalang
Kash Deoripara	Tainanggre	Kemranggre	Waibragre
Lower Bajengoda	S3s	Mekalpagiri	Wakskogre
New Harinkata	Agonggre	Tebilgre	S3s
New Miapara		Tepantogre	Mandanggre
Rongge		S3s	S3sw
Thapa Agitchak (B)		Dagal Asimgre	Angratuli
Upper Bajengdoba		Gilmatkolgre	Gandhibor
Upper Nogolpara		S3t	Jatapara
S3ts		Mitap Bodolagre	Kadimboka
Berubari		Waidagre	S3tw
Digisinggre Nollongge			Doragre
Rangadam			S3w
			Nagrajora
			Rongsugre
			Silbaripara

Table 11: Name of villages falling under different suitability classes in Songsak, Mawsynram, Kharkutta and Rongara block

Songsak	Mawsynram	Kharkutta	Rongara
S3tsw	S2wf	S2sw	S2sf
Bijasik Doki Ading	Khaikuna	Mendima Bakragittim	Rangreng Bibra
	Sanditola	S3t	
		Ganggasa	
		S3ts	
		Dapolpara	

Table 12: Name of villages falling under different suitability classes in Rongram block

S2sf					
Angalgre	Dallenggittim	Chenggni Songmong	Sanbanagre	Rongdokgre	Masumatagre
Chenggni Songmong	Daren Agal	Chutmang Songmong	Simakona	Rongkhon Boldamgre	Matchakol
Chikimilgre	Dopananggre	Dagalgittim	Toklekbari	Snarugre	Meangittim
Chimisenggre	Gongagittim	Dallenggittim	Wachal Chiring	Songkonggre	Mongmabel
Chutmang Songmong	Hangkema	Dambuk Ading Songgital	Wagekona	S3ts	New Galasora
Dallenggittim	Makbiljora	Dulbeta	Warima Konagittim	Ailatuli	Rangreng Bibra
Gongagittim	Meangittim	Ganganagar B	Wasogittim	Alokpang Nokalgre	Rantanggre
Hangkema	Mongmabel	Gongagittim	S3t	Angalgre	Rongbakgre
Makbiljora	New Upper Damalgre	Gramkol	Agisimgre	Asibra	Rongkhon Boldamgre
Meangittim	Rangreng Bibra	Gurpani Nokat	Angalgre	Badagonggre	Rongmin Chiring
Mongmabel	Rongbakgre	Gurpani Songmong	Asibra	Batlaban	Rongru Asim
New Dengasi	Rongdokgre	Hangkema	Asigre	Bonbera	Rubber Gittim
Rangreng Bibra	Rongru Asim	Imbloka	Badagonggre	Chenggni Songgital	Sanbanagre
Rerapara	Wasogittim	Makbiljora	Chandragre	Chenggni Songmong	Simakona
Rongbakgre	S2tsw	Matchakol	Chikimilgre	Chutmang Songmong	Toklekbari
Rongru Asim	Chismokgre	Meangittim	Chimisenggre	Dambuk Ading Songgital	Wachal Chiring
Wasogittim	Dopananggre	Mongmabel	Chismokgre	Dimchanggittim	Wagekona
S2tsf	Songkonggre	New Galasora	Daren Agal	Ganganagar B	Warima Konagittim
Angalgre	S2twf	Rangreng Bibra	Dopananggre	Gongagittim	Wasogittim
Asibra	Dopananggre	Rantanggre	Dorenggre	Gramkol	S3tsw
Chandragre	S3s	Rona Agal	Masumatagre	Gurpani Nokat	Silsekgre
Chikimilgre	Ailatuli	Rongbakgre	New Dengasi	Gurpani Songmong	
Chimisenggre	Alokpang Nokalgre	Rongmin Chiring	New Upper Damalgre	Hangkema	
Chismokgre	Angalgre	Rongru Asim	Rerapara	Imbloka	
Chutmang Songmong	Bonbera	Rubber Gittim	Rongbakgre	Makbiljora	

5. Conclusions

From the study it is observed that geospatial technology has helped in identifying suitable areas for expansion of Boro rice cultivation with limited field studies. The study reveals that out of 4903 Sq. Km study area, only 807 Sq. Km (16.5%) area is suitable for Boro rice cultivation in the state. Even though 16.5% area is suitable for Boro rice but it is found that only 0.8 % (635 ha) area is highly suitable which is found in West Garo hills district. It is observed that where as 219.07 Sq. Km area is moderately suitable and 581.74 Sq. Km areas are marginally suitable in the state. It is also observed that maximum suitable areas are distributed in West Garo Hills, South West Garo Hills, South Garo hills and North Garo hills district that covers more than 98% suitable areas. Only 1287.3 ha area is found suitable in East Khasi Hills district that covers 1.6% of total suitable areas. In East Garo hills, South West Khasi Hills and West Khasi Hills suitable areas are found scattered and size of fields are less than 10 ha and that covers only 0.5% of total suitable areas. From the study it is observed that suitable areas are distributed in 20 blocks of 8 districts of the state. It is also observed that highest suitable areas are found in Selsella and Dadenggre block of West Garo Hills district followed by Betasing block of South West Garo hills. Lowest area is found in Nongstoin block of West Khasi Hills district.

Annexure-I



Training on use of GPS and map for soil sample collection



Collection of soil samples

Recording of field information



Labelling of soil samples



Preparation of soil samples for analysis



Soil sample analysis



Soil sample analysis



Boro rice field