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Soil Fertility Atlas for Karnataka, India

Department of Agriculture
Government of Karnataka

International Crops Research Institute
for the Semi-Arid Tropics

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Abstract

Our research during the last decade showed that soil testing is an effective tool for diagnosing nutrient problems in farmers' fields. Soil test-based nutrient management allows a judicious use of fertilizers supplying various nutrient elements. This Atlas comprises of results from Bhoochetana Mission Project under which a large-scale soil sampling was undertaken on farmers' fields in all the districts of Karnataka. Bhoochetana is a mission project for enhancing agricultural productivity of rain-fed systems in the state of Karnataka by adopting science-led approach with technical backstopping from ICRISAT-led consortium. The recommendations on nutrient applications are made by using critical limits in the soil for major, secondary and micronutrients. The soil test results are categorized as sufficient (soil test value above the critical limit of an element) or deficient (soil test value below the critical limit).

Following a soil sampling methodology standardized earlier, 92904 soil samples were collected from 30 districts of Karnataka in India. The soil samples were processed and analyzed for pH, electrical conductivity (EC) as a measure of salts, organic carbon (as a proxy for available nitrogen), and available phosphorus, potassium, sulfur, boron and zinc using standard methods.

Using critical limits in the soil, soil test results were categorized into deficient or sufficient. Soil samples were prepared showing the category of soil sample per nutrient or soil fertility parameter as deficient or sufficient using two color codes. The maps were based on the soil test results at the Taluka or Block level of each of the 30 districts.

The results showed that soil reaction was in the neutral range with a few soil samples in the acid and alkaline range. Except for a few farmers' fields affected by salts, most of the samples were salt free. Majority of the samples from farmers' fields were low to moderate in organic carbon, low to moderate in available phosphorus, and generally sufficient in potassium. However, the results on available sulfur, boron and zinc were most revealing. Considering the mean values of soil test results for all the 30 districts, boron was deficient in 62% of the farmers' fields, followed by zinc, which was deficient in 55% of the farmers' field and sulfur was deficient in 52% of the farmers' fields in Karnataka state.

The color code used in preparing soil nutrient/parameter maps is easy to use by extension staff or farmers. The results presented in the maps are made web-based for easy access and practical use by extension staff, NGOs or farmers.

Soil Fertility Atlas for Karnataka, India

Editors

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Acknowledgments

We gratefully acknowledge the Government of Karnataka for its bold and innovative initiative to adopt science-led approach for development in the state. This is possible largely because of examplery leadership shown by the leaders and policy makers in the state. We sincerely acknowledge support of Mr Sandeep Dave, Commissioner of Watershed and currently Principal Secretary, Principal Secretary to Government, Department of Agriculture, who initiated the soil fertility mapping in six districts of Karnataka under Sujala-ICRISAT initiative at the pilot for scaling-up productivity enhancement measures to cover 3700 ha. Based on the results of the pilot initiative in 2009, Dr KV Raju, Economic Advisor to Hon. Chief Minister of Karnataka, Additional Chief Secretary and Development Commissioner Mrs Shantha Kumari and Department of Agriculture officials supported by the State Coordination Committee of Bhoochetana who initiated the process of soil sampling and mapping. We also thank the Commissioner, Director and associated staff (Additional Directors of Agriculture - Organic Farming, Crop Development and Planning; Joint Directors of Agriculture - Inputs, Development; Deputy Directors of Agriculture - Soil Health and Food Crops; All District Joint Directors of Agriculture; All Assistant Director of Agriculture; All Agricultural Officers, Soil Health Centers; All Agricultural Officers - Raitha Samparka Kendra's; All Assistant Agricultural Officers; All Agriculture Assistants; State Agricultural Universities; ICRISAT, Patancheru; NBSS&LUP, Nagpur; Farm Facilitators and Farmers). Good efforts have enabled preparing of this Soil Fertility Atlas of Karnataka. Financial assistance provided by the Government of Karnataka to ICRISAT is gratefully acknowledged. We also acknowledge the help of number of staff in Charles Renard Analytical Laboratory of ICRISAT who undertook the analysis and Soil analytical laboratory in the state of Karnataka who have undertaken the analysis. We also acknowledge ICRISAT's GIS Lab, Communication Office and RDS secretarial staff.

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Principal Scientist (Watersheds) & Project Coordinator (IWMPs)
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All Agricultural Officers - Raitha Samparka Kendras
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All Agriculture Assistants of ICRISAT and Govt. of Karnataka
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All Assistant Directors of Agriculture, Govt. of Karnataka
All District Joint Directors of Agriculture. Govt. of Karnataka
Commissioner, Department of Agriculture, Govt. of Karnataka
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Message

Agriculture is the main stay for survival of all civilization as it is the major source of food, fiber and fuel. Sustainability of agriculture depends on productive and healthy soils to feed our growing population. A productive and healthy soil is critical to harness the potential of any agricultural technology. Therefore, the fertility of our soils is an indicator of the health condition of the soil.

The main thrust for increased agricultural output will have to be an integrated approach to improve soil fertility status by judicious use of fertilizer blended with organic source. Micronutrient application along with major nutrients has shown significant impact in increasing production.

I am proud to state that Karnataka has secured prestigious **Krishi Karman Award** for recording highest production of coarse cereals in the country during 2010-11. The Department has made all possible efforts in this endeavour.

Bhoochetana, a flagship programme of Karnataka which started in 2009 in 6 districts has been extended to all 30 districts during 2011-12 covering an area of 25 lakh ha benefiting nearly 22 lakh farmers. The programme is being extended to 50 lakh ha under dryland and 5 lakh ha under irrigated condition during 2012-13. The soil test based -fertilizer recommendation have been made for different crops which in turn have enhanced the productivity ranging from 20 to 45%.

I am glad to note that Karnataka State Department Of Agriculture has brought out this Atlas on Soil Fertility Status of Karnataka which is an outcome of analysis of 92,642 samples. It depicts the nutrient status in the dry tracts of our state, so that measures to improve soil health can be planned which in turn will help in increasing the fertilizer use efficiency, crop productivity and farmers income. The efforts of the Agriculture Department and ICRISAT in bringing out this useful Atlas is highly appreciated. I hope this will be useful to all field functionaries and farming community of the Karnataka state to increase productivity of agricultural crops.

(D.V. SADANANDA GOWDA)

Chief Minister
Government of Karnataka

Message

Rainfed agriculture supports millions of poor people in India but is prone to severe land degradation and water scarcity. There is currently a two- to five-fold shortfall in the productivity of rainfed agriculture compared to its achievable potential yield. This calls for urgent measures to increase productivity in order to achieve food security and improve the livelihoods of the rural poor in the country. Karnataka is the second largest state in India with large dryland areas.

Bhoochetana is an innovative and novel initiative taken by the Government of Karnataka to undertake science-led development of rainfed agriculture to enhance agricultural productivity. It is technically supported by ICRISAT and the Department of Agriculture (DoA).

Soil testing is an effective tool for diagnosing nutrient problems in farmers' fields. As part of the Bhoochetana Mission Project, extensive soil sampling was undertaken in farmers' fields in 30 districts of Karnataka, leading to the collection of 92,904 soil samples using a stratified soil sampling method. The soil-test results have revealed that soils in the state are not only thirsty but also hungry due to multi-nutrient deficiencies caused by continuous nutrient mining. Adopting the soil-test based recommendations have led to increased crop yields in the range of 32-66%, ensuring balanced nutrient management and huge benefits for farmers.

The *Soil Fertility Atlas of Karnataka* is unique since it places in the public domain the results of the soil sampling, making precious knowledge available to stakeholders like policymakers, development agencies, extension workers, researchers and farmers. The book not only demonstrates how the science of soil sampling can be taken to the doorstep of the farmer but also provides a strong and scientific basis to develop taluk-wise nutrient management recommendations that can benefit small farmers. Such a science-led initiative is a stepping stone to a second Green Revolution. The atlas will serve as a valuable resource for all stakeholders in rainfed agriculture.

William D Dar
Director General
ICRISAT

Message

It gives me an immense pleasure to note that Karnataka State Department of Agriculture has brought out Soil Fertility Atlas of Karnataka. The efforts initiated under Bhoochetana programme to boost agriculture productivity in dryland regions of our state are praiseworthy.

This Soil Fertility Atlas is an outcome of the Bhoochetana initiative and I hope this atlas will be of immense use for planning balanced nutrient management in dryland agriculture. It not only reflects the fertility status of our soil but also helps to plan corrective measures to improve the productivity of the soils. I hope this atlas would be a valuable asset not only to the Government but also to research organizations and many others involved in crop nutrient management programme.

I congratulate the team of KSDA & ICRISAT for their valuable efforts. I hope this atlas will be useful to our field functionaries and farming community in increasing agriculture productivity

(Umesh V Katti)
Minister for Agriculture
Government of Karnataka

Message

Karnataka is blessed with varied agroclimatic regions. Dryland agriculture is predominant in our state as it is practiced in 70% of net cultivated area. There is a wide gap between the potential yield and the yield obtained in the farmers feild. This needs to be addressed.

I appreciate the efforts of Karnataka State Department Of Agriculture and ICRISAT for focusing on increasing the agriculture productivity in dryland farming through Bhoochetana Programme initiative. The soil test-based fertilizer recommendation along with other technological innovations had a major impact in boosting the productivity of rainfed crops.

The Soil Fertility Atlas brought out by Karnataka State Department of Agriculture and ICRISAT helps us not only to understand the fertility status of Karnataka but also to plan the fertilizer application in a scientific manner.

I hope this Soil Fertility Atlas will be of great value to field staff, research organizations and more important to the farmers in knowing their soil health status and in adopting the corrective measures.

(Dr.K.V.Raju)
Economic Advisor to Chief Minister
Government of Karnataka

Message

Modern agriculture uses high yielding crop varieties, intensive cropping pattern, balanced fertilizers to achieve bumper harvest. But this achievement is coming at a hefty price by draining our soil resources. Intensive agriculture has led to increasing removal of secondary and micronutrients from soil and multiple nutrient deficiencies are now surfacing which are posing a major constraint for increasing food production in the state.

Bhoochetana programme initiated by Karnataka State Department Of Agriculture to boost crop production in dryland areas has given major thrust for soil test based nutrient application along with other dryland farming technologies. Extensive soil testing was done in all 30 districts to provide soil test-based fertilizer recommendations which include micronutrient application. This has led to increased crop production in dry land crops.

I appreciate the team of KSDA & ICRISAT for their committed effort in bringing out this Soil Fertility Atlas for Karnataka and wish them success in all their future endeavors.

(Subir Hari Singh)
Additional Chief Secretary and
Development Commissioner
Government of Karnataka

Message

Increasing agricultural production by improving plant nutrition management, together with better use of other production factors is a complex challenge. The challenges for plant nutrition management is to maintain sustainable crop productivity to meet the demands for food and fibre.

Intensive agriculture inevitably removes plant nutrients from the soil. The prime objective in agriculture must be to assess emerging nutrient deficiency followed by crop-wise, region-wise nutrient recommendations. Emphasis must also be made for conjunctive use of organic matter and fertilizer application.

Optimising the management of plant nutrients, as a part of sound agricultural intensification, results from a balanced supply of plant nutrient sources and maximizing income for farmers.

Information on soil fertility will help in nutrition recommendation resulting in better soil health and I wish this Soil Fertility Atlas would serve as a guiding factor in giving regionwise nutrition recommendations, which goes a long way in providing higher yield and income to the dryland farmers.

(DR.SANDEEP DAVE)

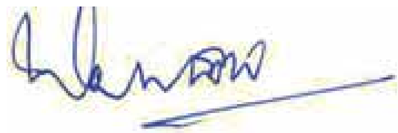
Former Principal Secretary (Agriculture) &
Commissioner, Watersheds
Government of Karnataka

Message

The rainfed agriculture place an important role in improving livelihoods of millions of small and marginal farm holders in Karnataka, as Karnataka has 5.2 million ha area under rainfed agriculture. Small and marginal farmers are deprived of new knowledge as well as technologies for improving productivity of rainfed agriculture. Government of Karnataka has taken up an innovative approach to harness the potential of rainfed agriculture with technical support from ICRISAT-led consortium in a mission mode. This mission mode program "Bhoochetana" has become a flagship program of the Government of Karnataka converging several productivity enhancement initiatives in the state.

Department of Agriculture as a nodal agency implementing Bhoochetana has taken the science of soil analysis at the door steps of the farmers with ICRISAT's help. I am pleased to note that the hard work of DoA-ICRISAT consortium has sampled 92,864 soil samples and analyzed for macro and micro nutrients. This massive analysis has been systematically analyzed and presented in the form of Soil Fertility Atlas of Karnataka by the DoA and ICRISAT. I am very pleased with the efforts of the DoA-ICRISAT team for putting together the Soil Fertility Atlas for the first time which helps in developing strategy for sustainable intensification of agriculture in Karnataka.

I am sure the Soil Fertility Atlas will go a long way in helping the farmers as well as the state of Karnataka to produce more food in sustainable manner to achieve targeted food security and improved livelihoods of the millions of poor in the state.



Dr. Baburao Mudbi
Principal Secretary (Agriculture)
Government of Karnataka

Message

Dryland agriculture being predominant in Karnataka has erratic rainfall, soils with low organic matter, acidic and alkaline reactions in surface layers. Micronutrient deficiencies, particularly zinc and boron, are one of the emerging constraints in sustainable crop production in rainfed areas.

The driving factor for soil nutrient depletion is imbalanced fertilizer application. Our farmers need to realize the importance of micronutrients as they not only contribute to qualitative and quantitative yield but also help to harness other nutrient reserves in the soil. Therefore, a holistic approach of supplying major secondary and micronutrients to overcome the hidden hunger must be adopted for a profitable agriculture.

Soil fertility maps help to delineate deficient soils and these maps serve as a better tool to educate farmers in understanding the fertility status of their soil and taking up corrective measures for improving soil health and productivity of crops.

We hope this atlas will be a valuable asset to our field functionaries to guide the farming community for sustainable soil resource management.

Dr. K.V. Sarvesh
Director of Agriculture

Introduction

The soil resource base in the Indian semi-arid tropics (SAT) is marginal compared to irrigated soils. However, it is a commonly held belief that at relatively low yields of crops in the rain-fed systems, the deficiencies of major nutrients, especially nitrogen and phosphorus are important for the SAT Indian soils and little attention has been devoted to diagnose the extent of deficiencies of the secondary nutrients such as sulfur and micronutrients in various crop production systems. It is duly recognized and emphasized that the productivity of SAT soils is low due to water shortage. Apart from water shortage, low fertility is also an issue because low fertility constrains crop productivity in the SAT regions of India, but in practice the deficiencies of major nutrients (nitrogen and phosphorus) are considered important. Moreover, the inputs of major nutrients to dryland production systems are meager. Also, due to low productivity of the dryland, it is generally assumed that the mining of micronutrient reserves in soils is much less than in irrigated production systems.

Our past research showed that the SAT soils of Rajasthan, Madhya Pradesh, Andhra Pradesh and Karnataka are not only low in organic matter, nitrogen and phosphorus, but also the deficiencies of sulfur and micronutrients such as boron and zinc in farmers' fields in these states are widespread; and the productivity of these soils can be sustainably enhanced through balanced nutrient management. Our research also demonstrated that soil testing is a successful tool for diagnosing the nutrient deficiencies in farmers' fields (Sahrawat et al. 2010). This report further uses soil testing to cover entire SAT districts of Karnataka and documents results in form (maps) that can be used by farmers for practicing balanced nutrient management in pursuit of sustainable enhancement of agricultural productivity in rain-fed areas of Karnataka.

Diagnosis of Nutrient Deficiencies by Soil Testing

Soil Sampling

To characterize the fertility status of soils, 92904 soil samples were collected from farmers' fields in watersheds, spread in 30 districts of Karnataka. The number of farmers cultivating arable land in watersheds varied along with land holding size and cropping systems. Soil sampling strategy was based on taking samples to represent the entire watershed. The soil sampling units were decided on the basis of crop, area covered by the crop and number of farmers owning the land. We used stratified random sampling methodology for collecting soil samples from the watershed. For effective sampling, the watersheds were divided into three groups based on the position of the fields on a toposequence: top, middle and bottom, depending on the elevation and drainage pattern. We separated different soil types in each category. For soil sampling, we randomly selected 20% farmers in each position on the toposequence, proportion to the farm size. Using stratified random sampling (Sahrawat et al. 2008), we collected 8 to 10 cores of surface (0-15 cm depth) soils to make one composite sample.

Soil Sample Preparation and Analyses

The soil samples were air-dried and powdered with wooden hammer to pass through a 2-mm sieve. For organic carbon analysis, the soil samples were ground to pass through a 0.25-mm sieve. Prepared samples were analyzed for various fertility characteristics using methods described in Sahrawat et al. (2010). For soil analysis, pH was measured by a glass electrode using soil to water ratio of 1:2 organic carbon was determined using the Walkley-Black method. Exchangeable or available potassium was determined using the ammonium acetate method. Available sulfur was measured using 0.15% calcium chloride ($CaCl_2$) as an extractant; available phosphorus was measured using the sodium bicarbonate ($NaHCO_3$) test. Available zinc was extracted by DTPA reagent and available boron was extracted by hot water.

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Sahrawat KL, Wani SP, Pardhasaradhi G and **Murthy KVS**. 2010. Diagnosis of secondary and micronutrient deficiencies and their management in rain-fed agroecosystems: Case study from Indian semi-arid tropics. Communications in Soil Science and Plant Analysis 41:346-360.

Karnataka Soil Fertility Status at a Glance

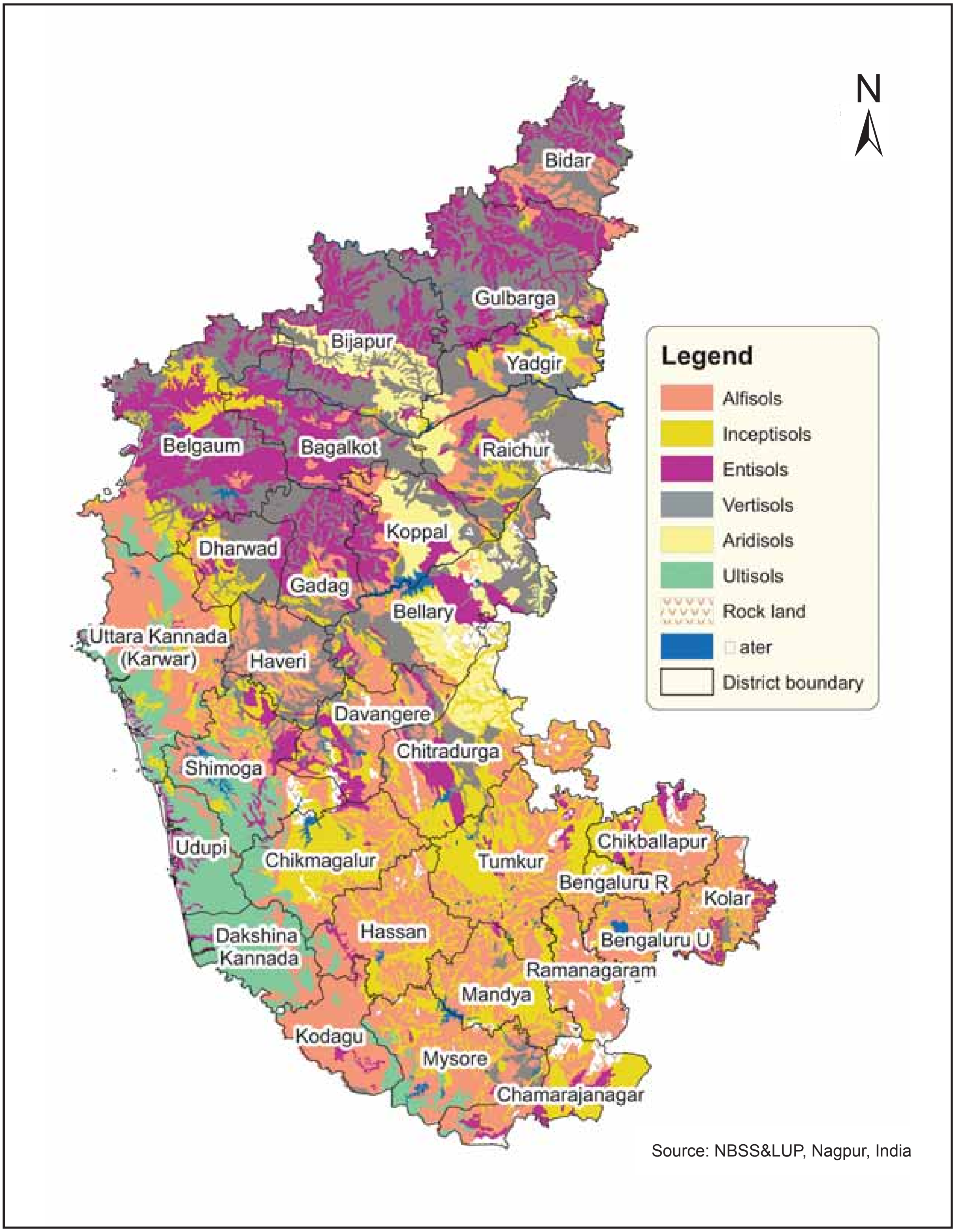


Figure 1. Soil orders of Karnataka state

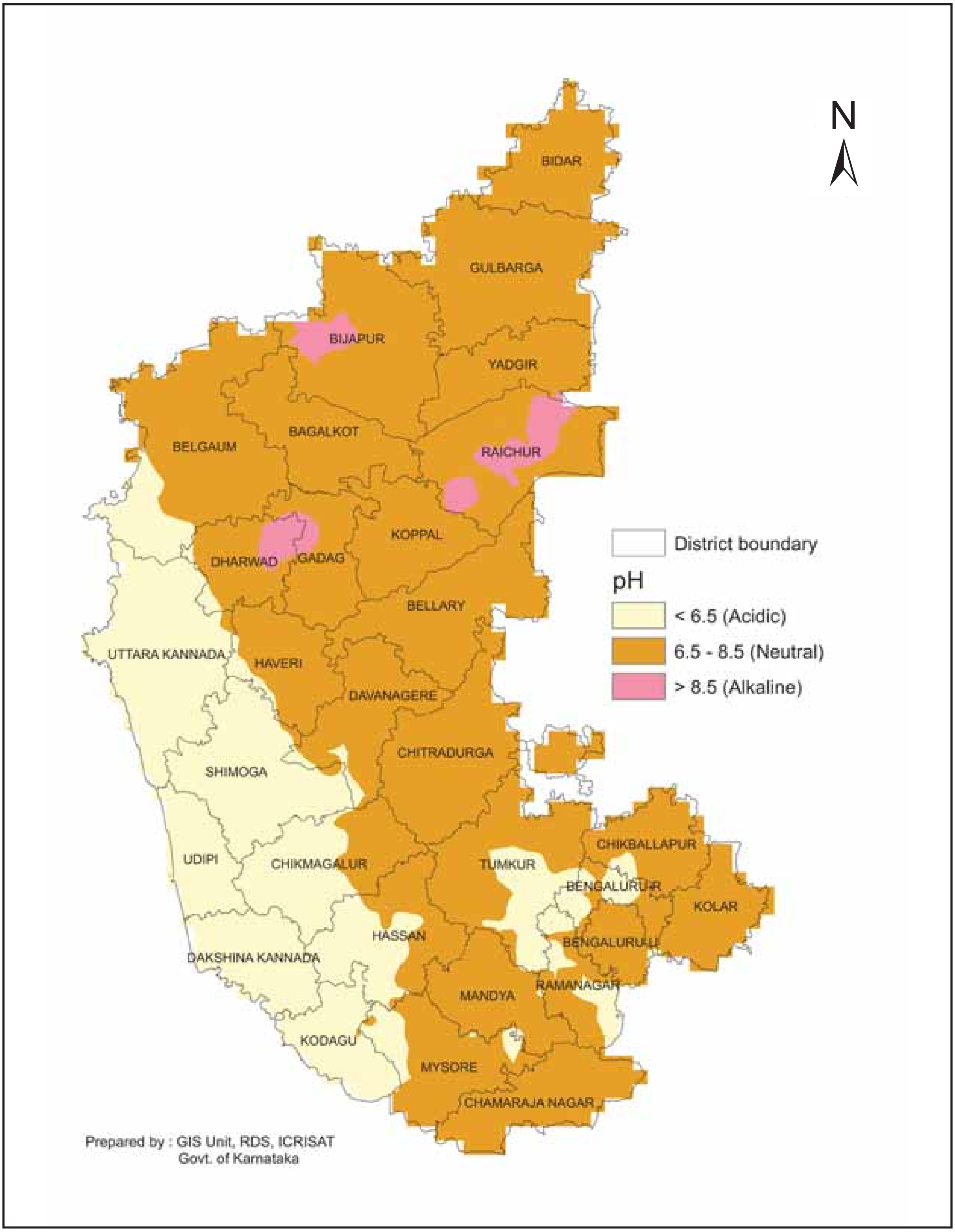


Figure 2. pH status of Karnataka soils

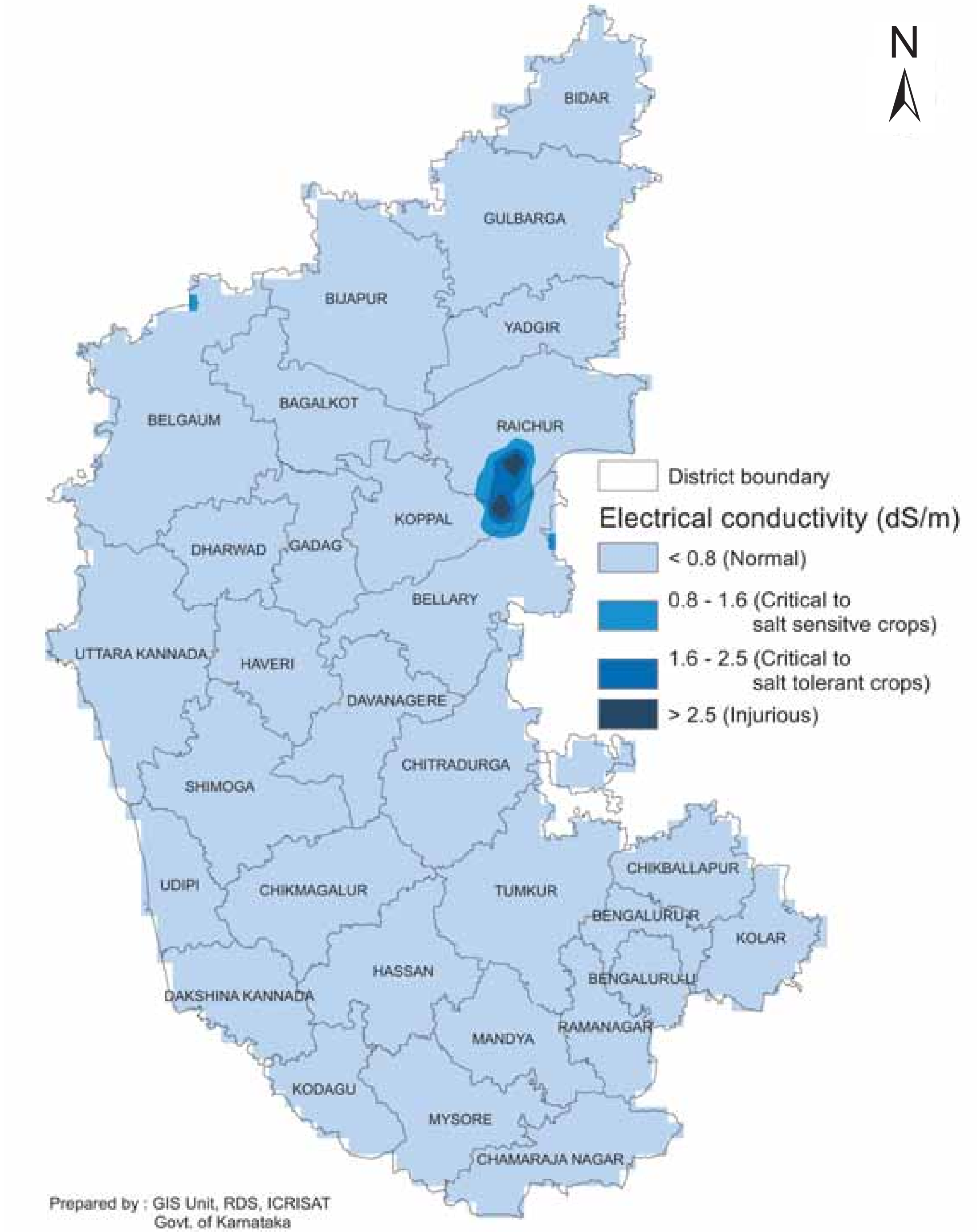


Figure 3. Electrical conductivity status of Karnataka soils

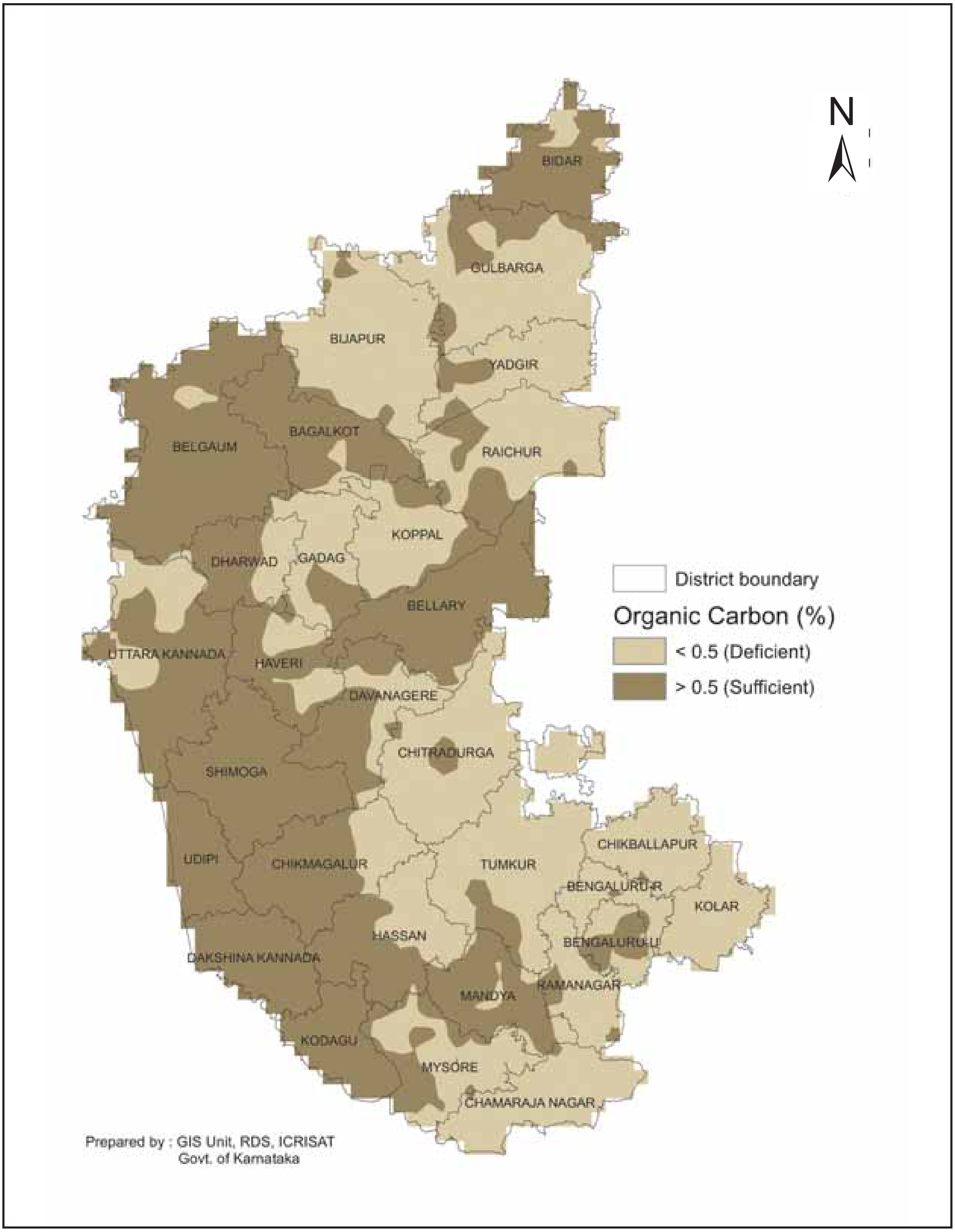


Figure 4. Organic carbon status of Karnataka soils

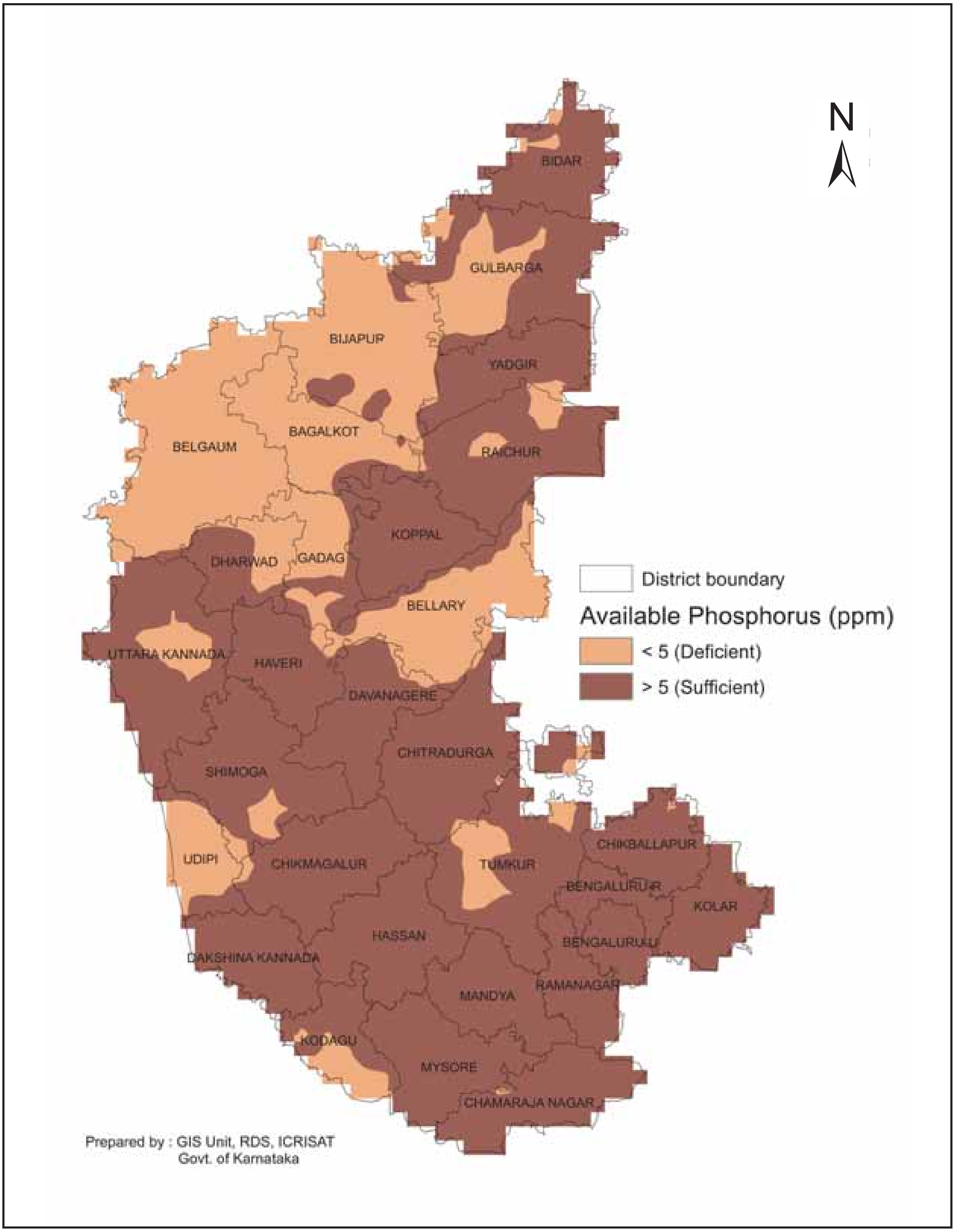


Figure 5. Available phosphorus status of Karnataka soils

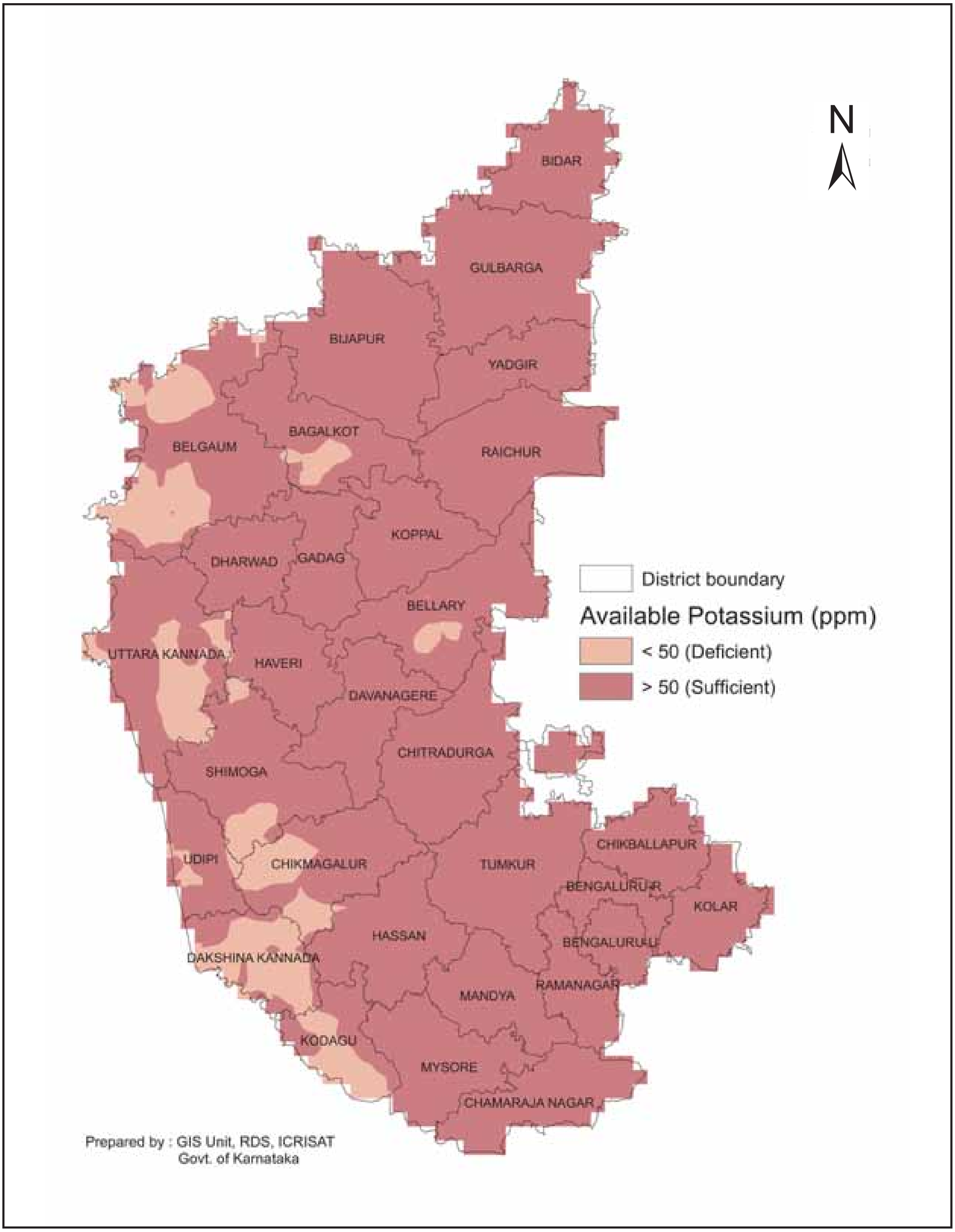


Figure 6. Available potassium status of Karnataka soils

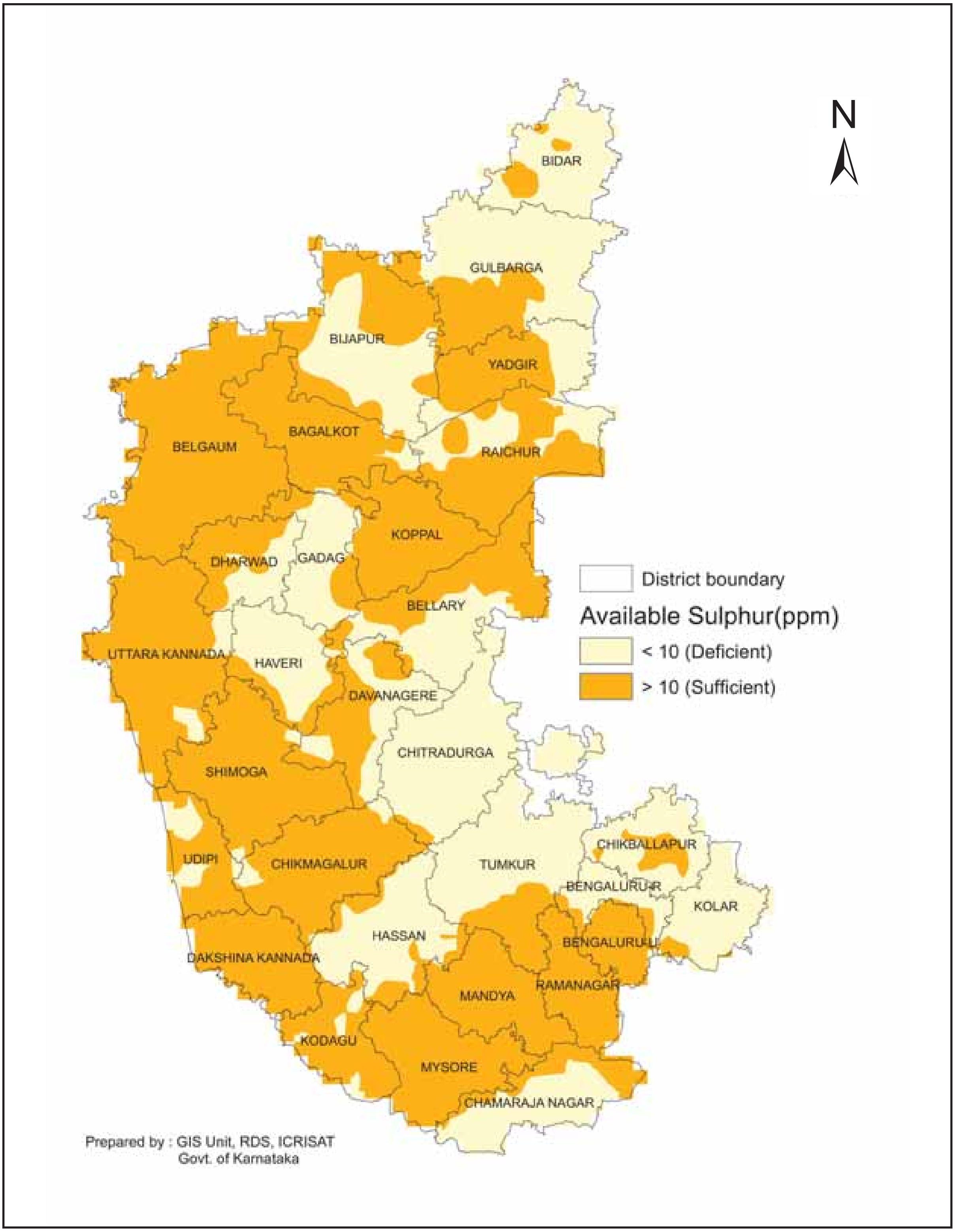


Figure 7. Available sulphur status of Karnataka soils

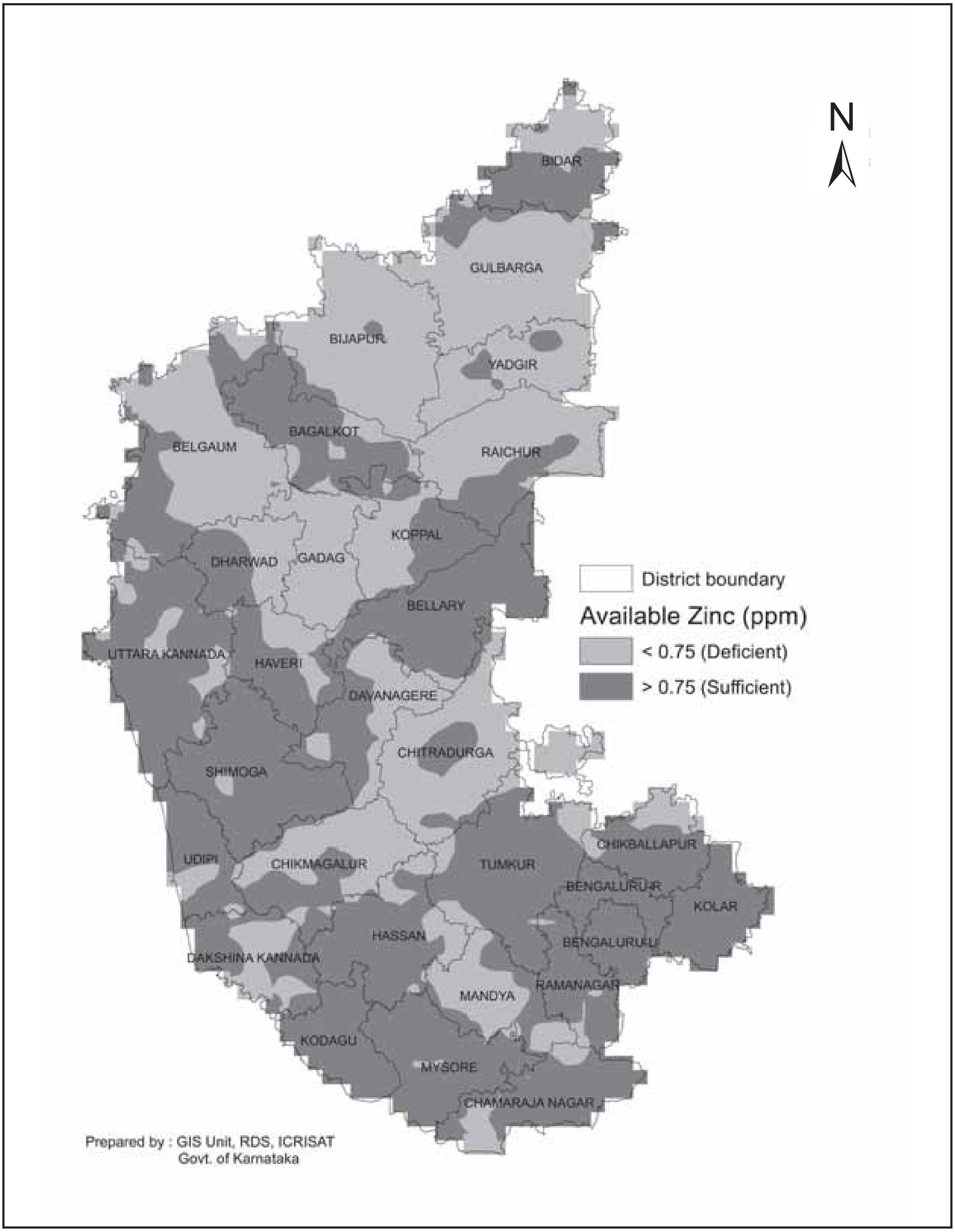


Figure 8. Available zinc status of Karnataka soils

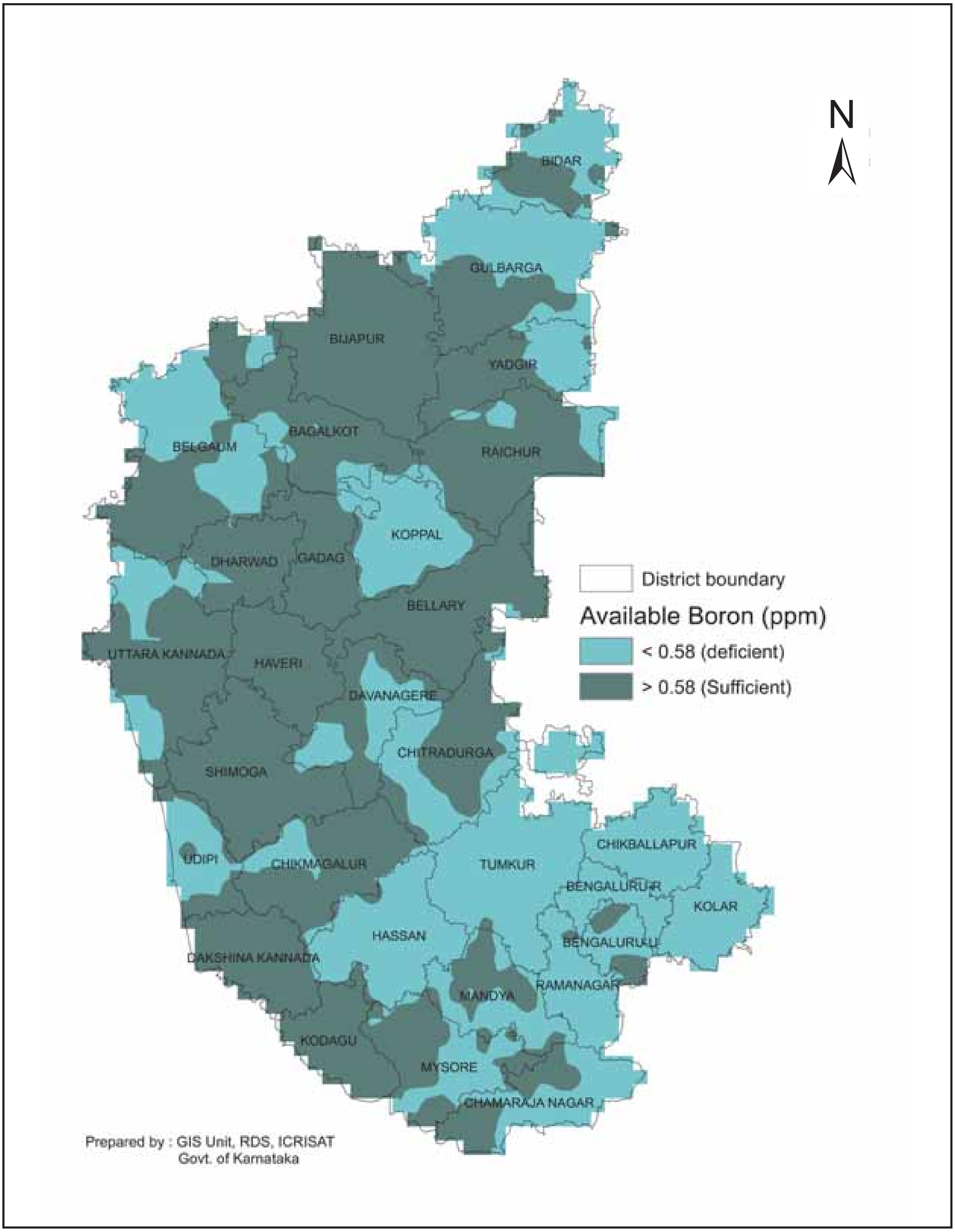


Figure 9. Available boron status of Karnataka soils

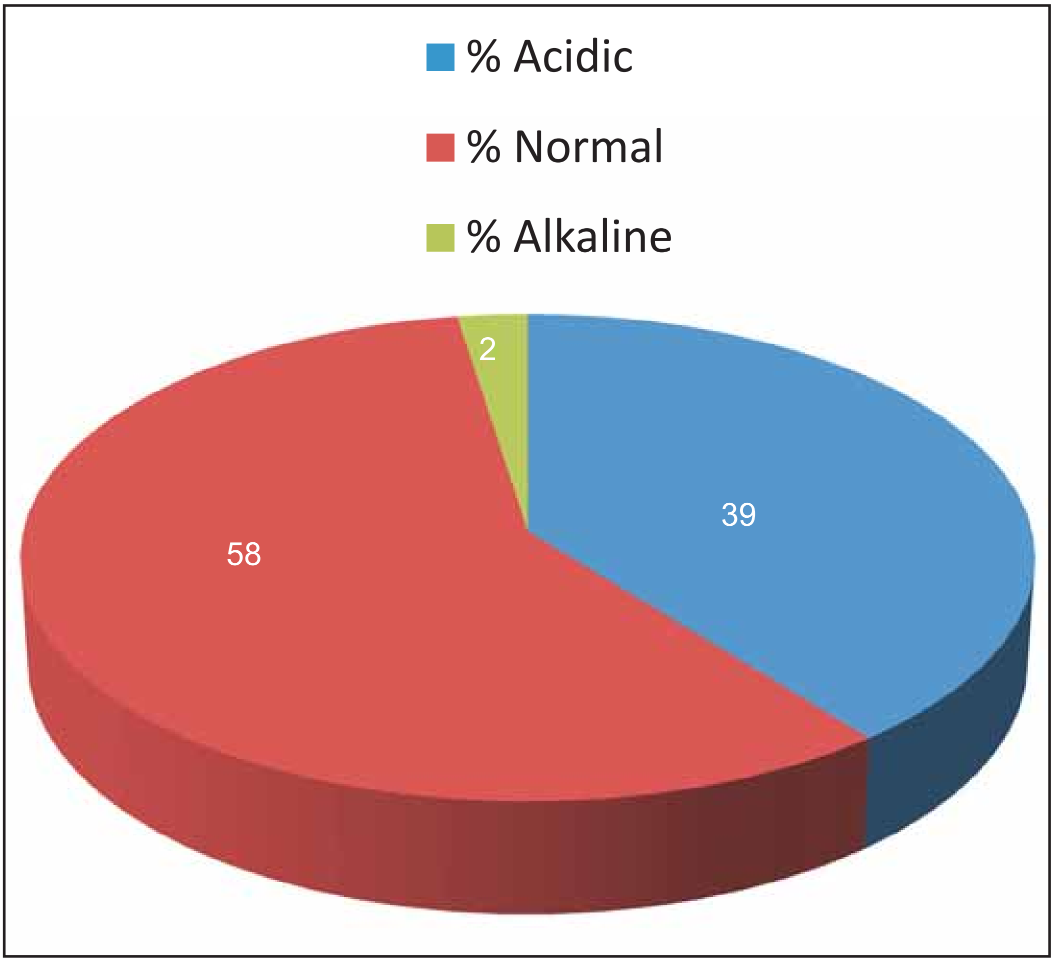


Figure 10. Karnataka soil status - pH

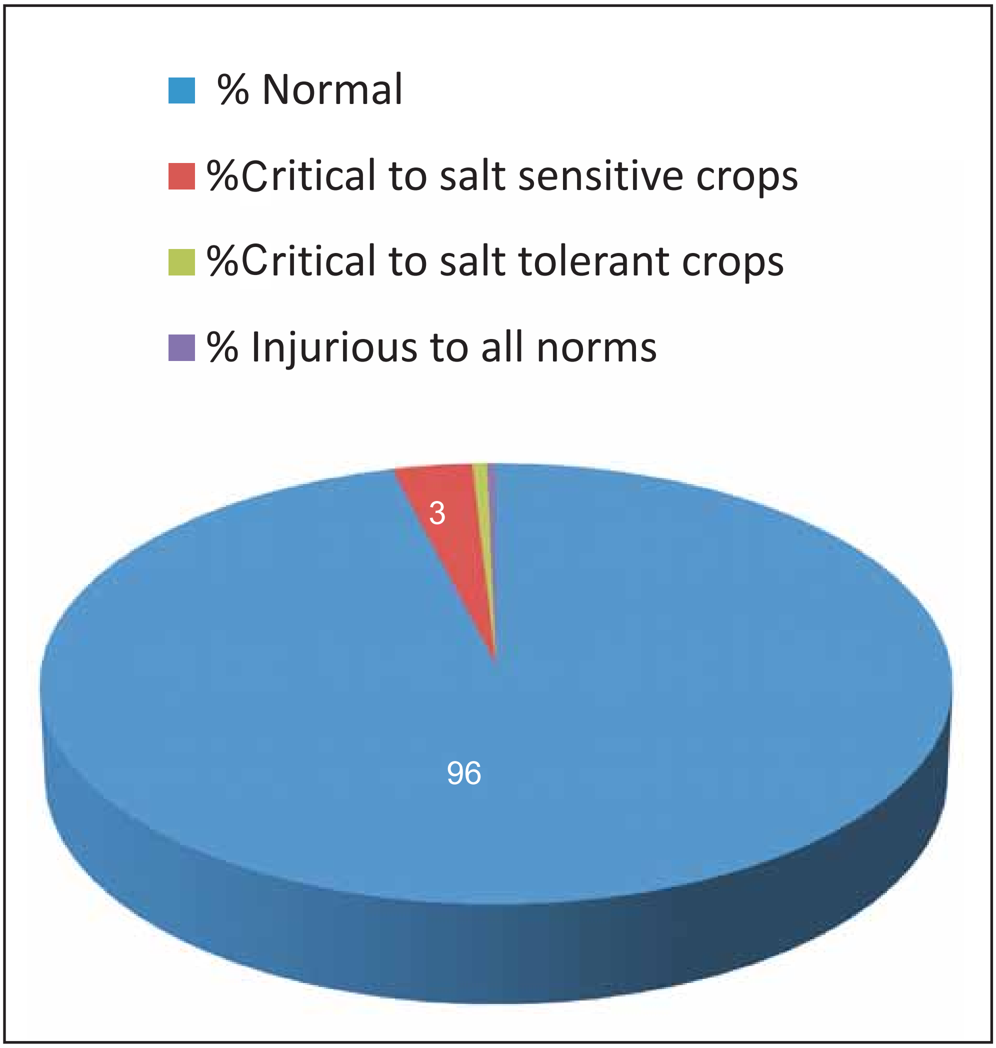


Figure 11. Karnataka soil status - Electrical conductivity

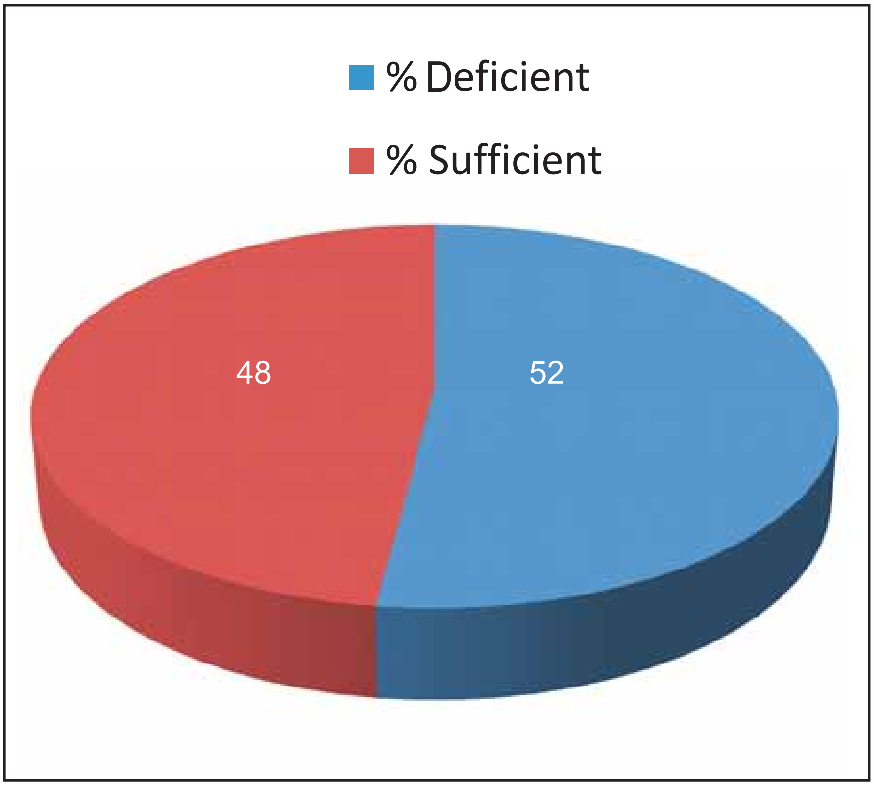


Figure 12. Karnataka soil status - Organic carbon

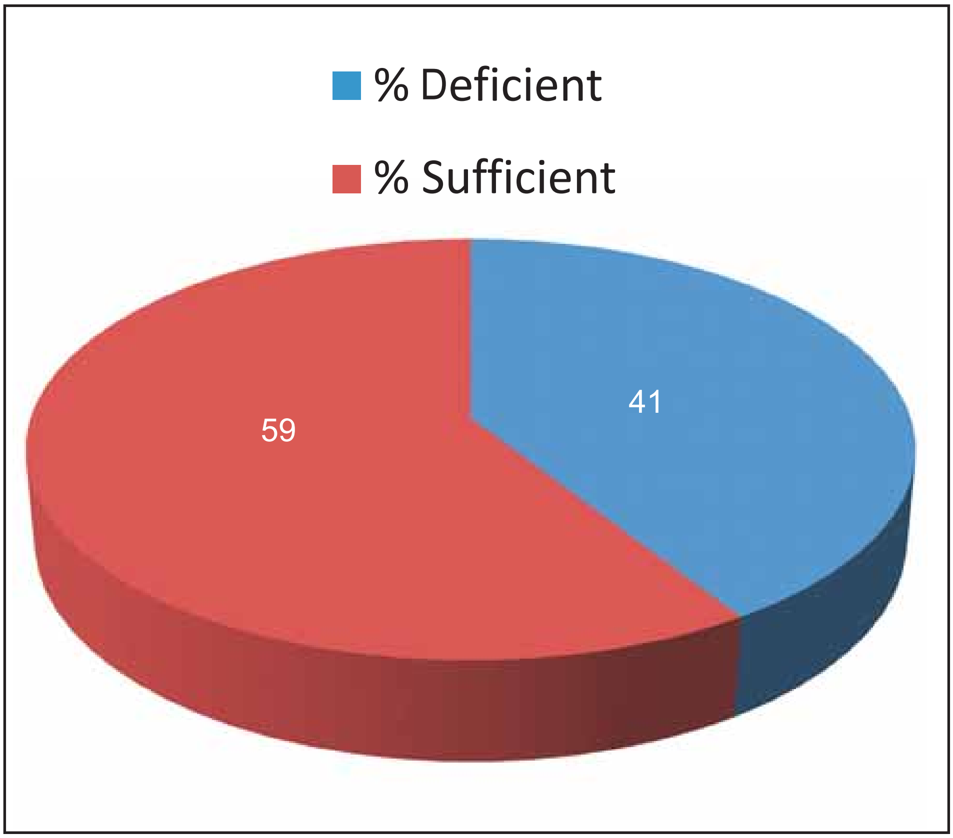


Figure 13. Karnataka soil status - Available phosphorus

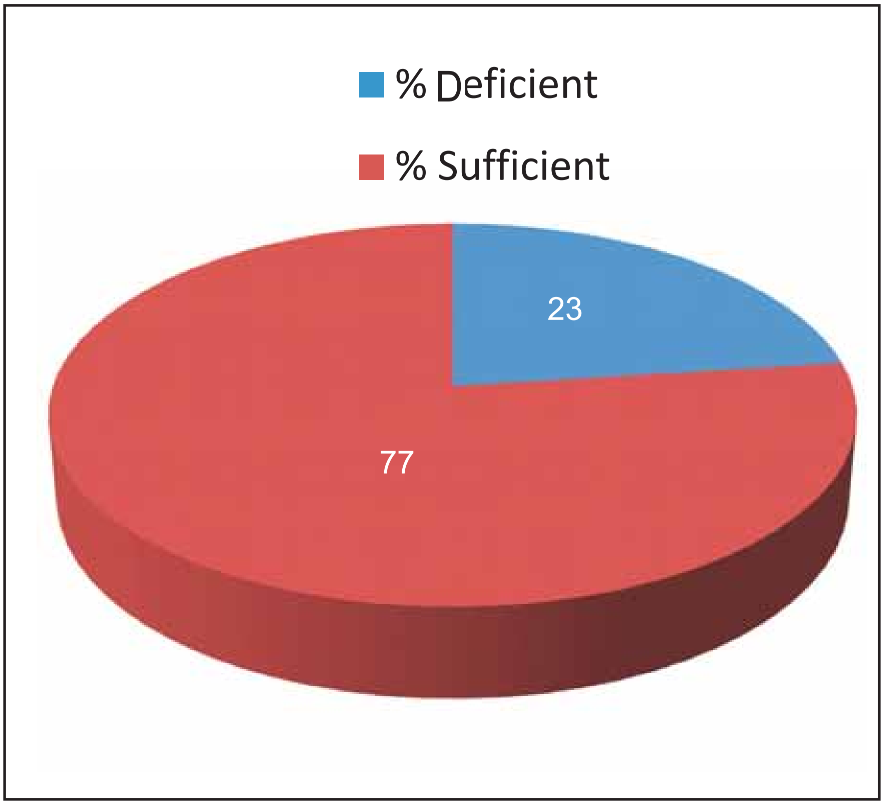


Figure 14. Karnataka soil status - Available potassium

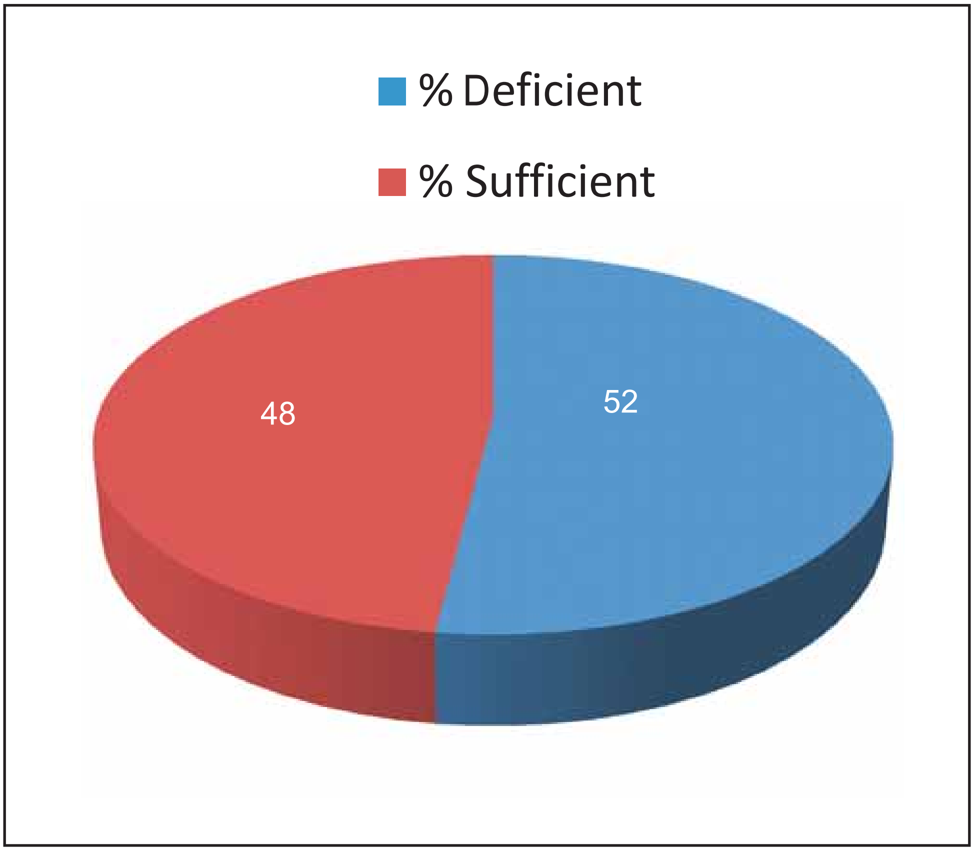


Figure 15. Karnataka soil status - Available sulfur

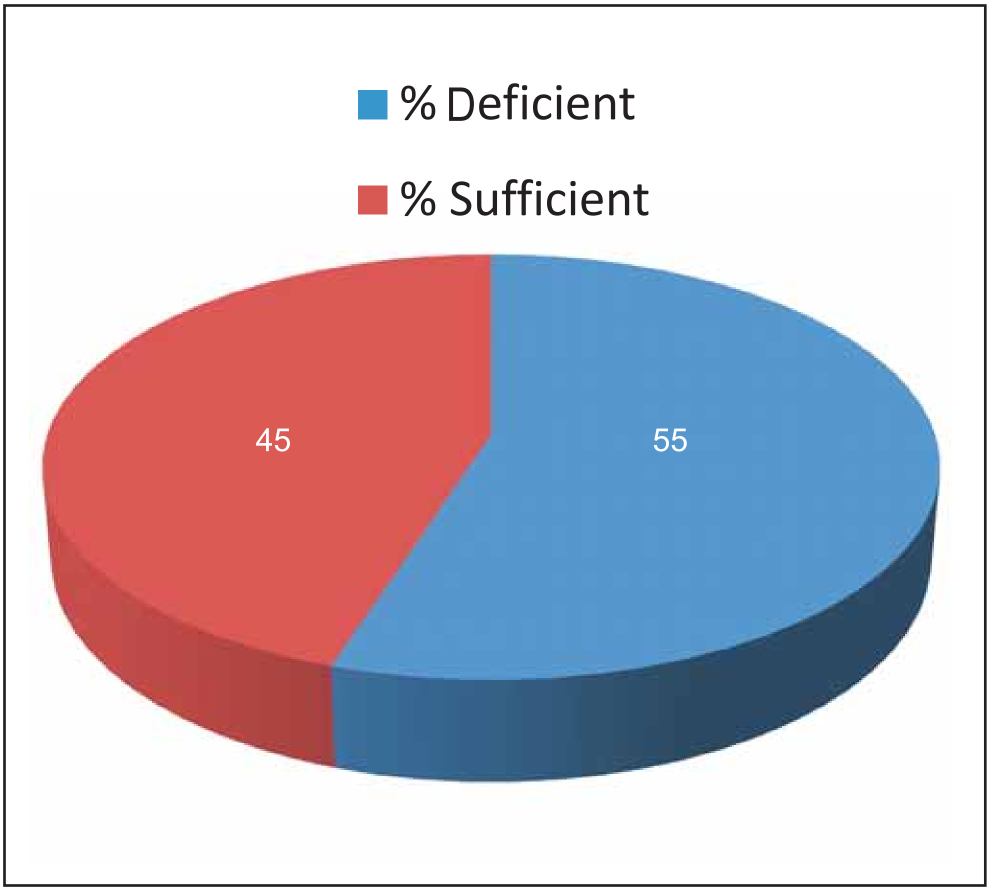


Figure 16. Karnataka soil status - Available zinc

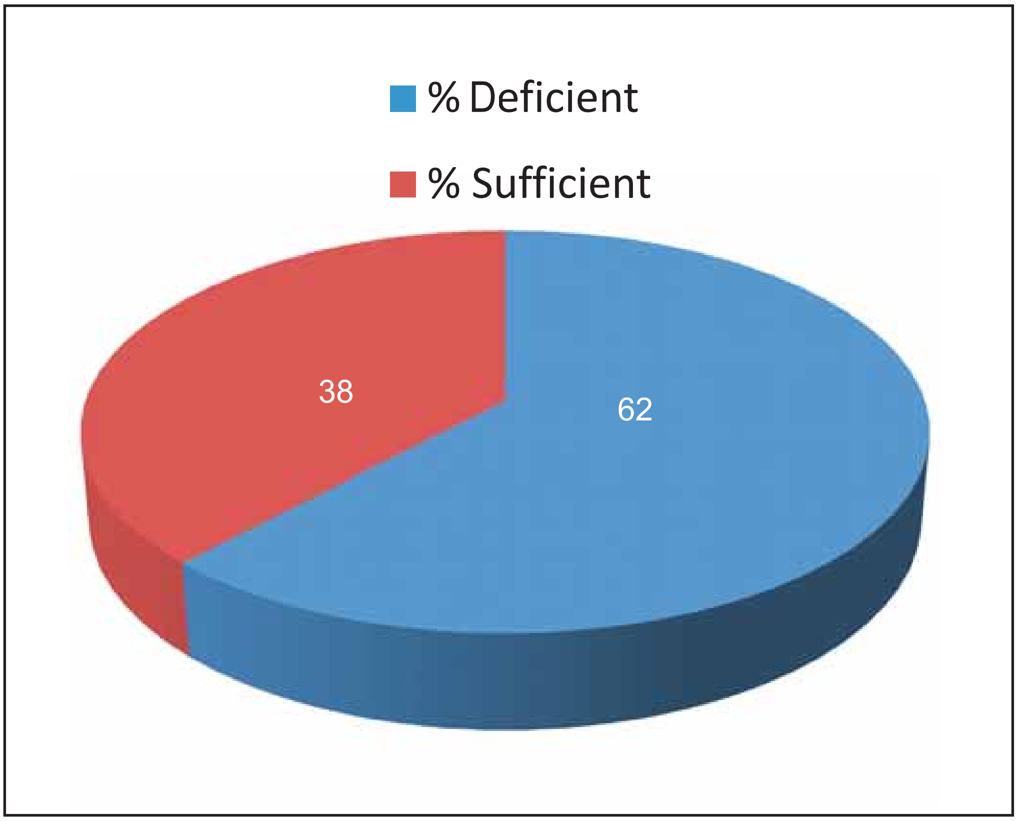
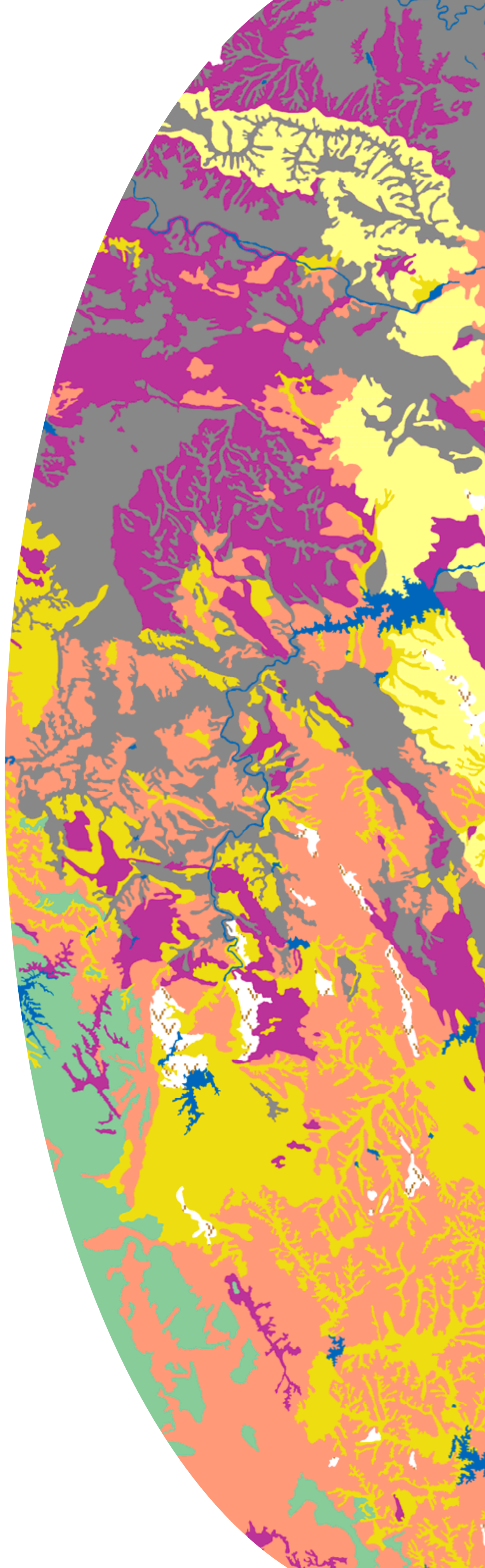


Figure 17. Karnataka soil status - Available boron

District-wise Soil Status Maps



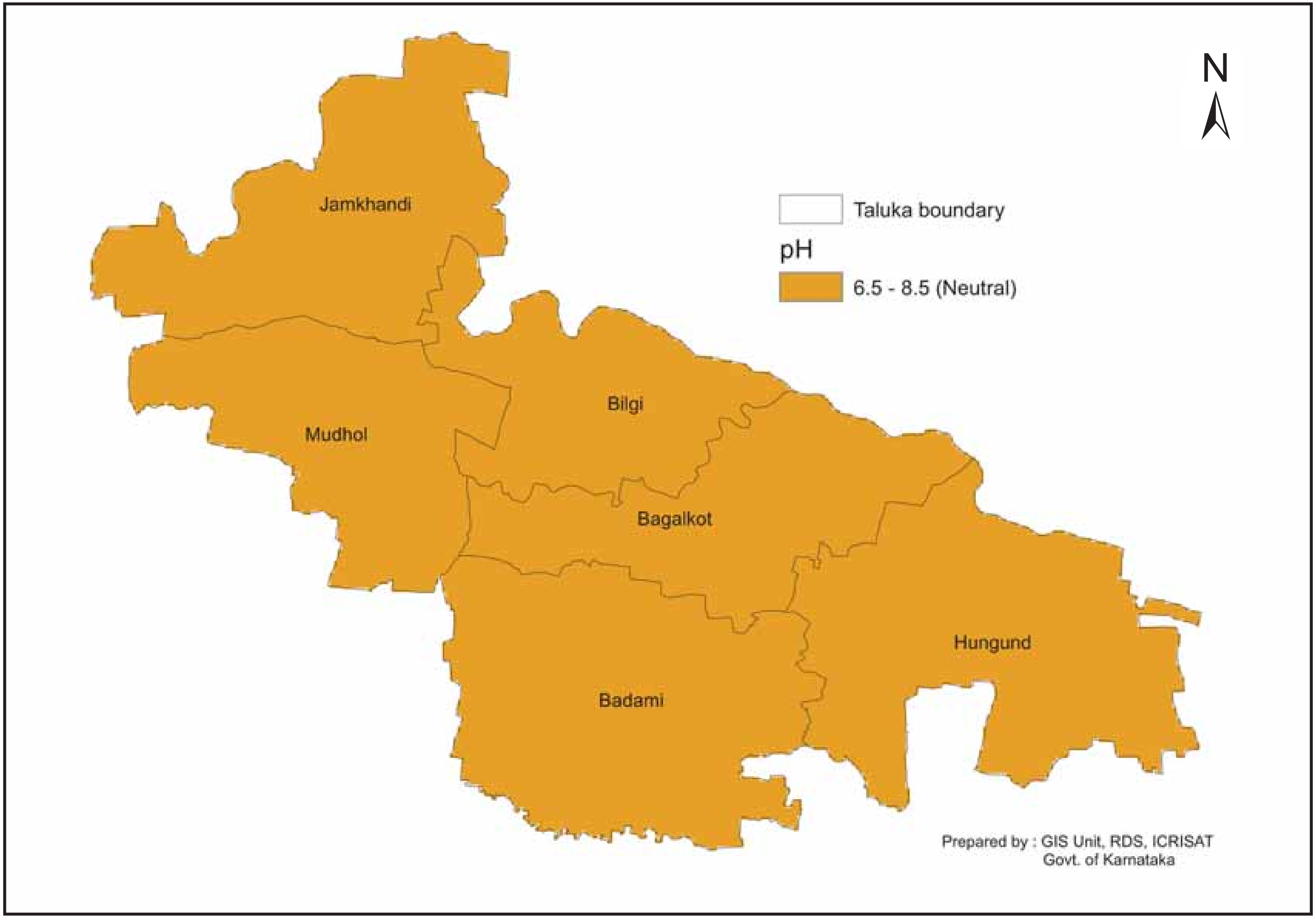


Figure 18. pH status in Bagalkot district

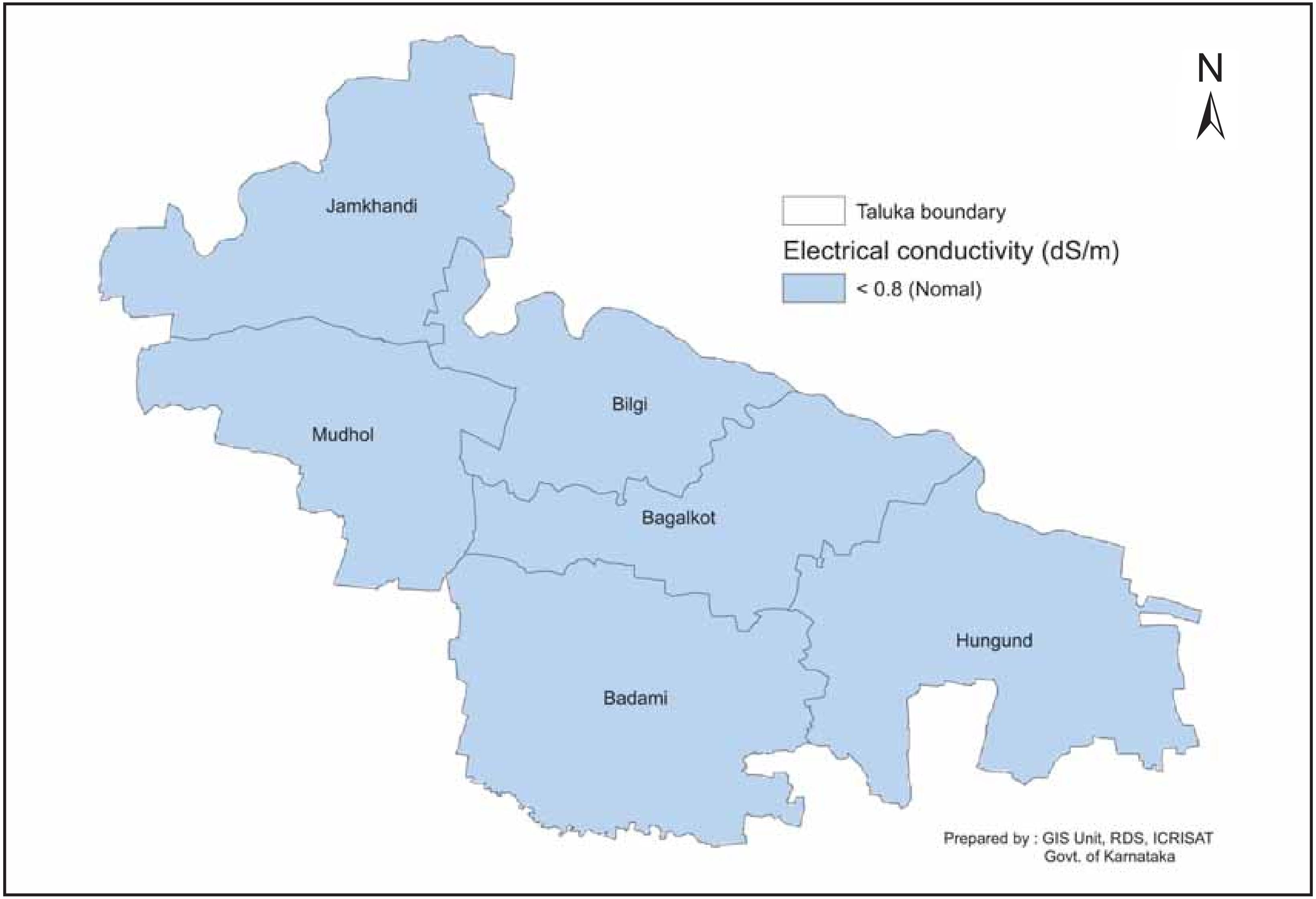


Figure 19. Electrical conductivity status in Bagalkot district

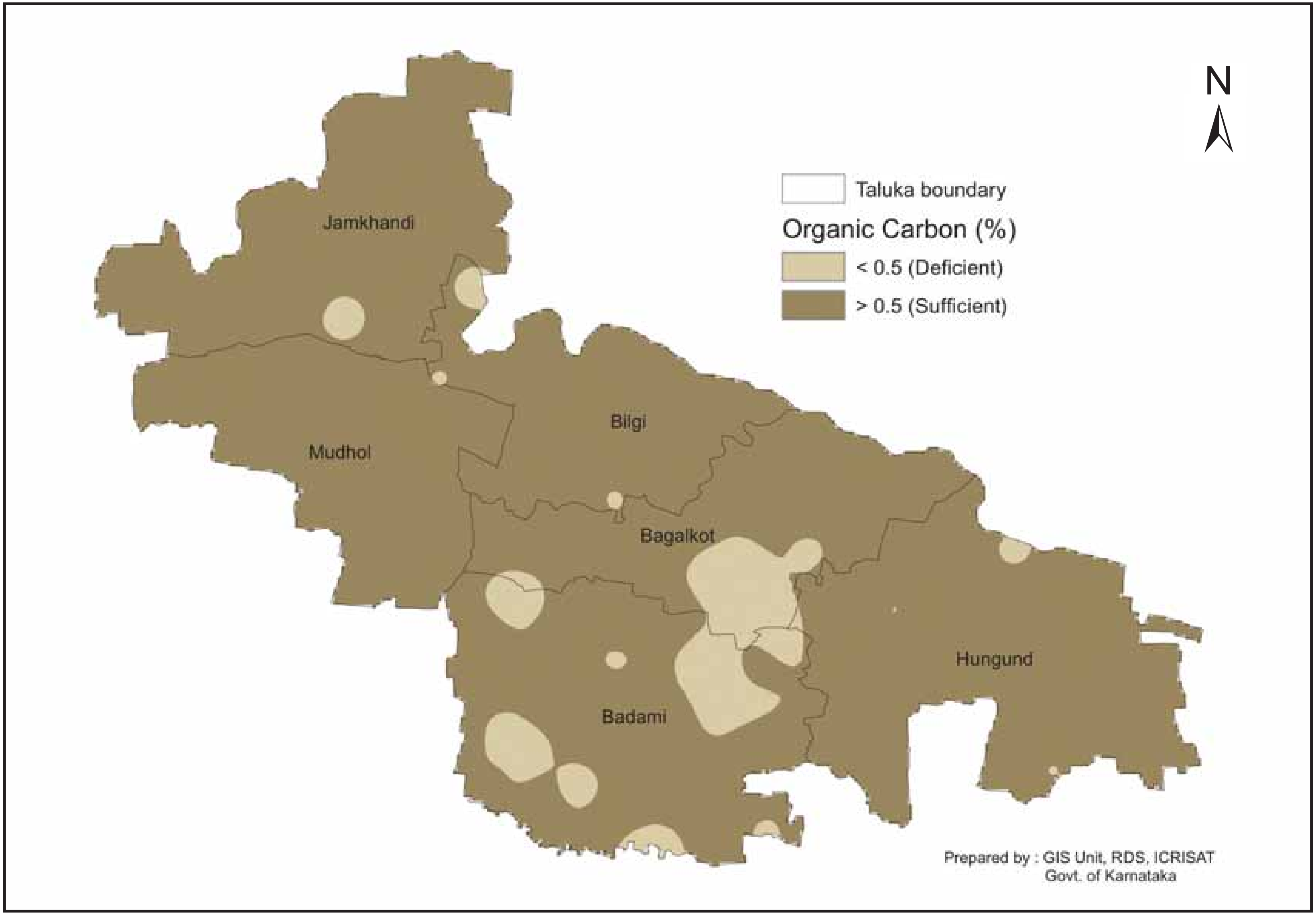


Figure 20. Organic carbon status in Bagalkot district

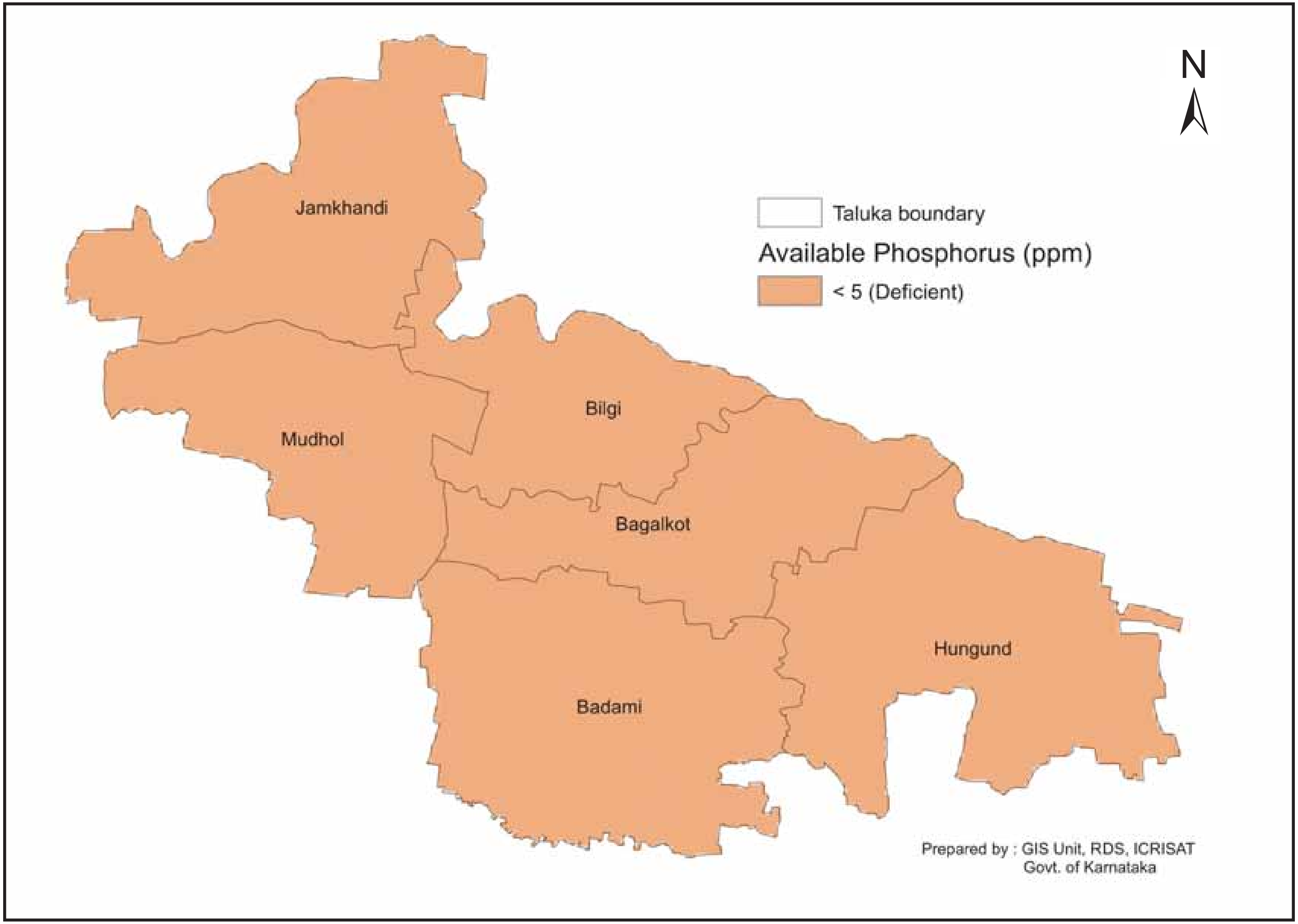


Figure 21. Available phosphorus status in Bagalkot district

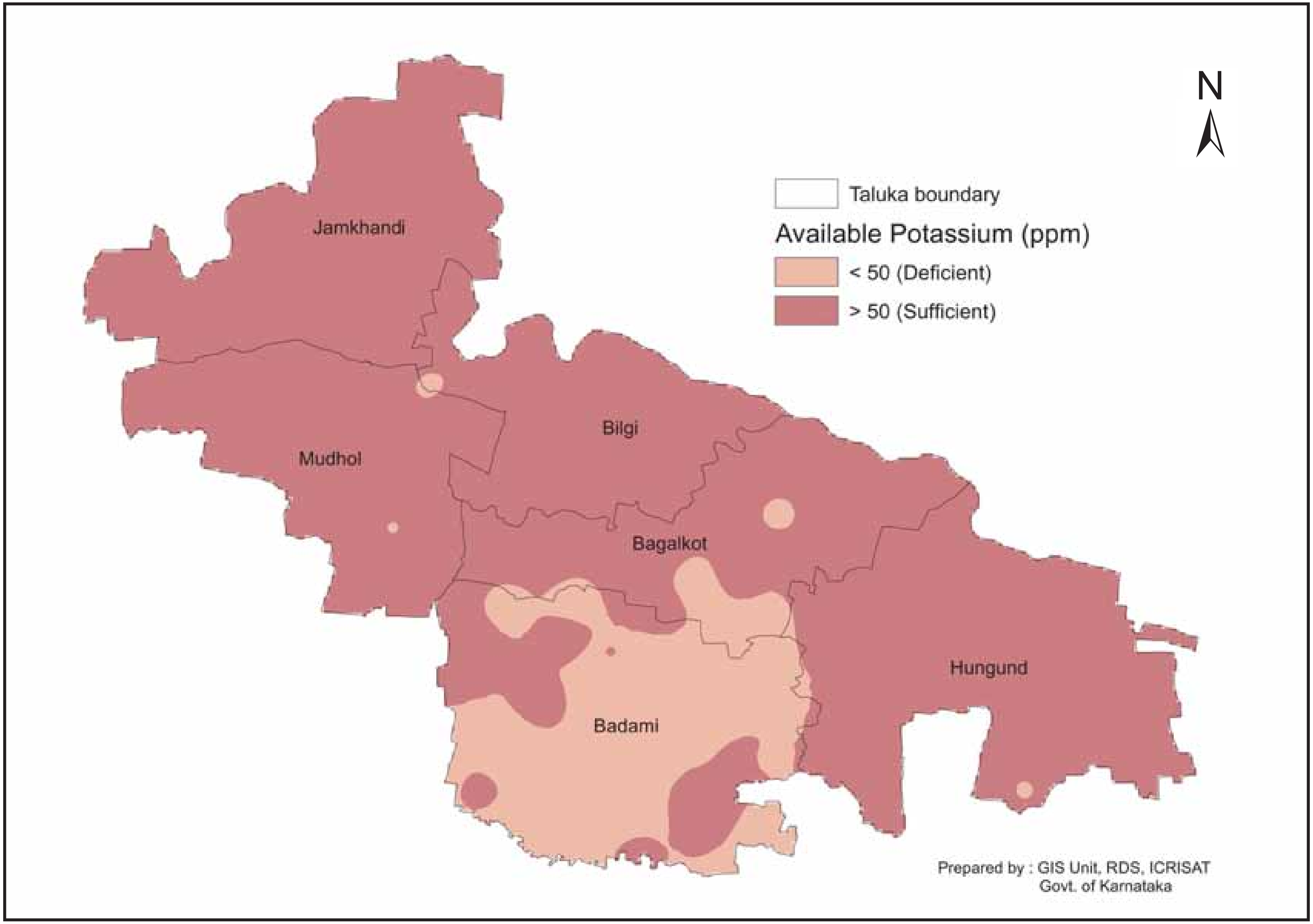


Figure 22. Available potassium status in Bagalkot district

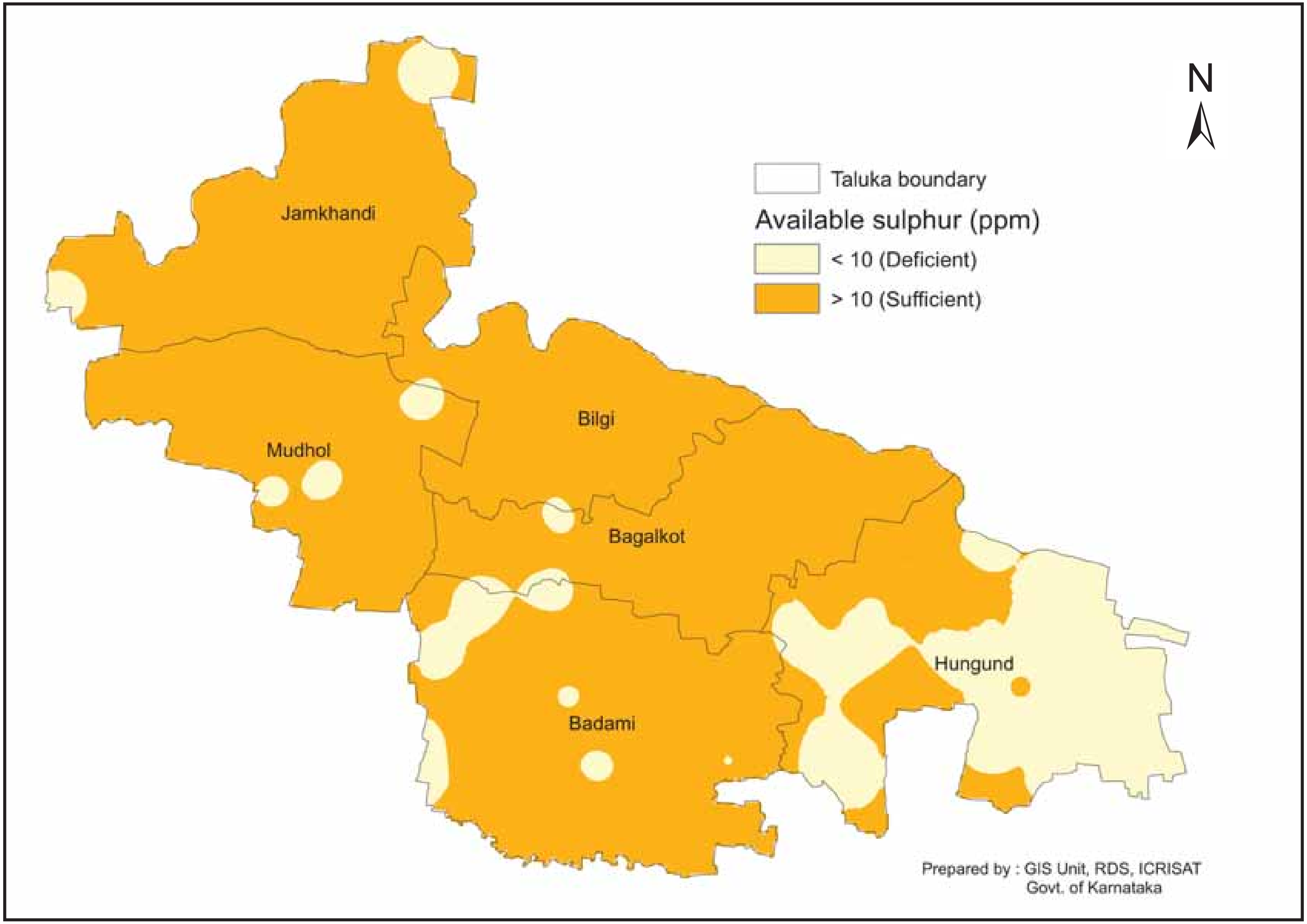


Figure 23. Available sulphur status in Bagalkot district

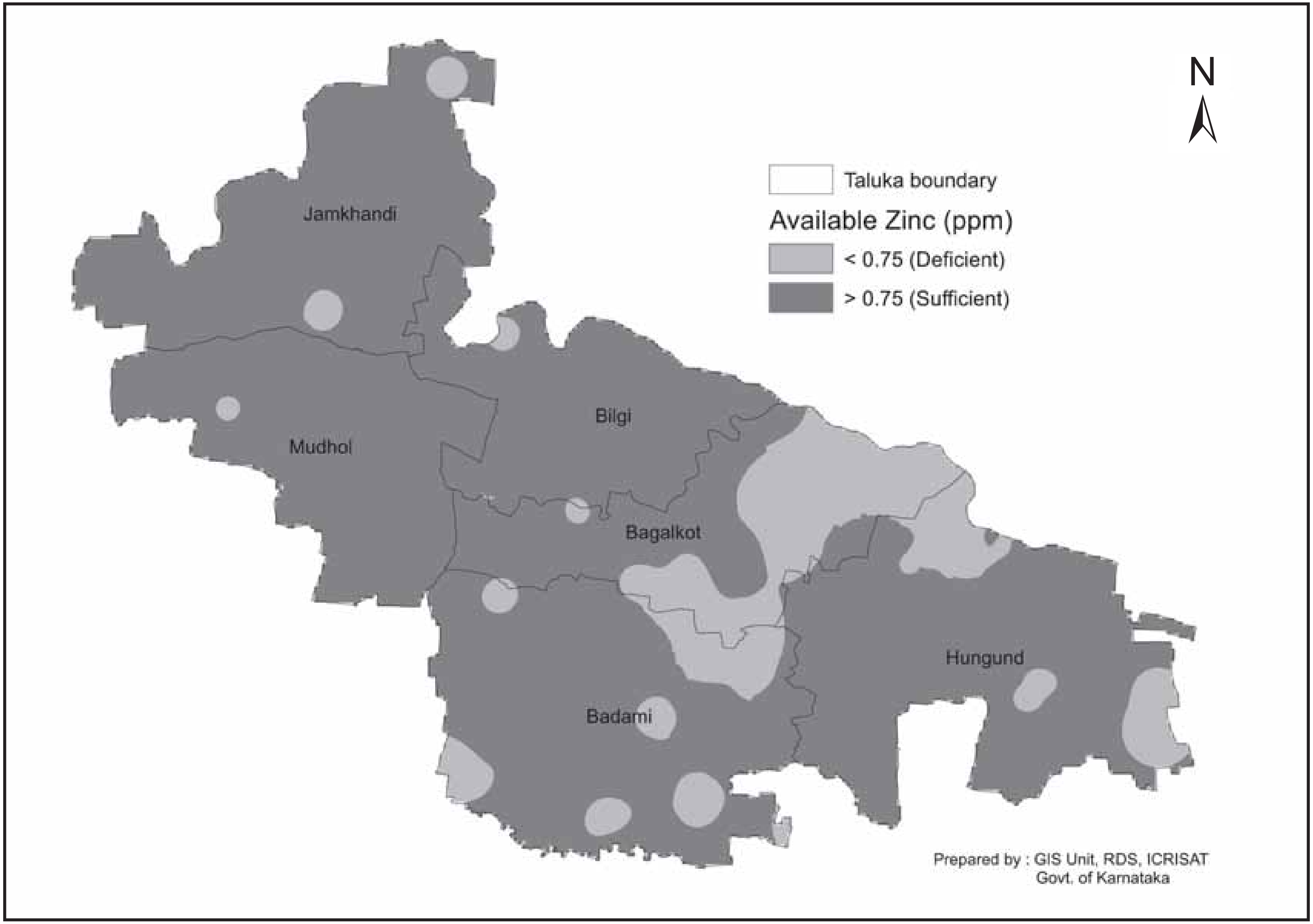


Figure 24. Available zinc status in Bagalkot district

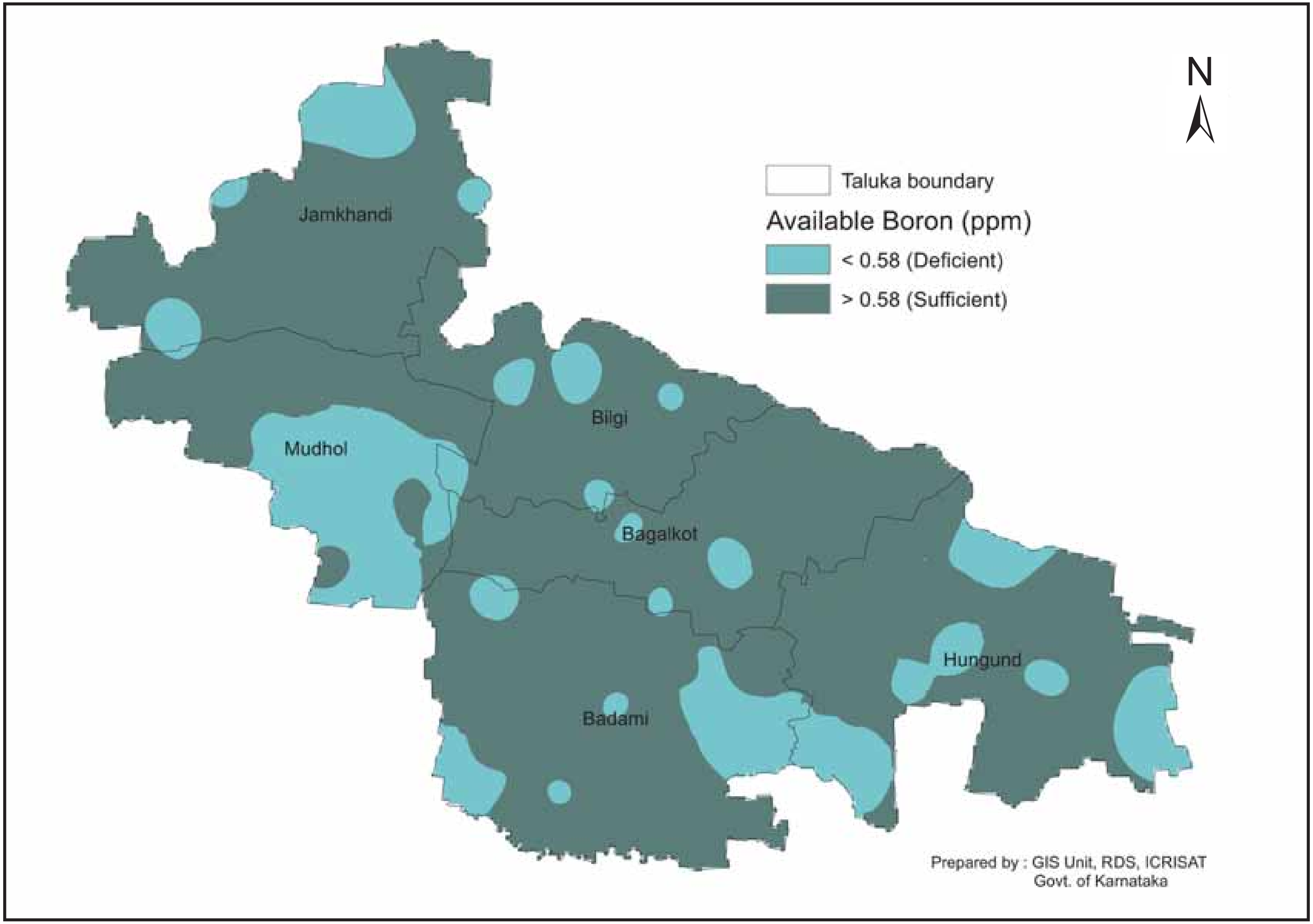


Figure 25. Available boron status Bagalkot district

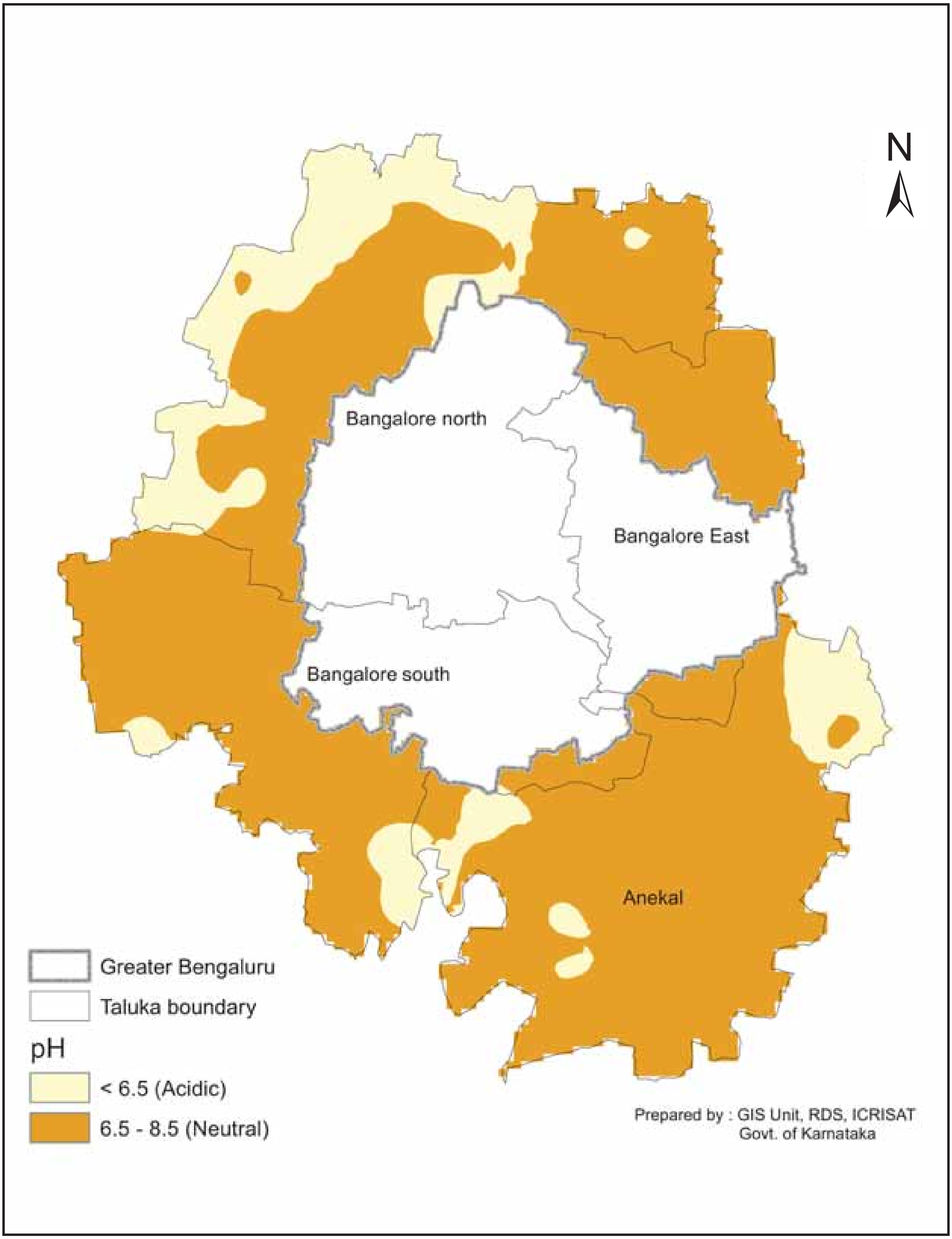


Figure 26. pH status in Bengaluru Urban district

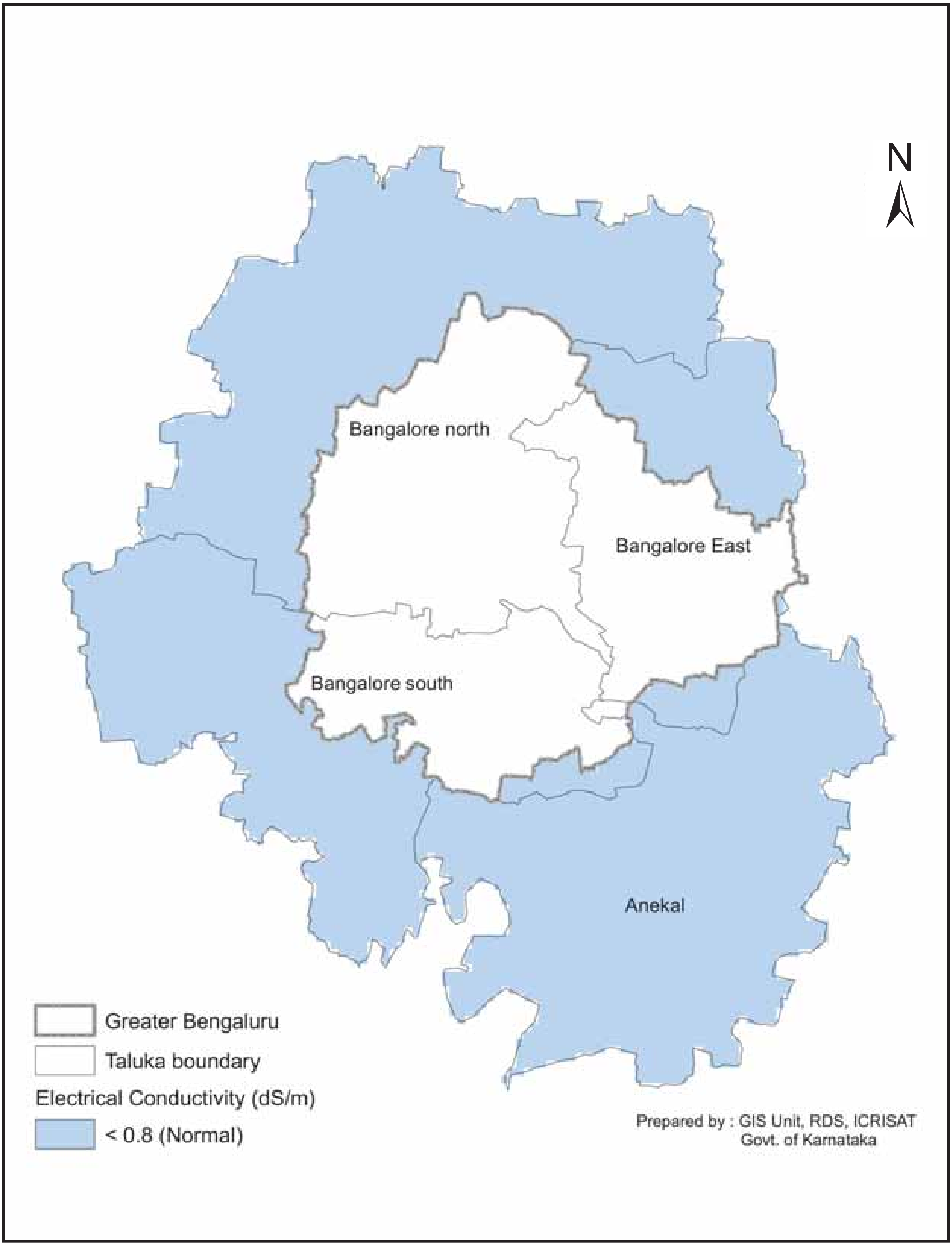


Figure 27. Electrical conductivity status in Bengaluru Urban district

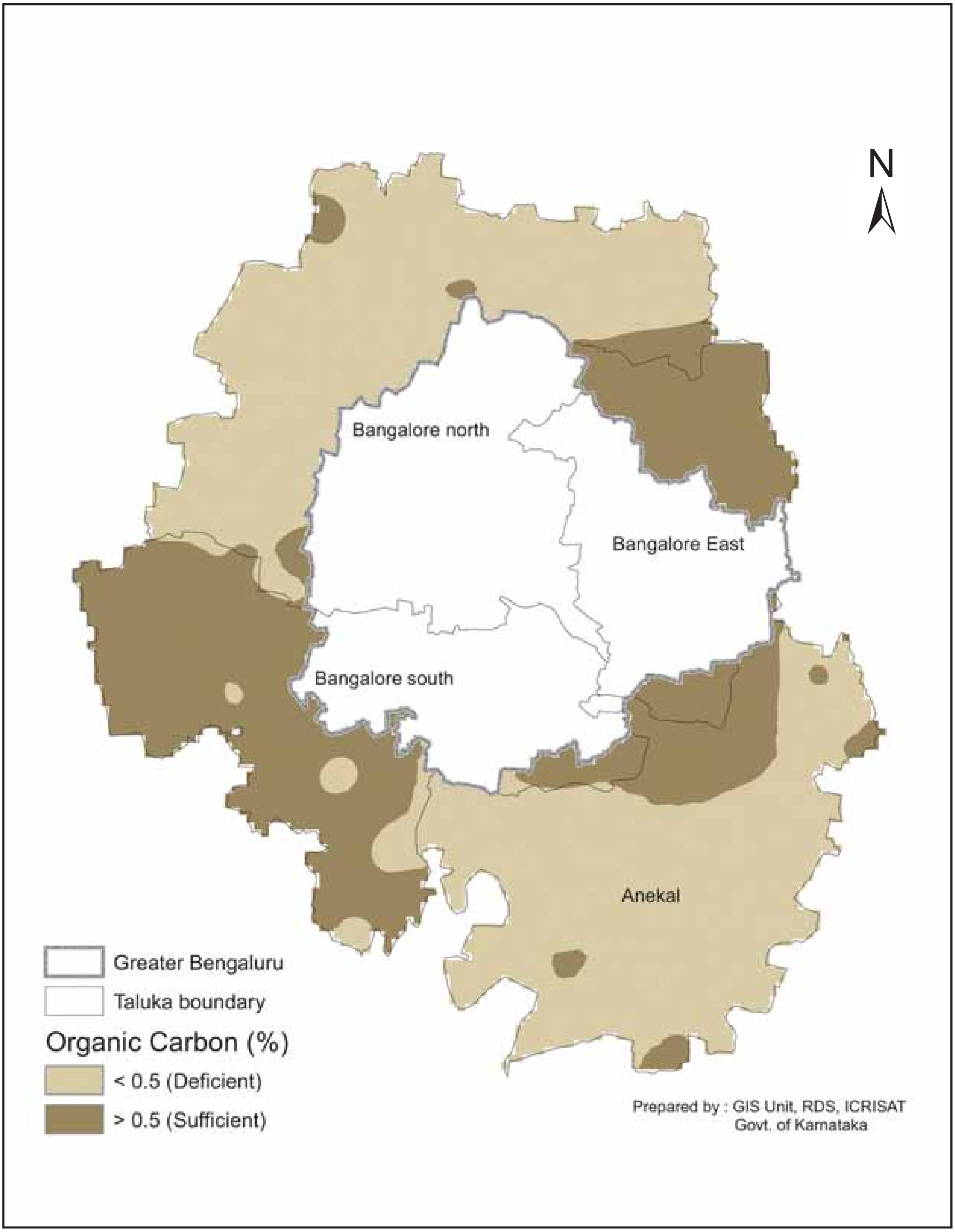


Figure 28. Organic carbon status in Bengaluru Urban district

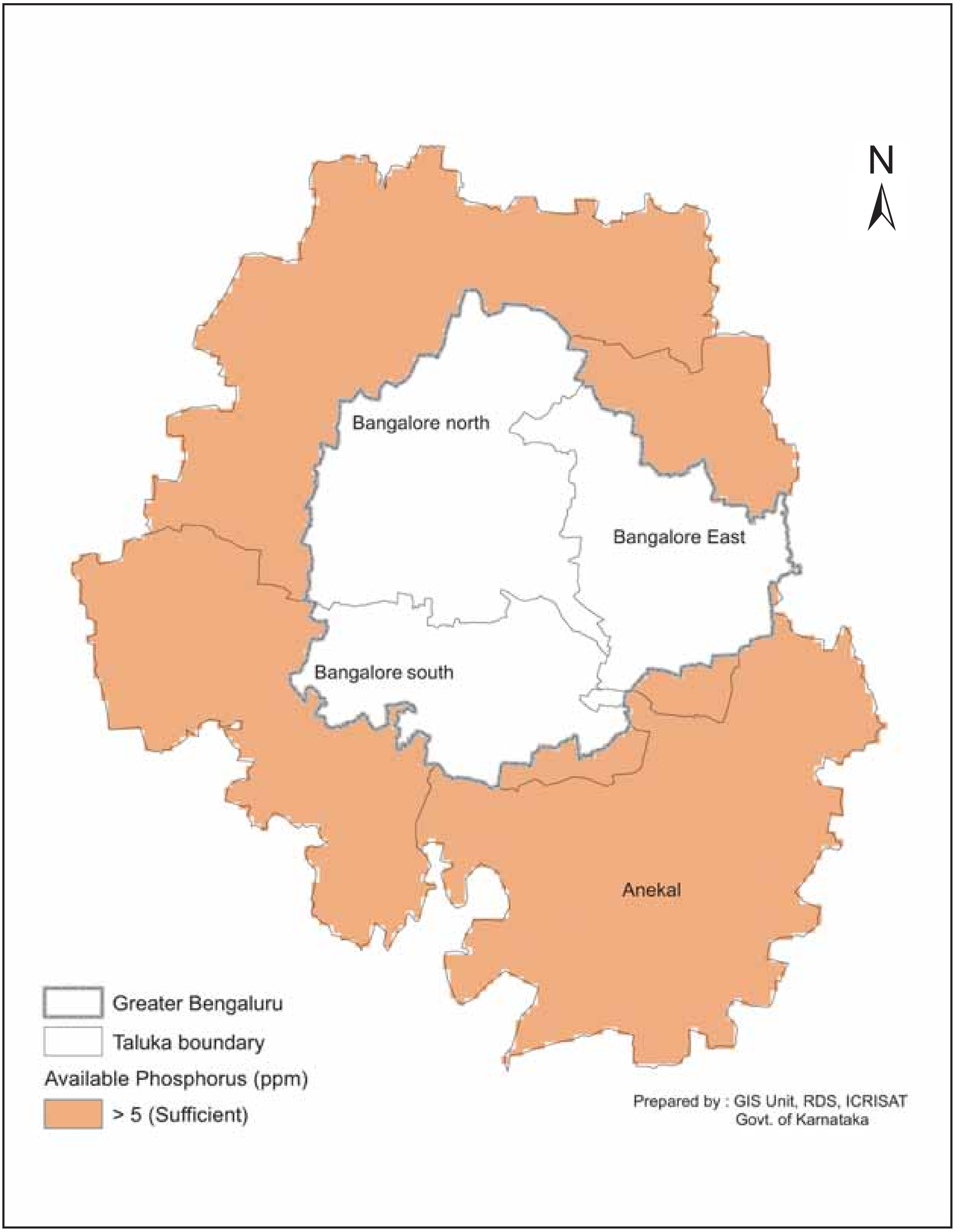


Figure 29. Available phosphorus status in Bengaluru Urban district

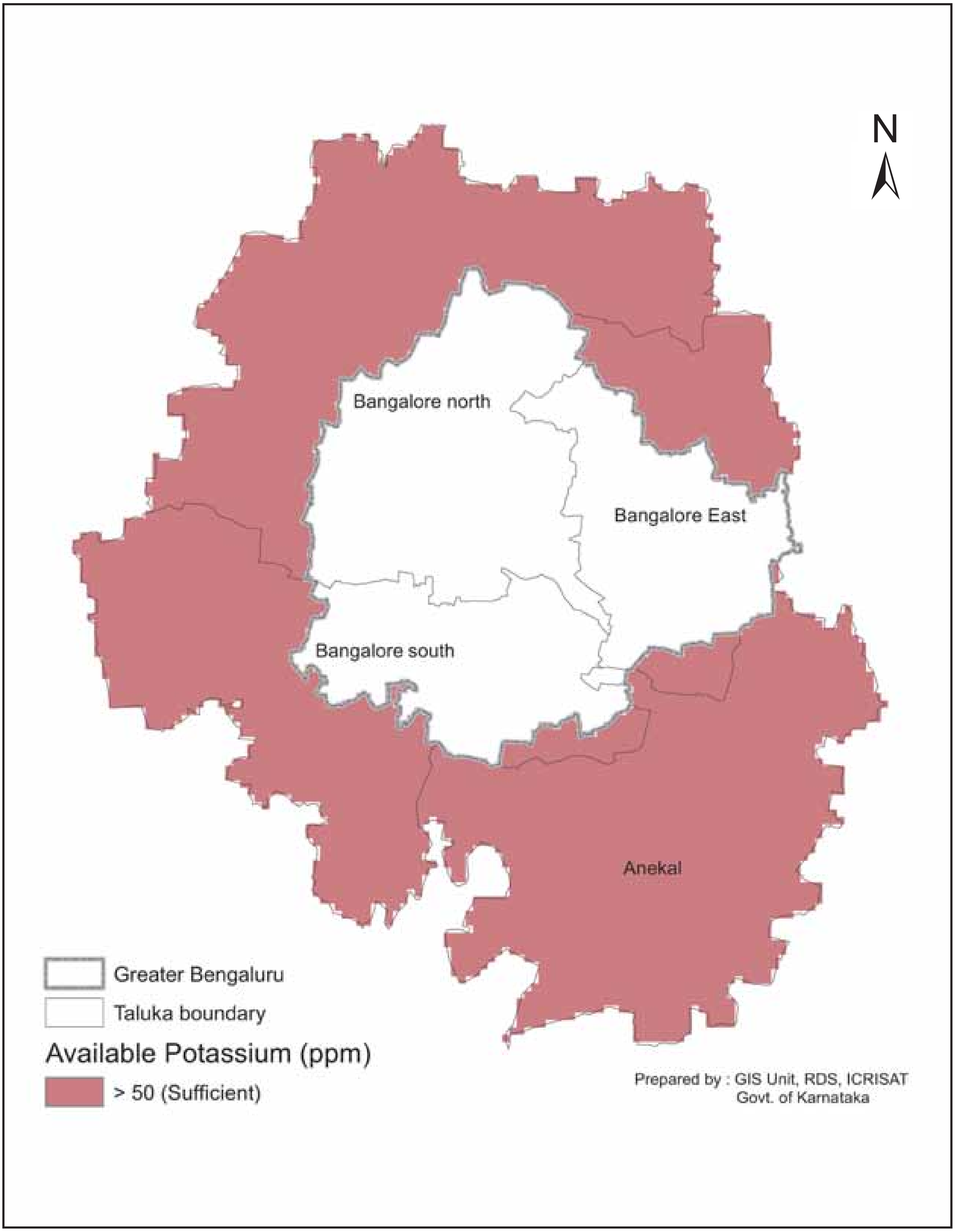


Figure 30. Available potassium status in Bengaluru Urban district

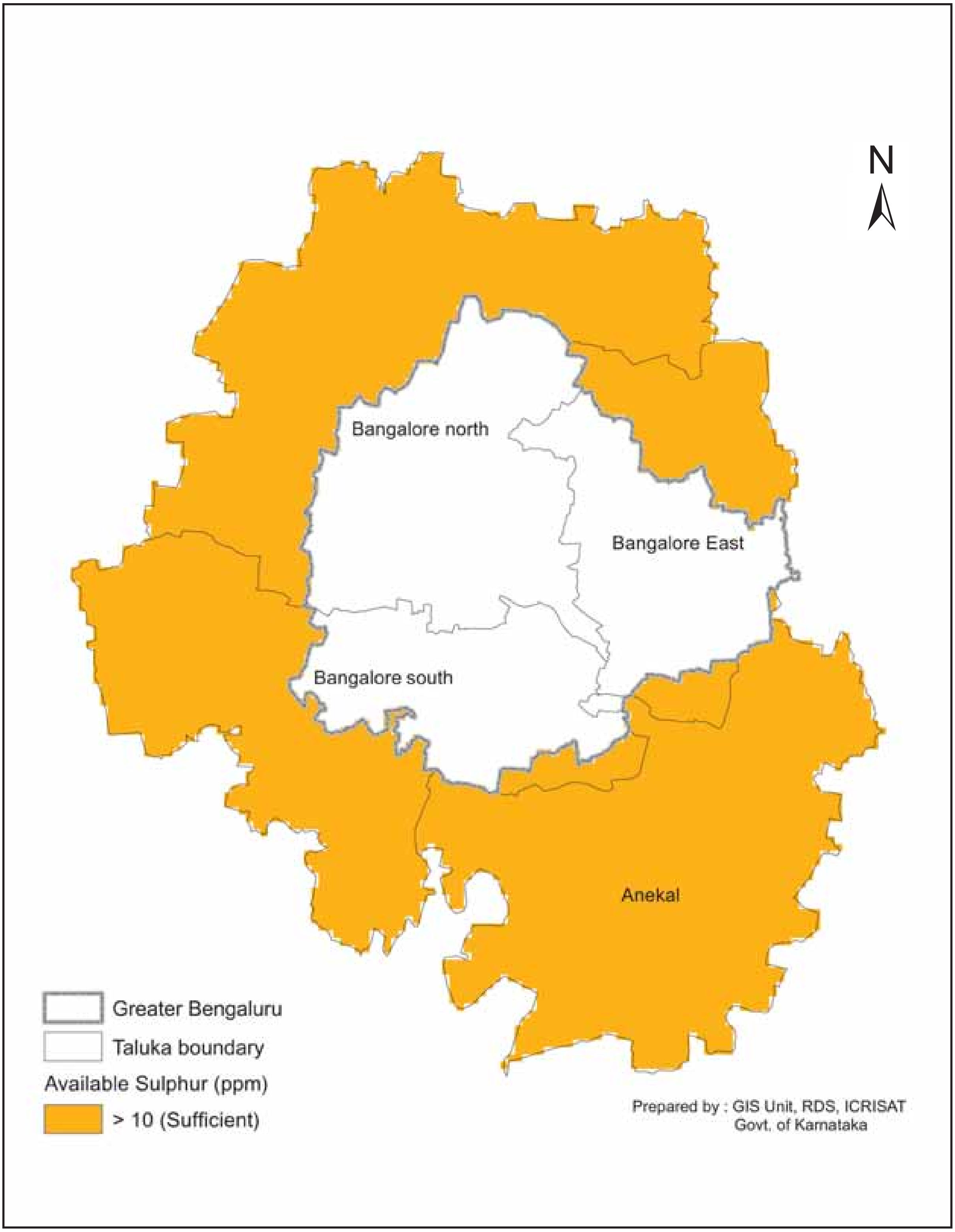


Figure 31. Available sulphur status in Bengaluru Urban district

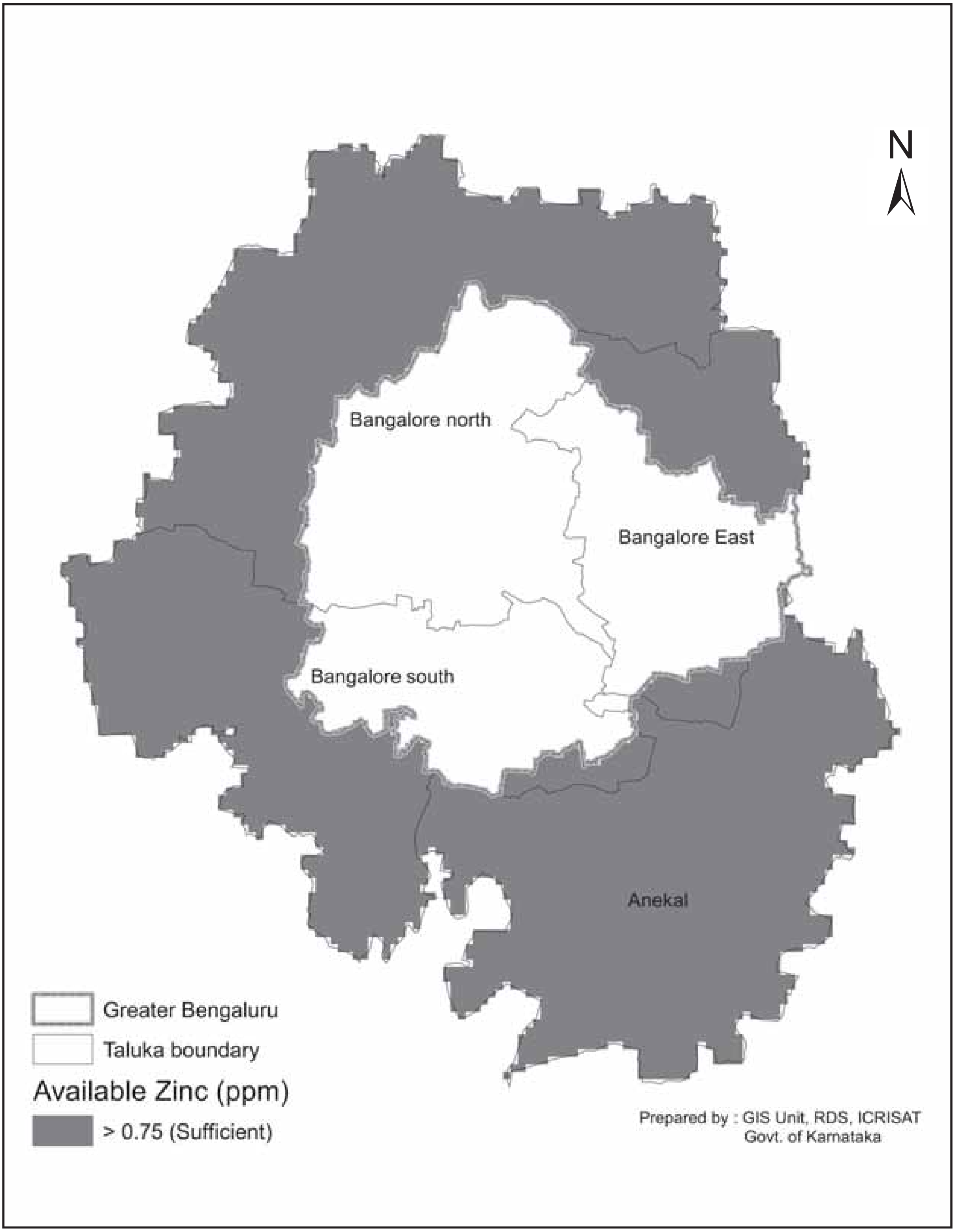


Figure 32. Available zinc status in Bengaluru Urban district

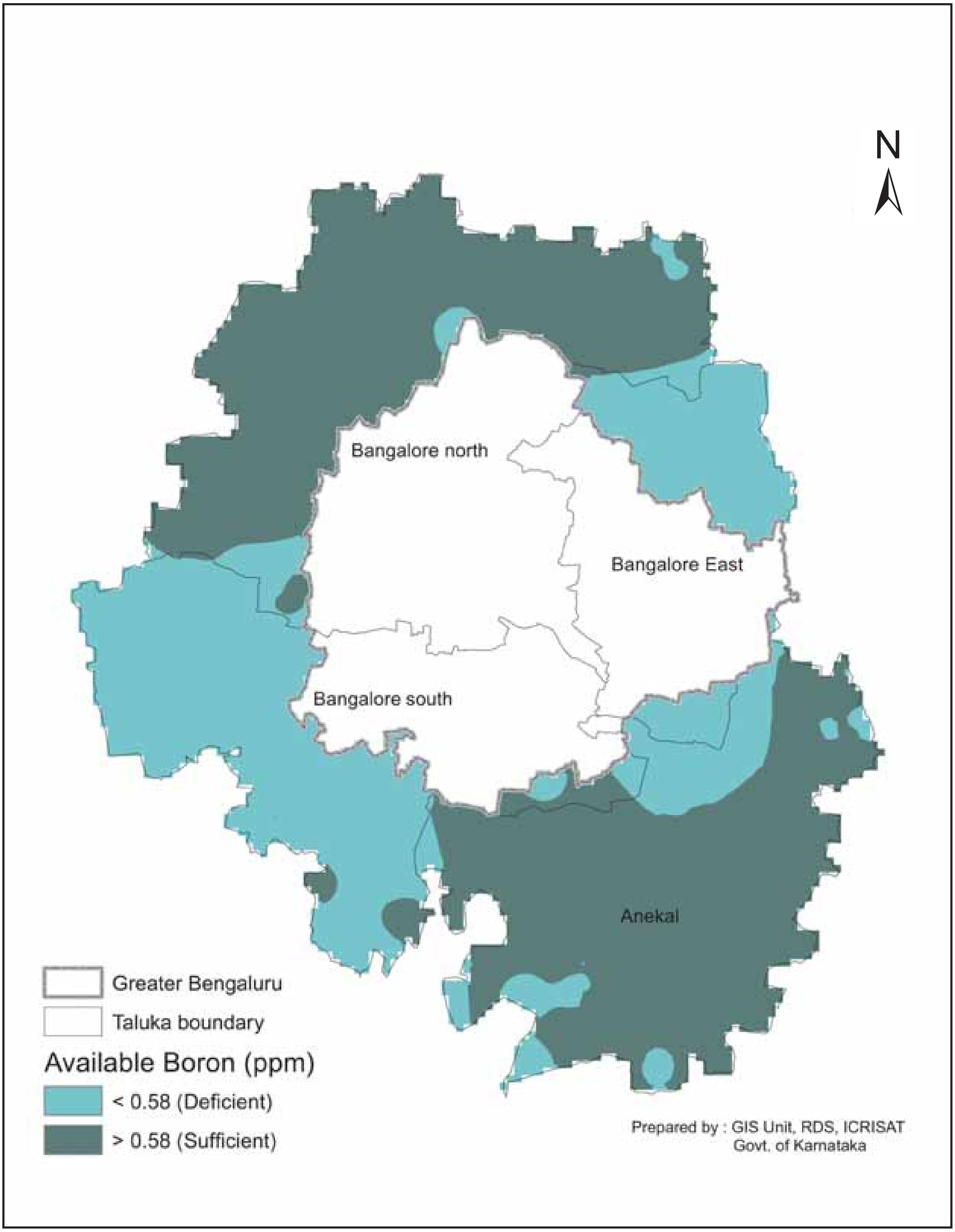


Figure 33. Available boron status in Bengaluru Urban district

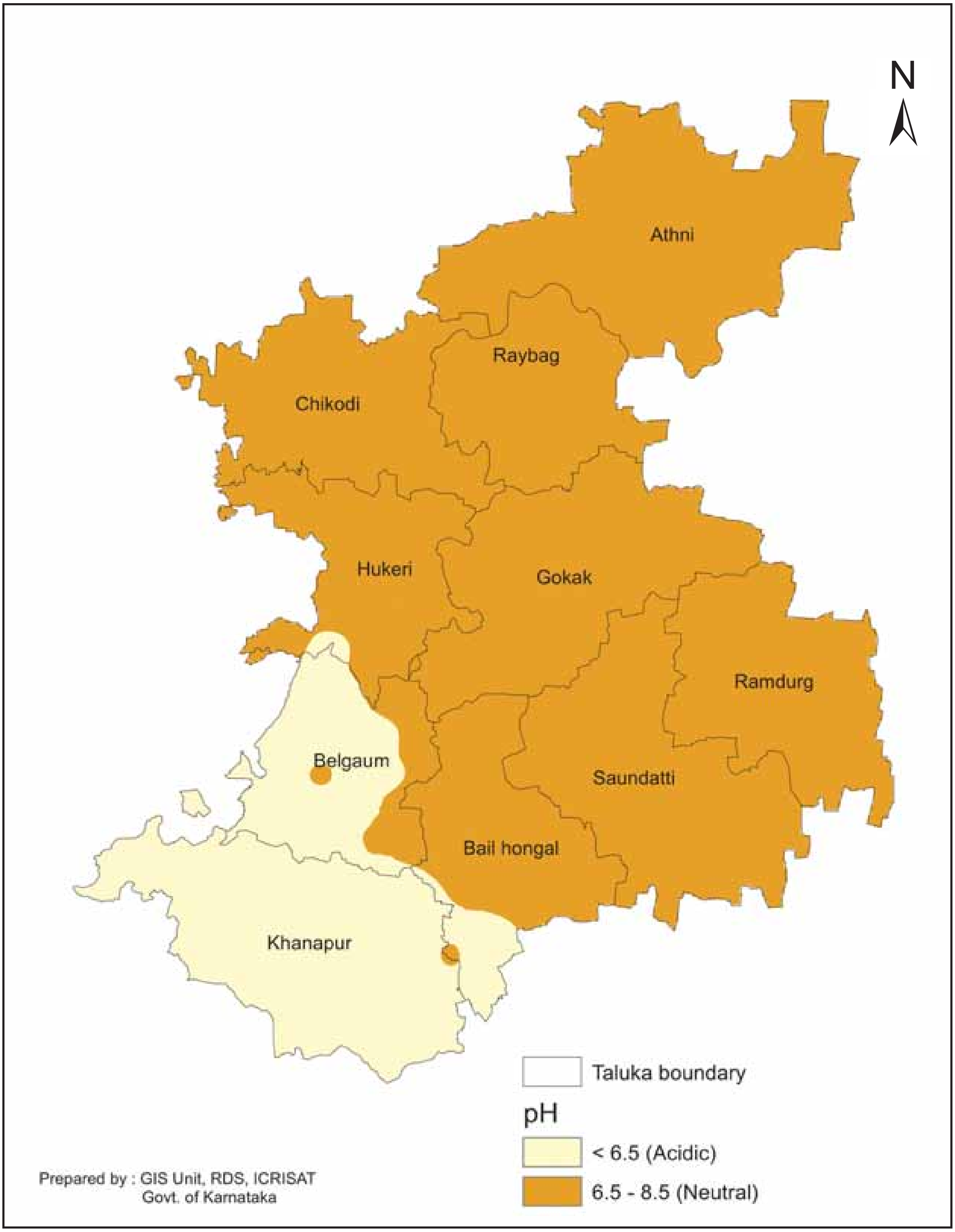


Figure 34. pH status in Belgaum district

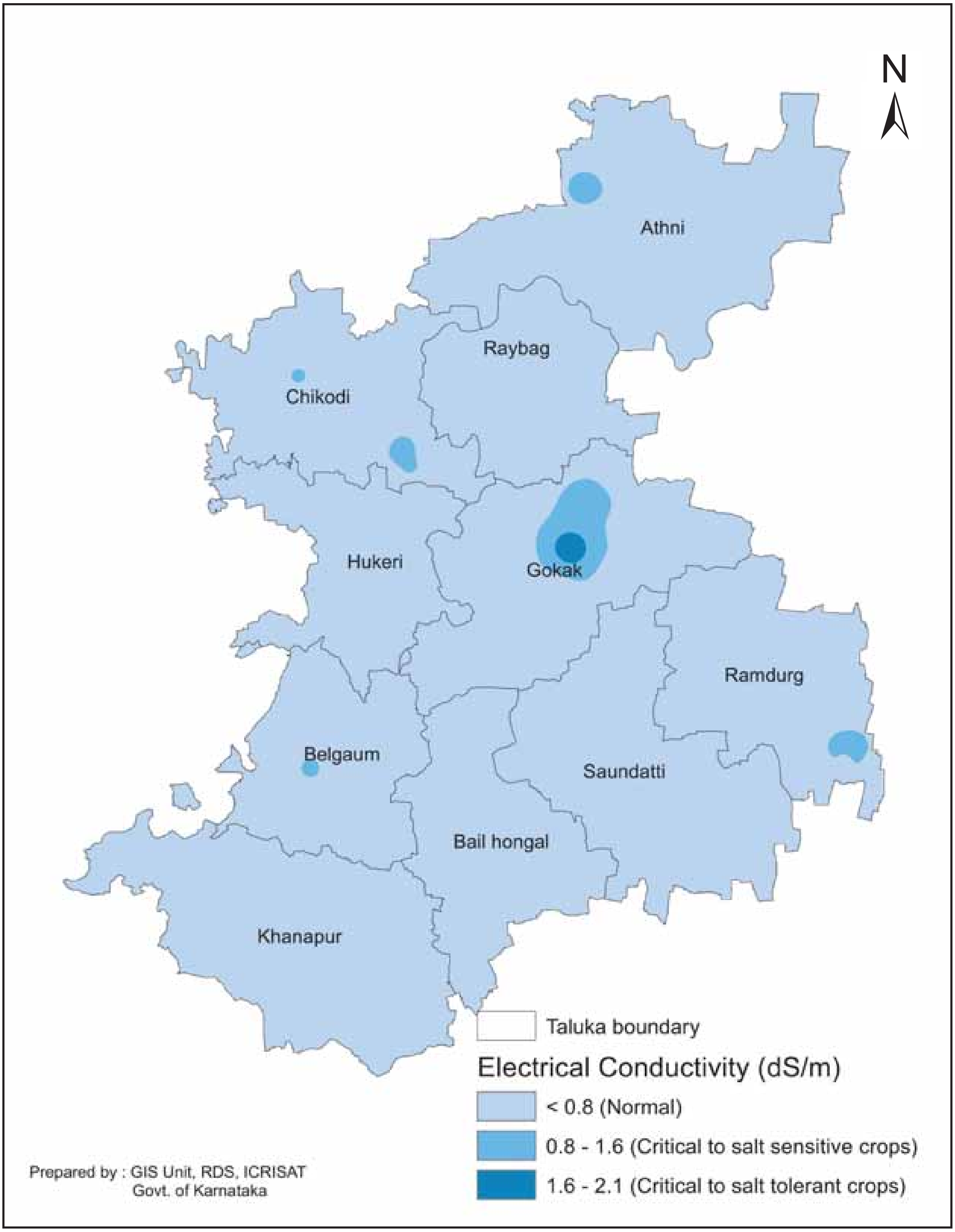


Figure 35. Electrical conductivity status in Belgaum district

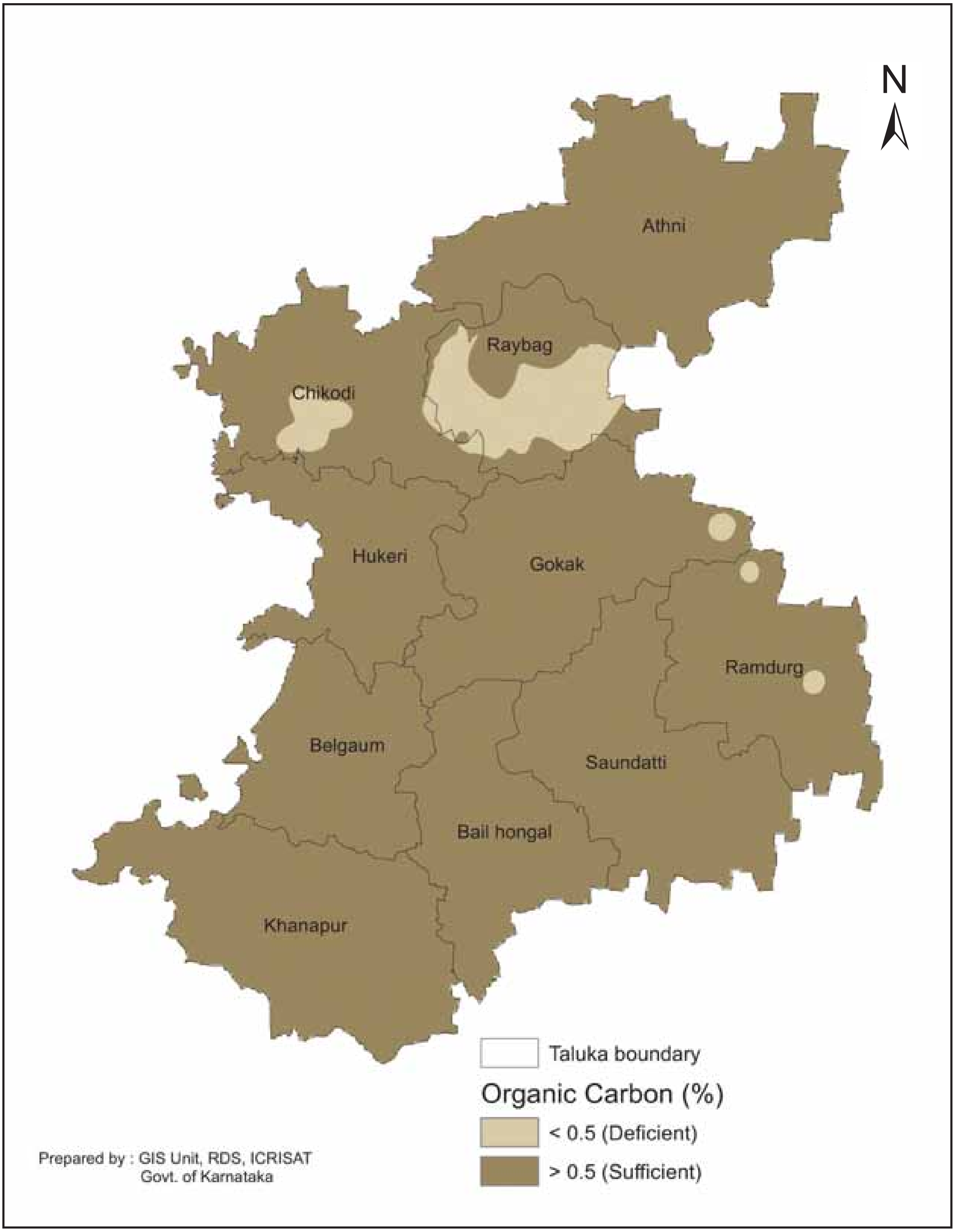


Figure 36. Organic carbon status in Belgaum district

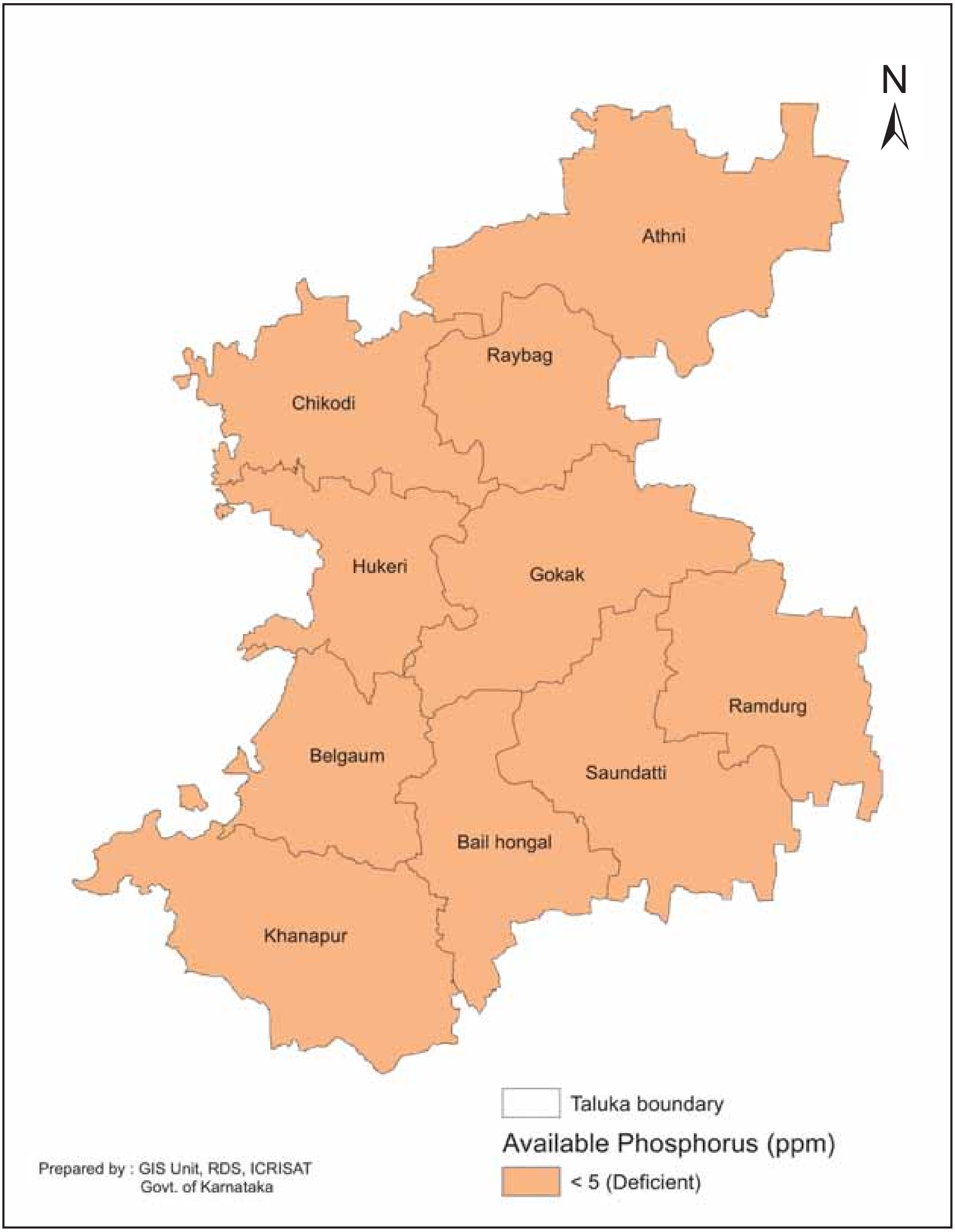


Figure 37. Available phosphorus status in Belgaum district

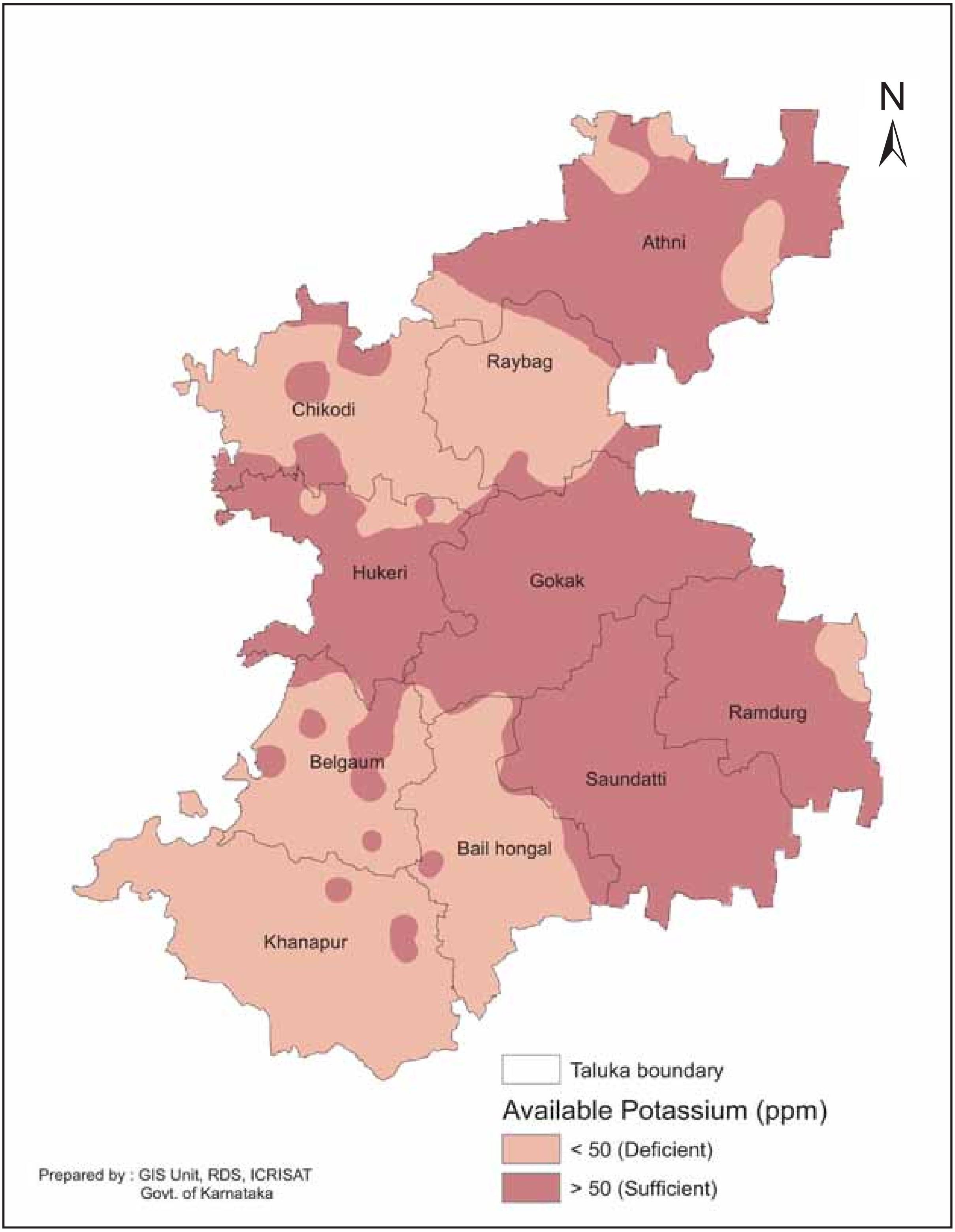


Figure 38. Available potassium status in Belgaum district

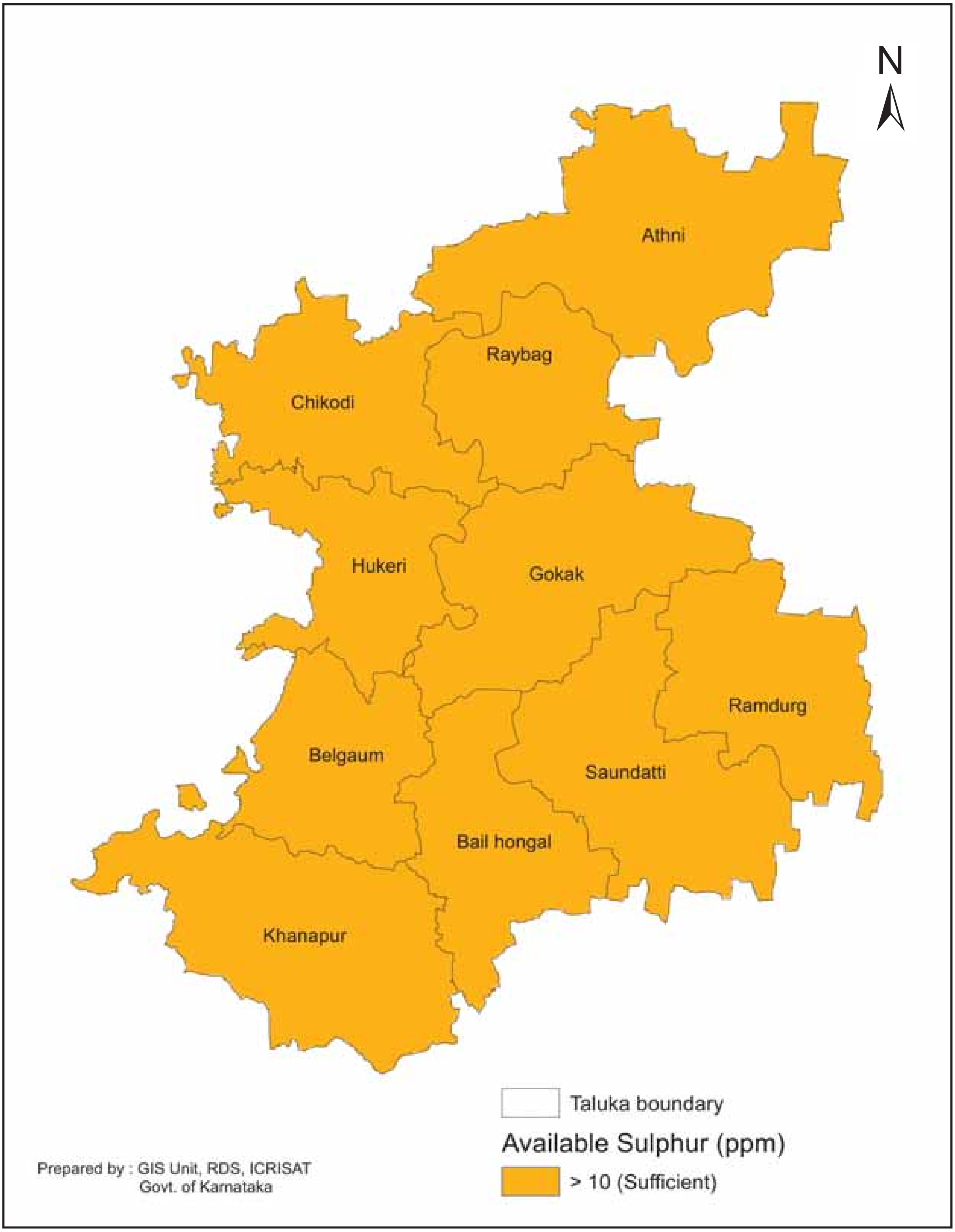


Figure 39. Available sulphur status in Belgaum district

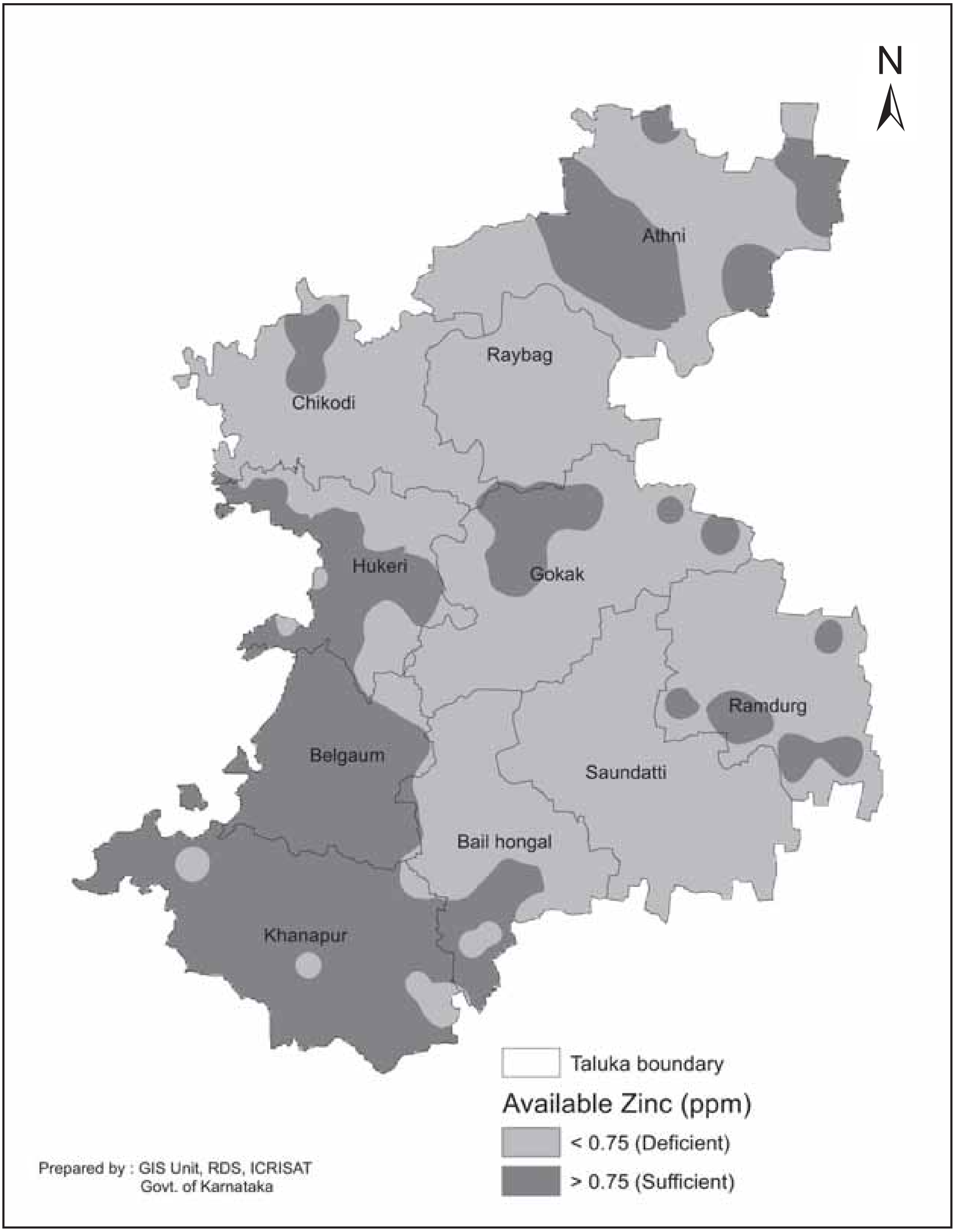


Figure 40. Available zinc status in Belgaum district

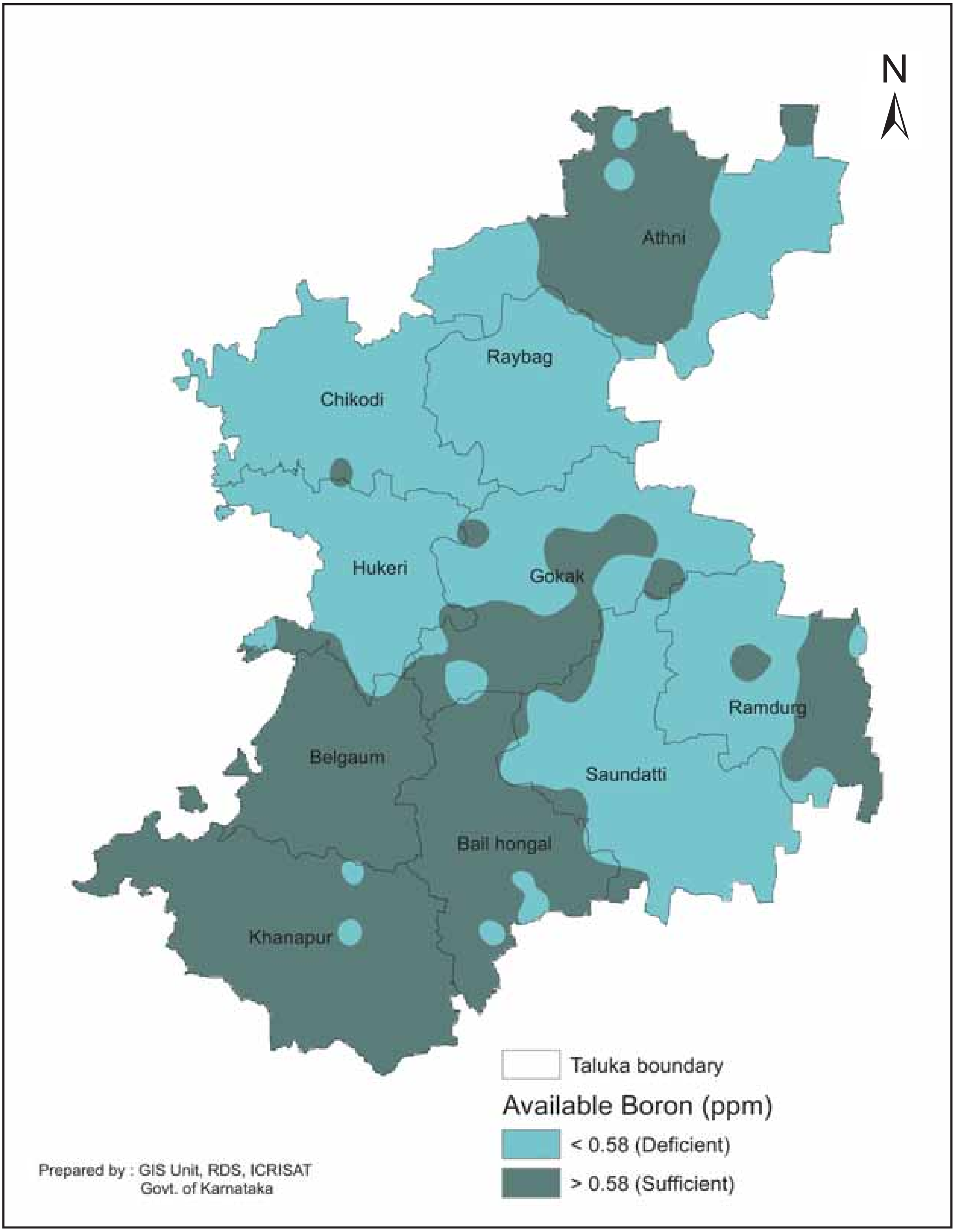


Figure 41. Available boron status in Belgaum district

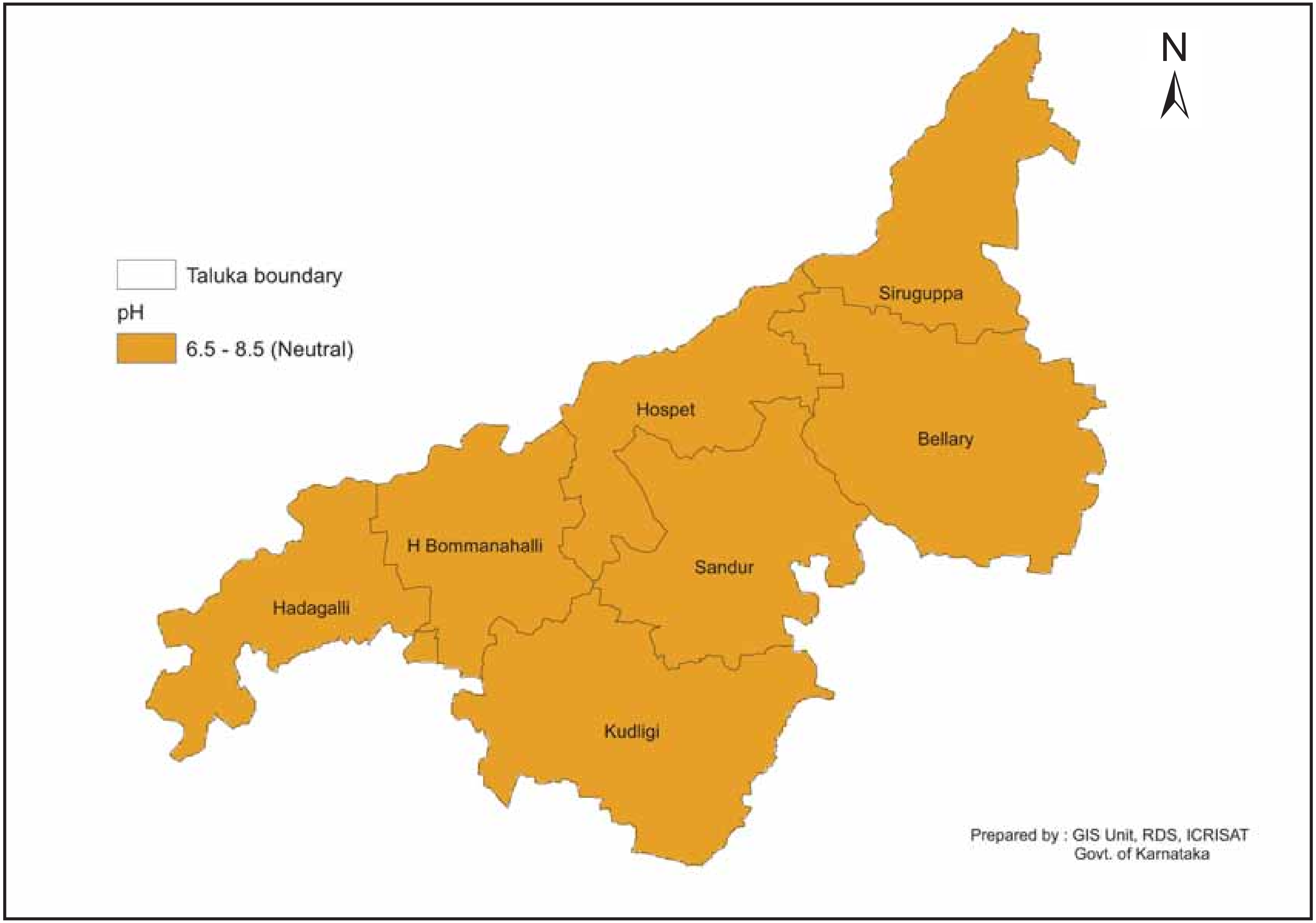


Figure 42. pH status in Bellary district

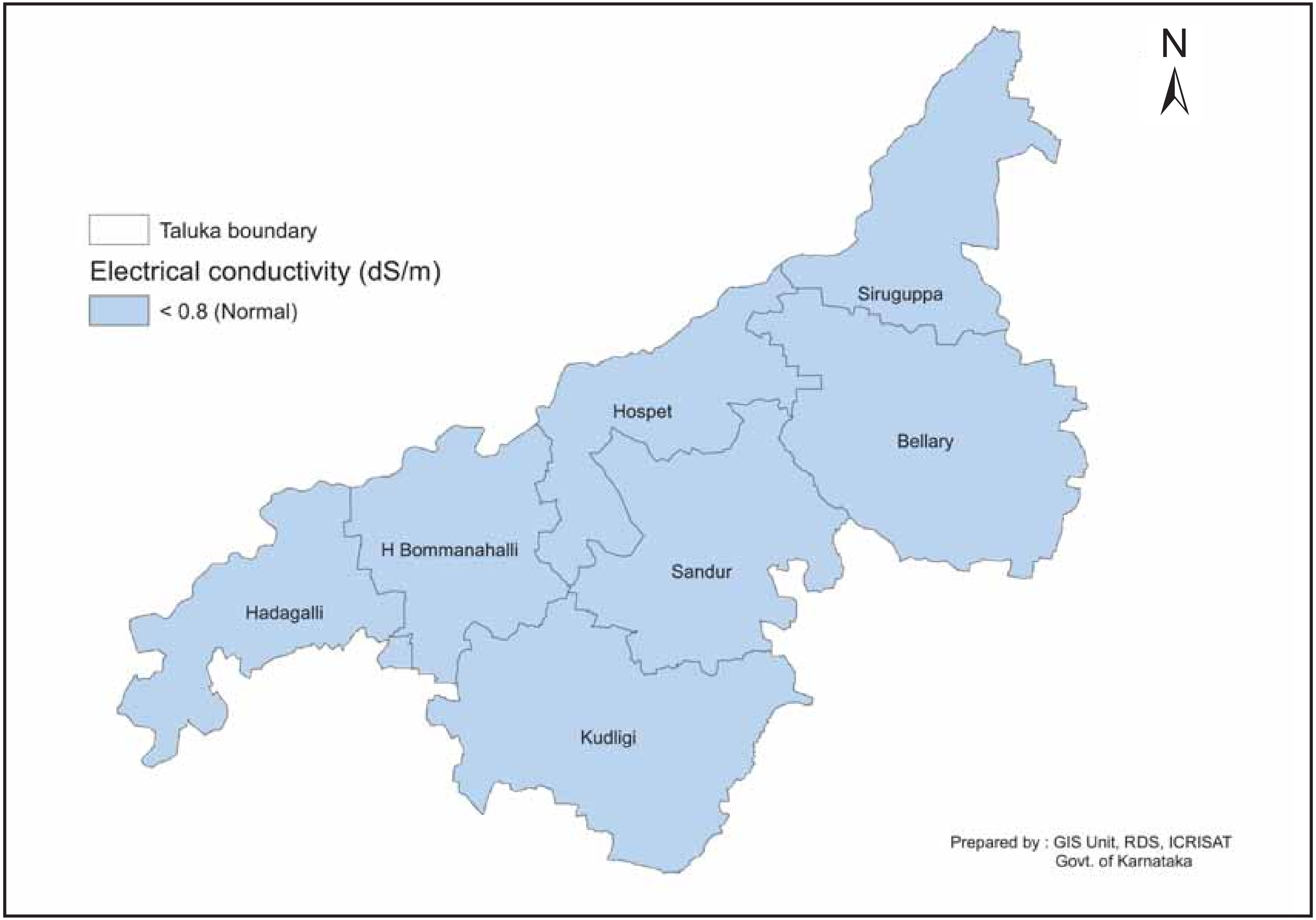


Figure 43. Electrical conductivity status in Bellary district

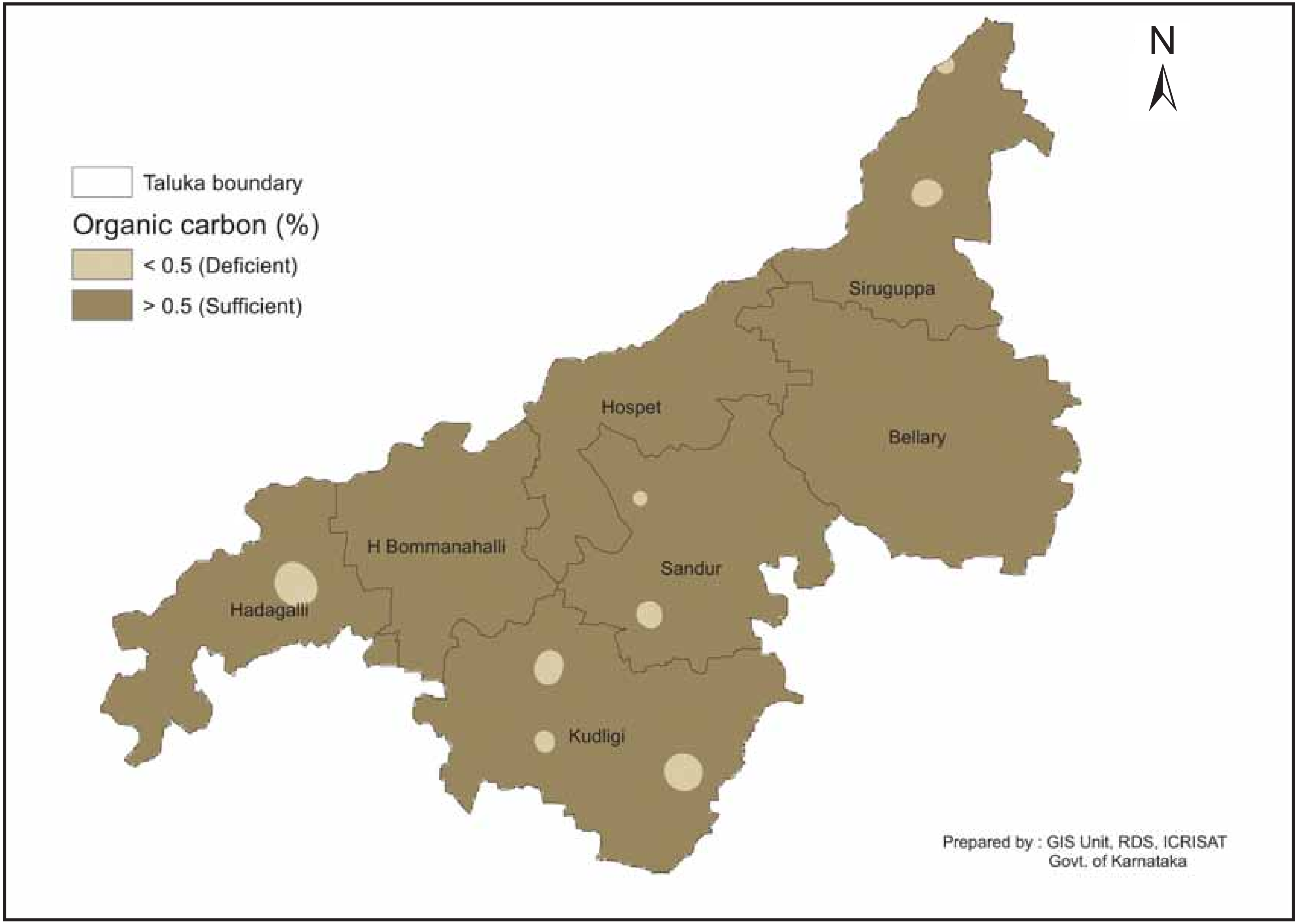


Figure 44. Organic carbon status in Bellary district

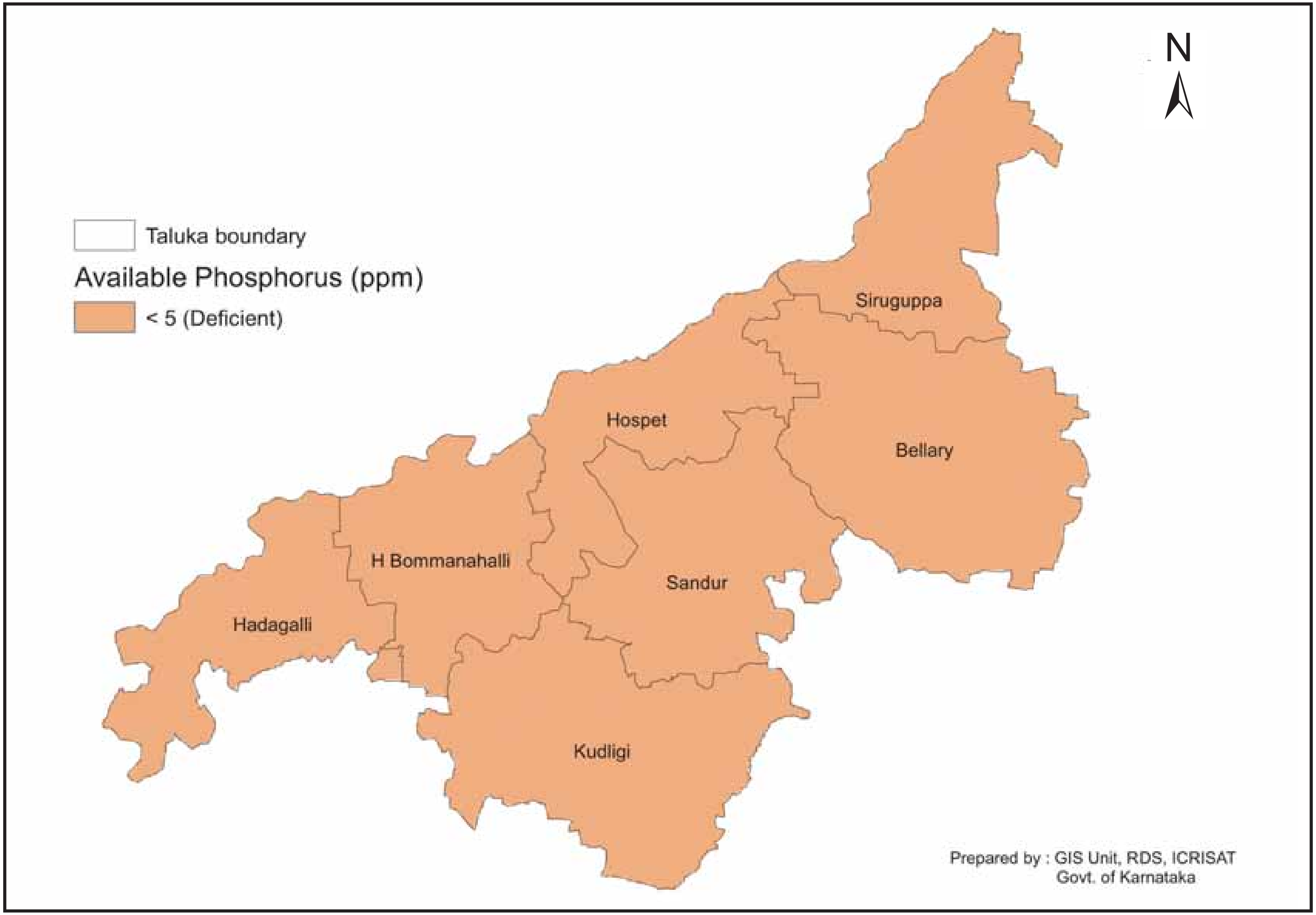


Figure 45. Available phosphorus status in Bellary district

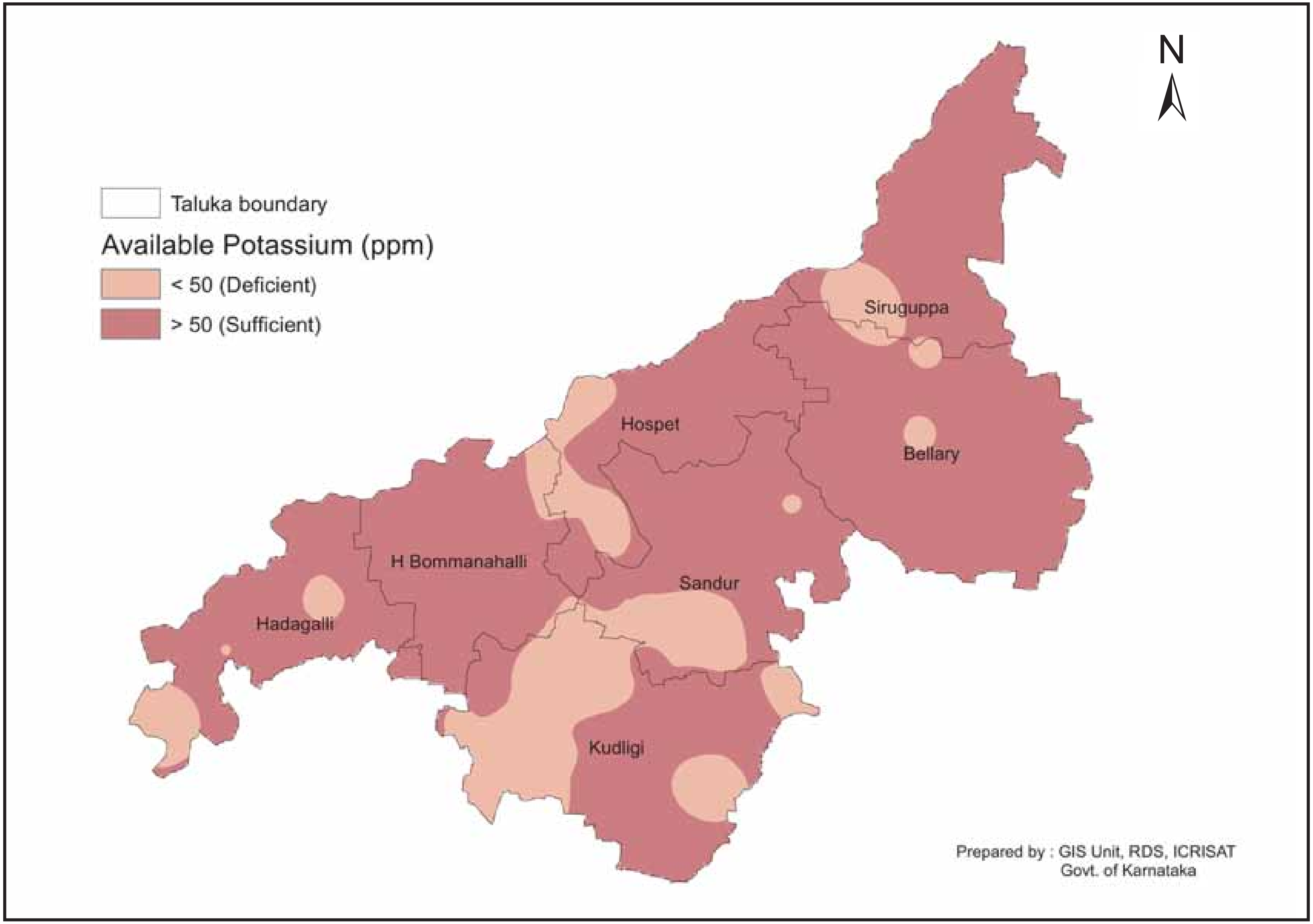


Figure 46. Available potassium status in Bellary district

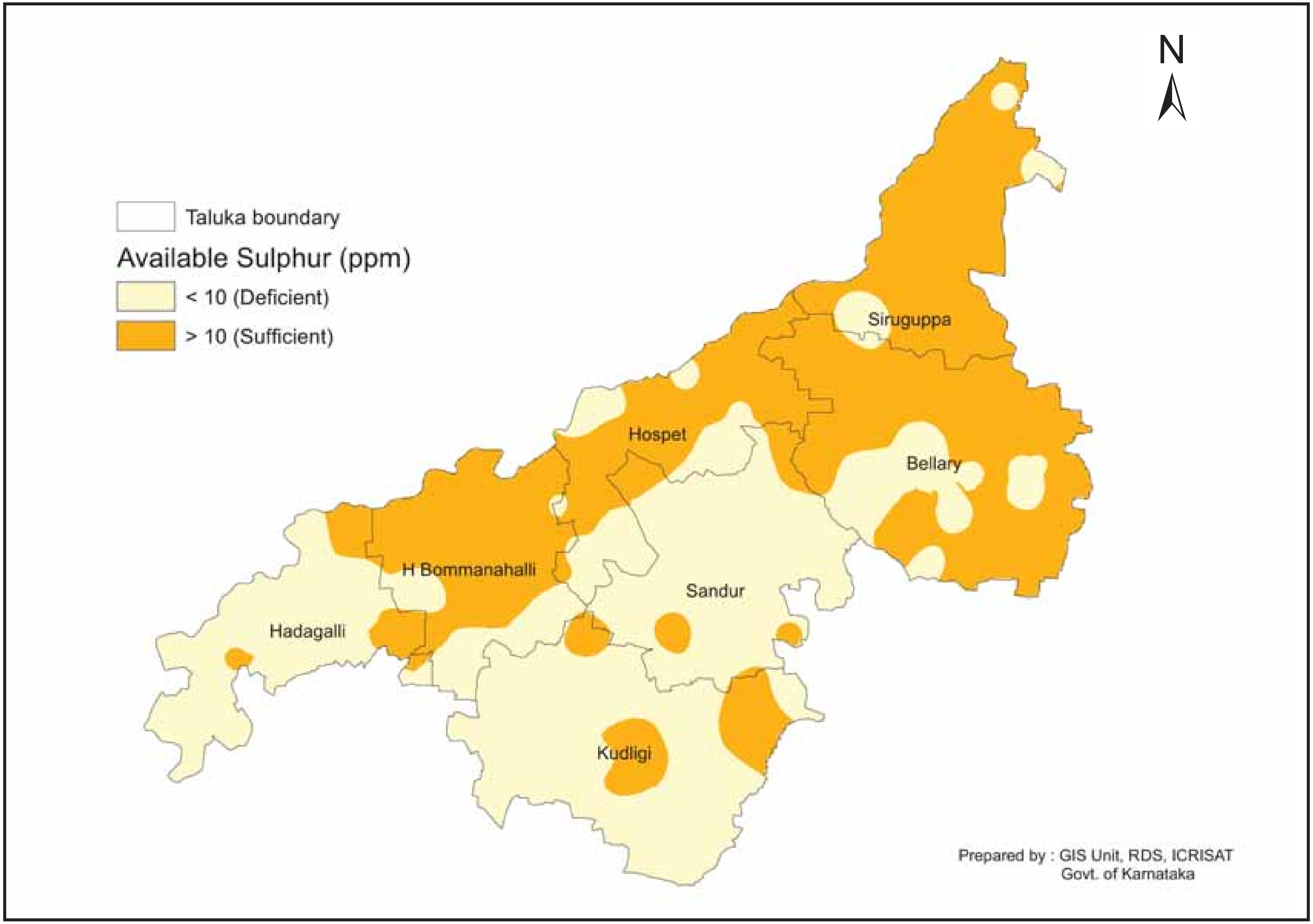


Figure 47. Available sulphur status in Bellary district

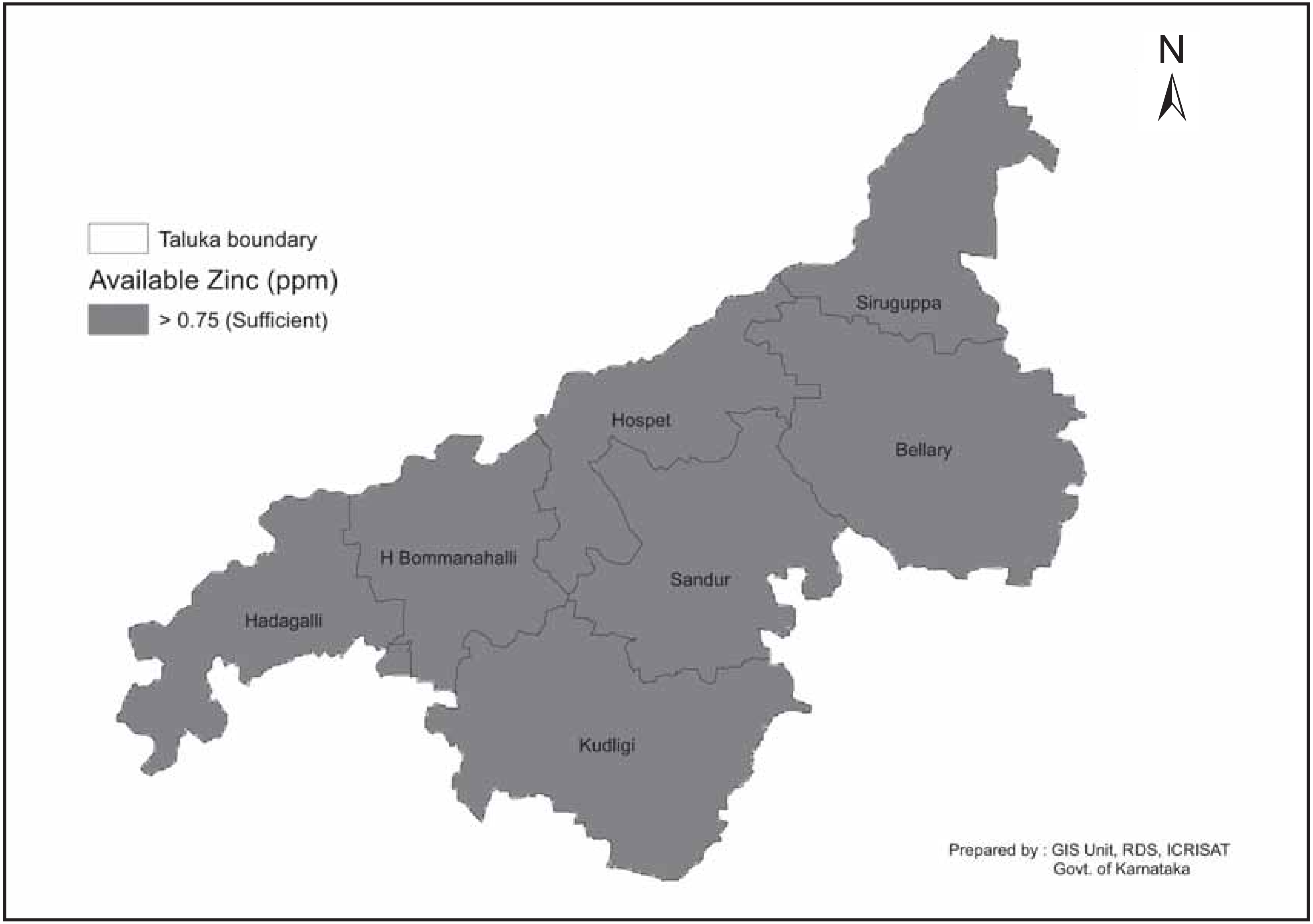


Figure 48. Available zinc status in Bellary district

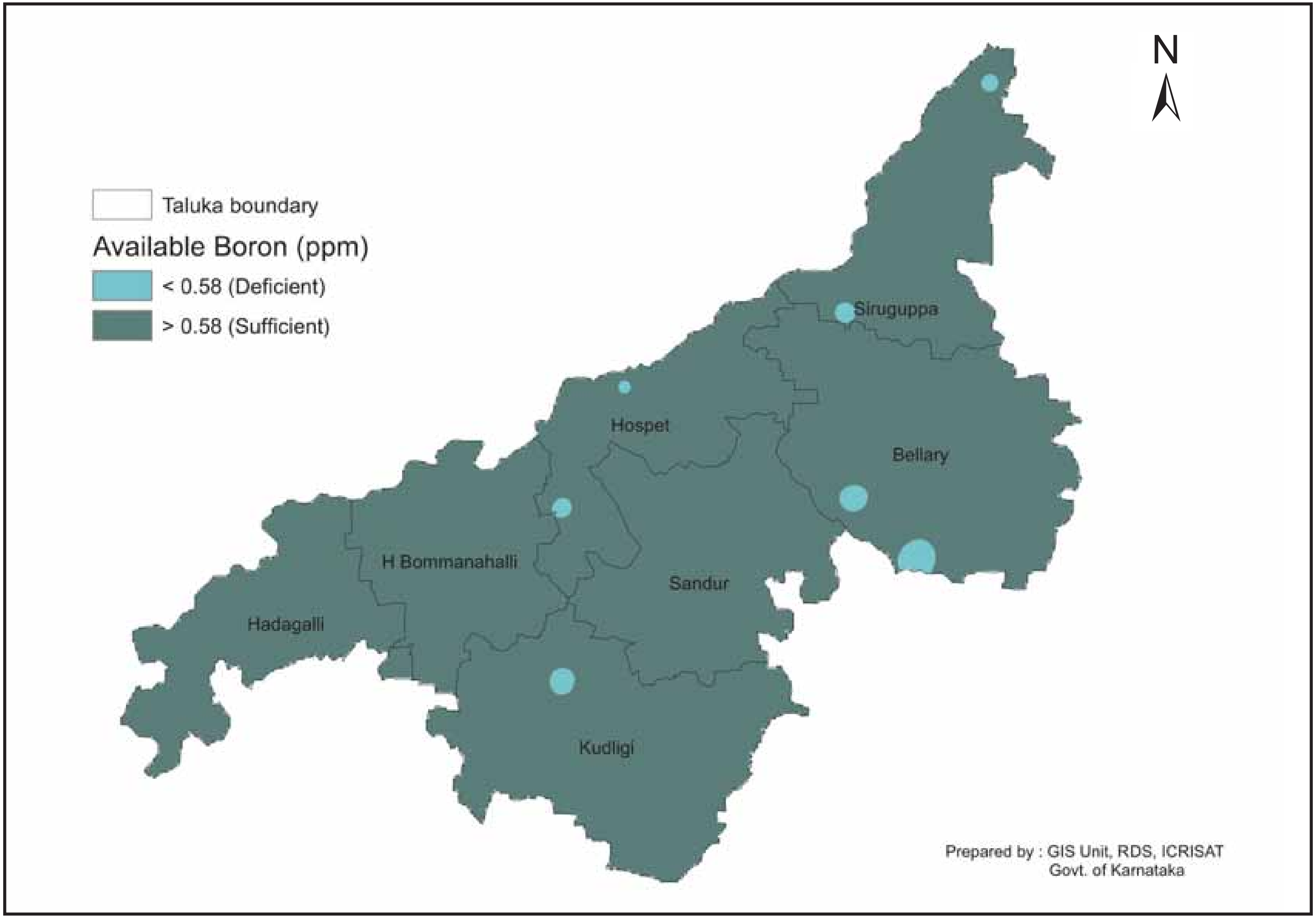


Figure 49. Available boron status in Bellary district

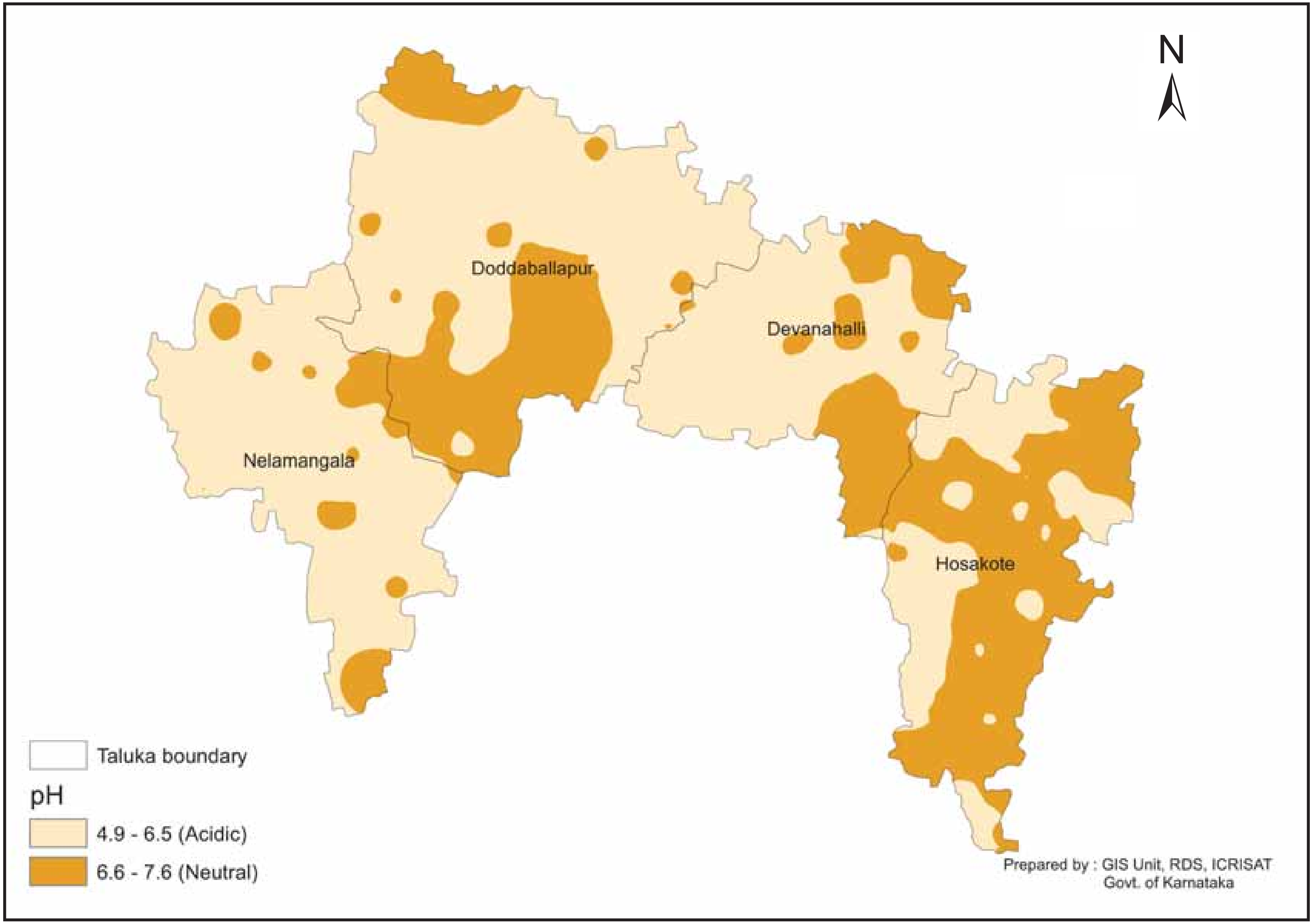


Figure 50. pH status in Bengaluru Rural district

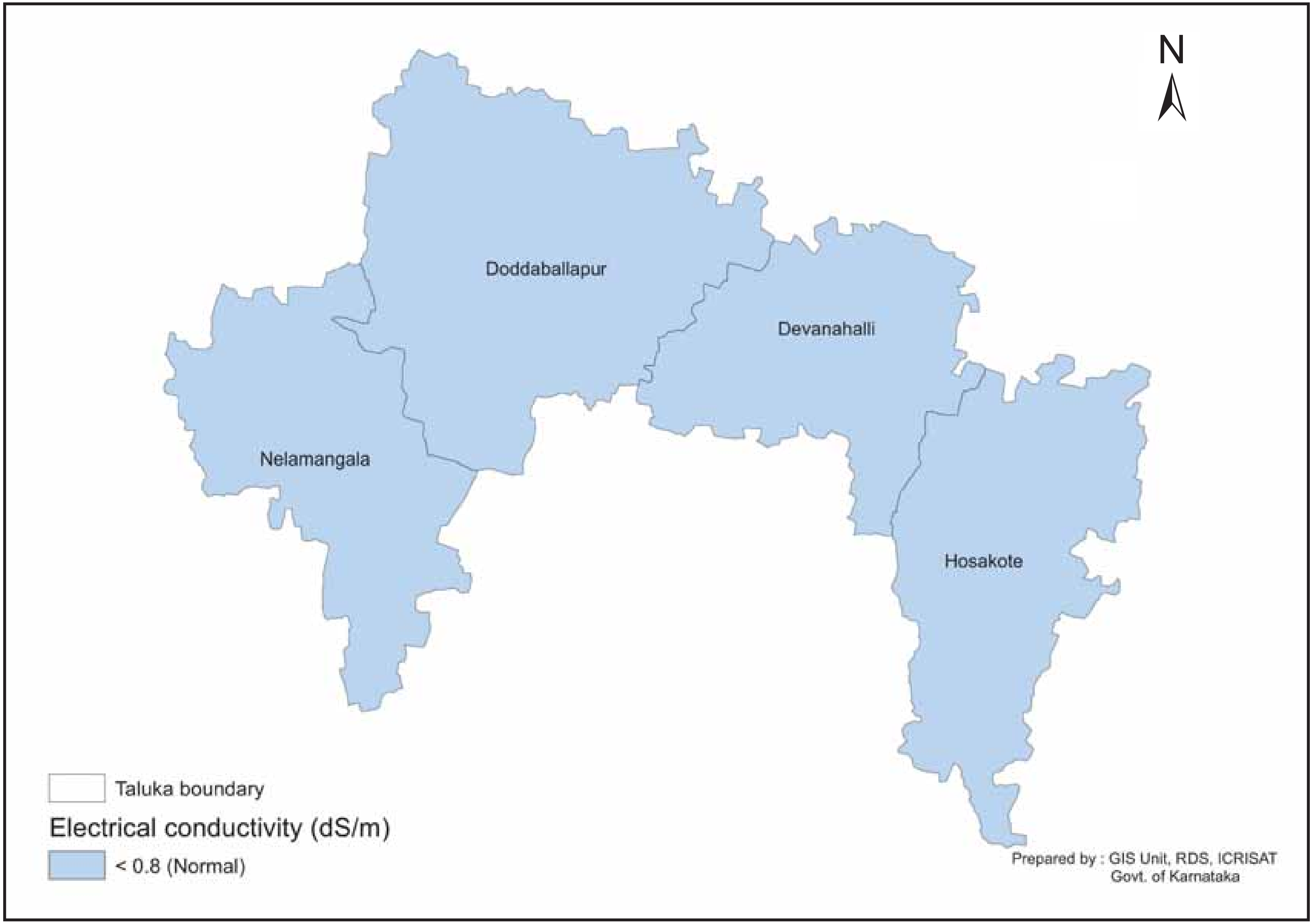


Figure 51. Electrical conductivity status in Bengaluru Rural district

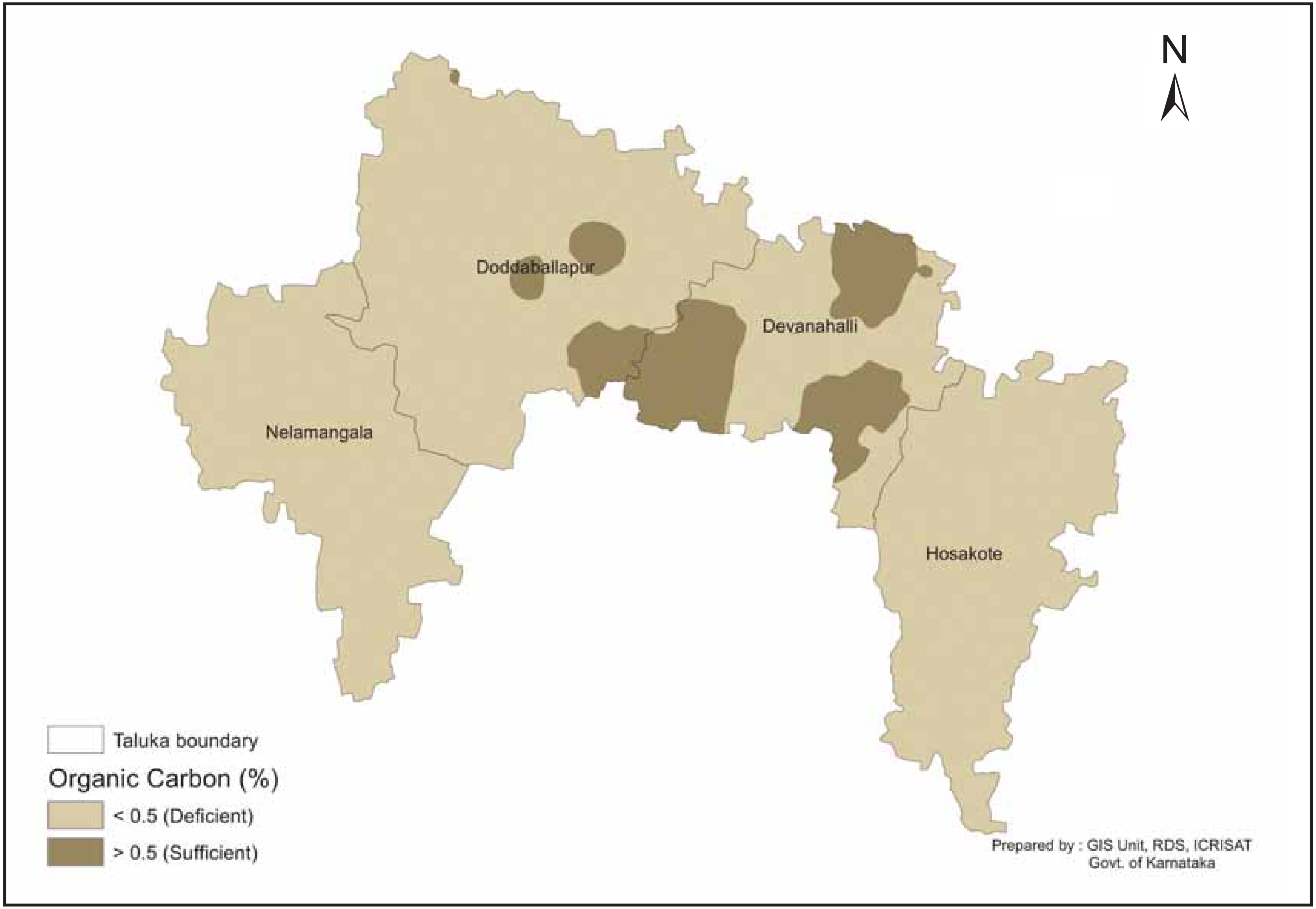


Figure 52. Organic carbon status in Bengaluru Rural district

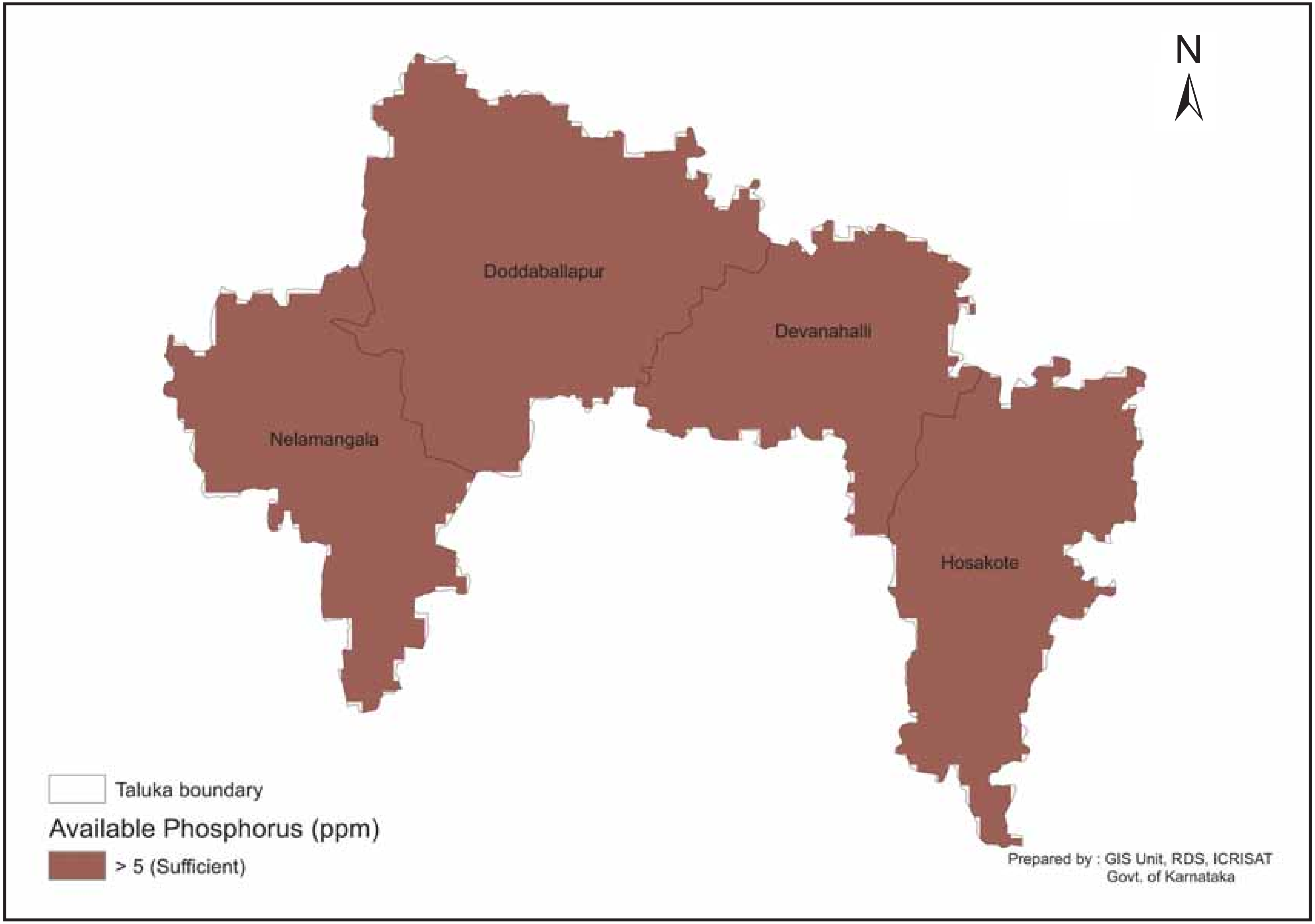


Figure 53. Available phosphorus status in Bengaluru Rural district

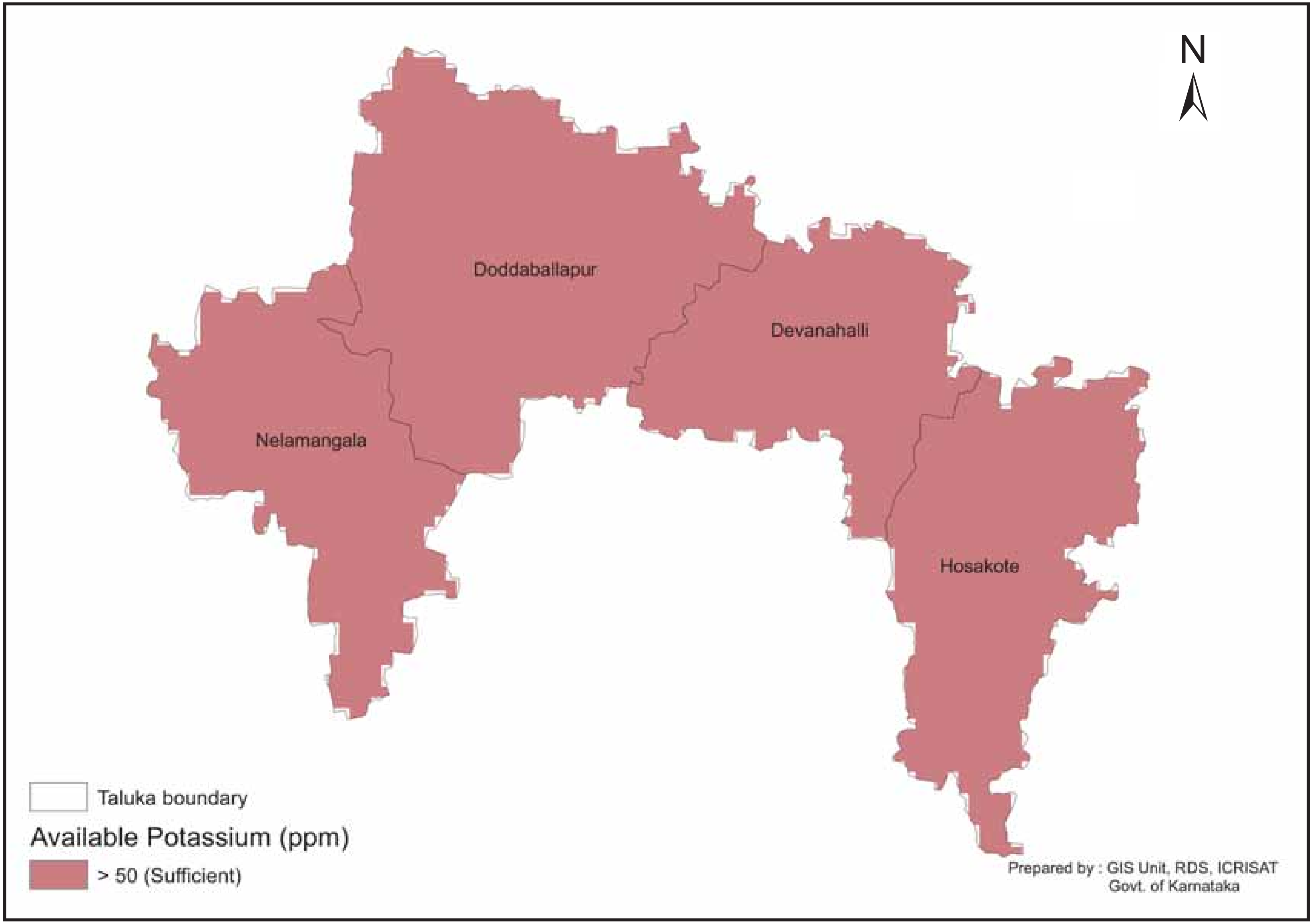


Figure 54. Available potassium status in Bengaluru Rural district

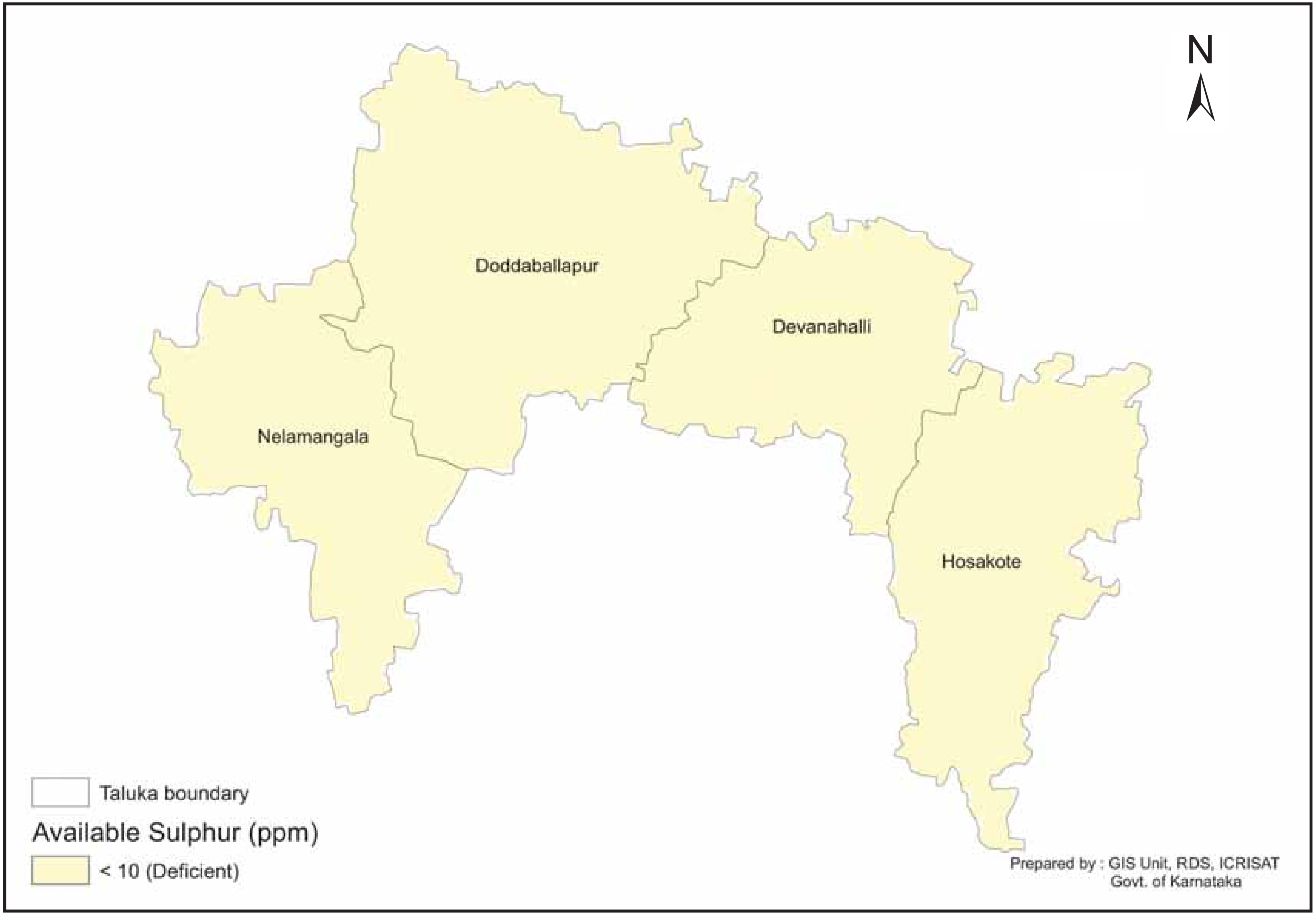


Figure 55. Available sulphur status in Bengaluru Rural district

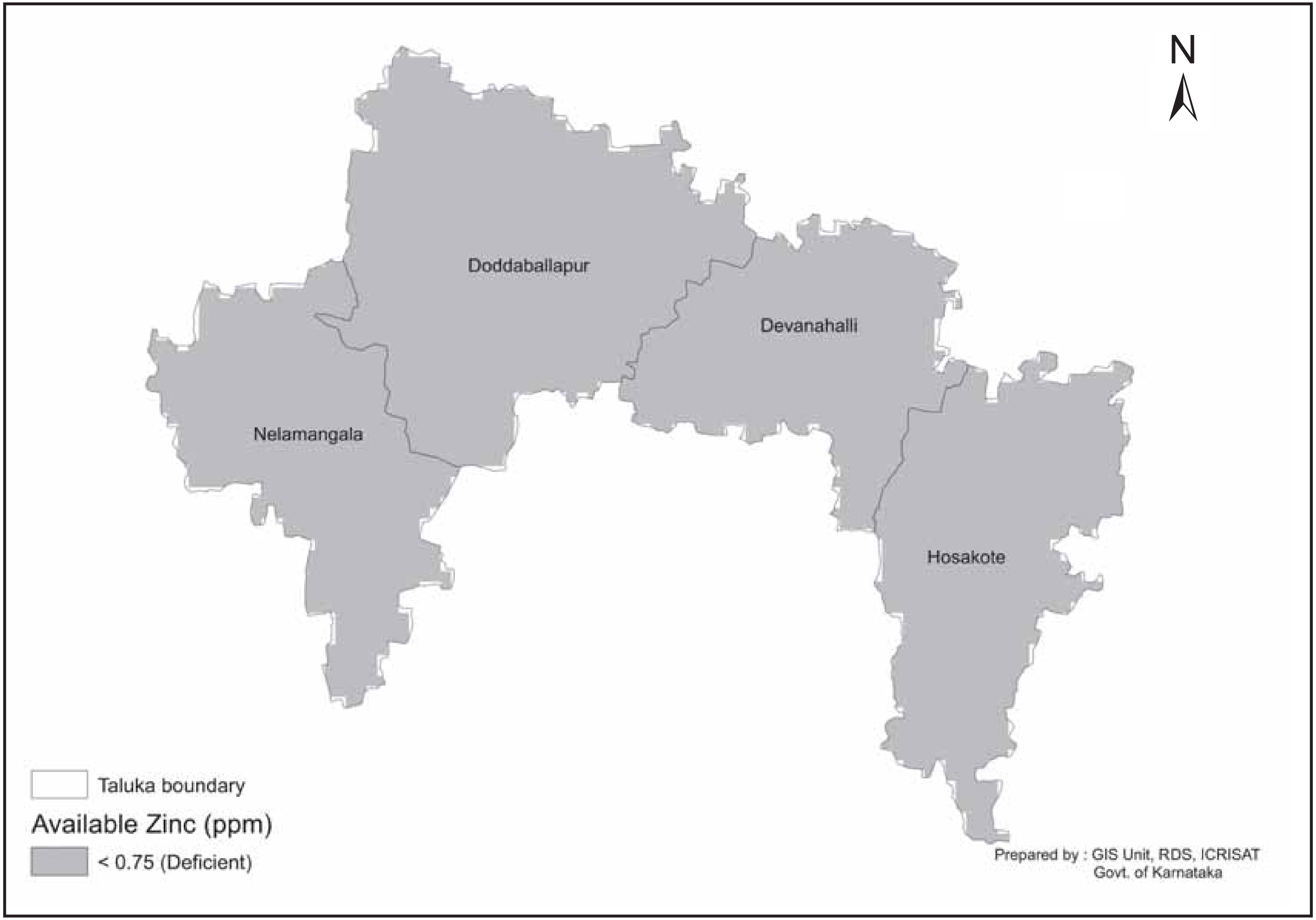


Figure 56. Available zinc status in Bengaluru Rural district

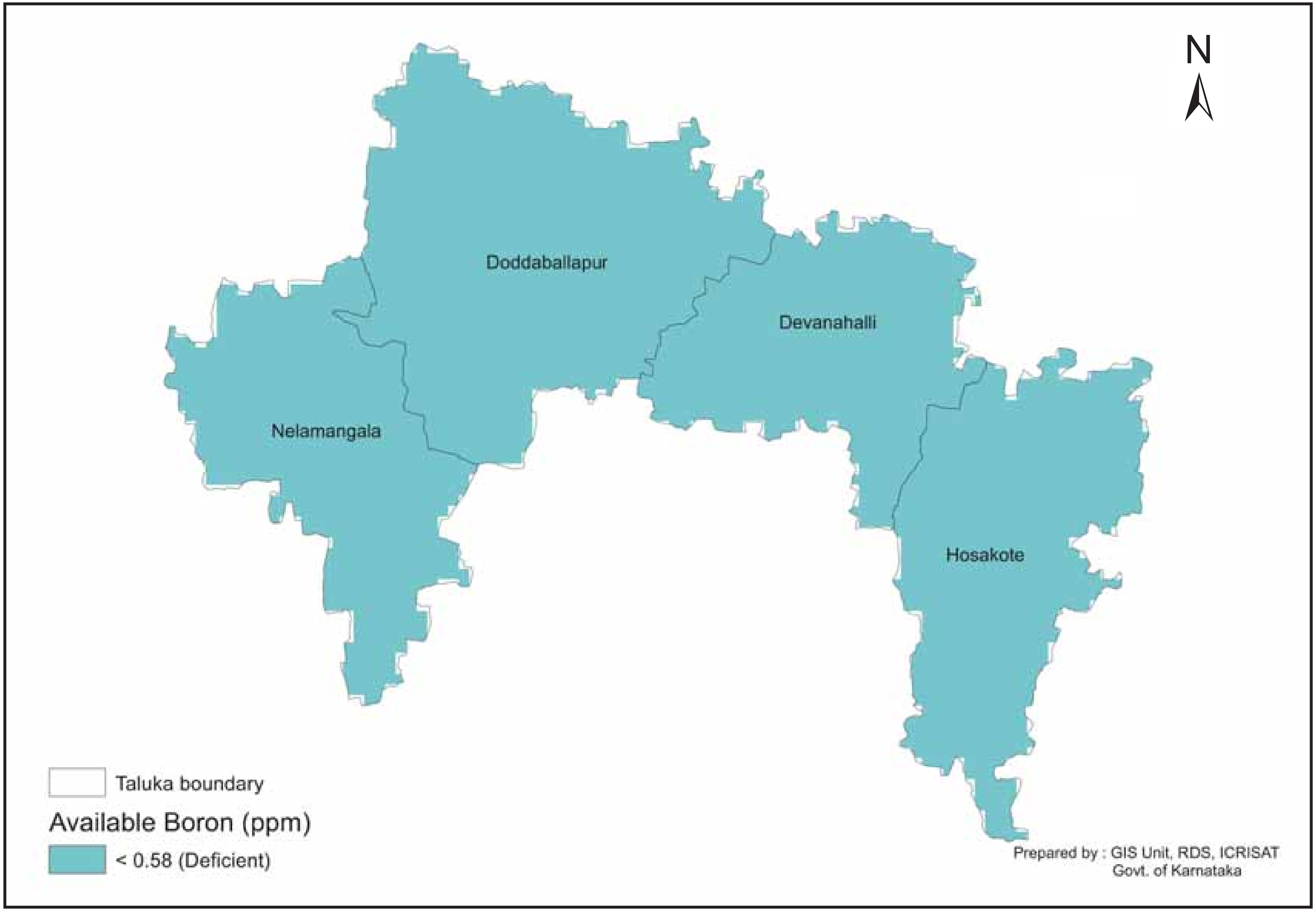


Figure 57. Available boron status in Bengaluru Rural district

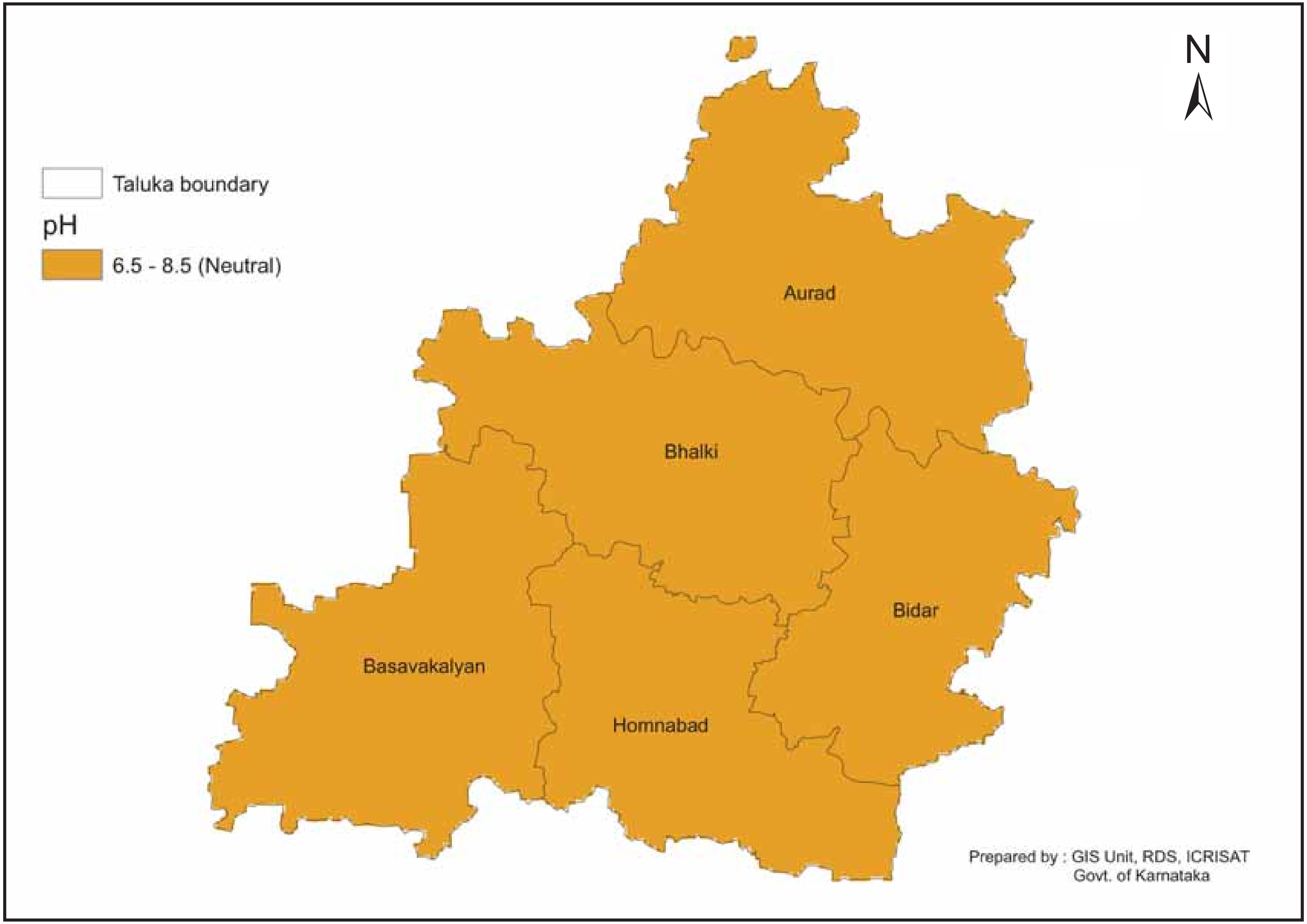


Figure 58. pH status in Bidar district

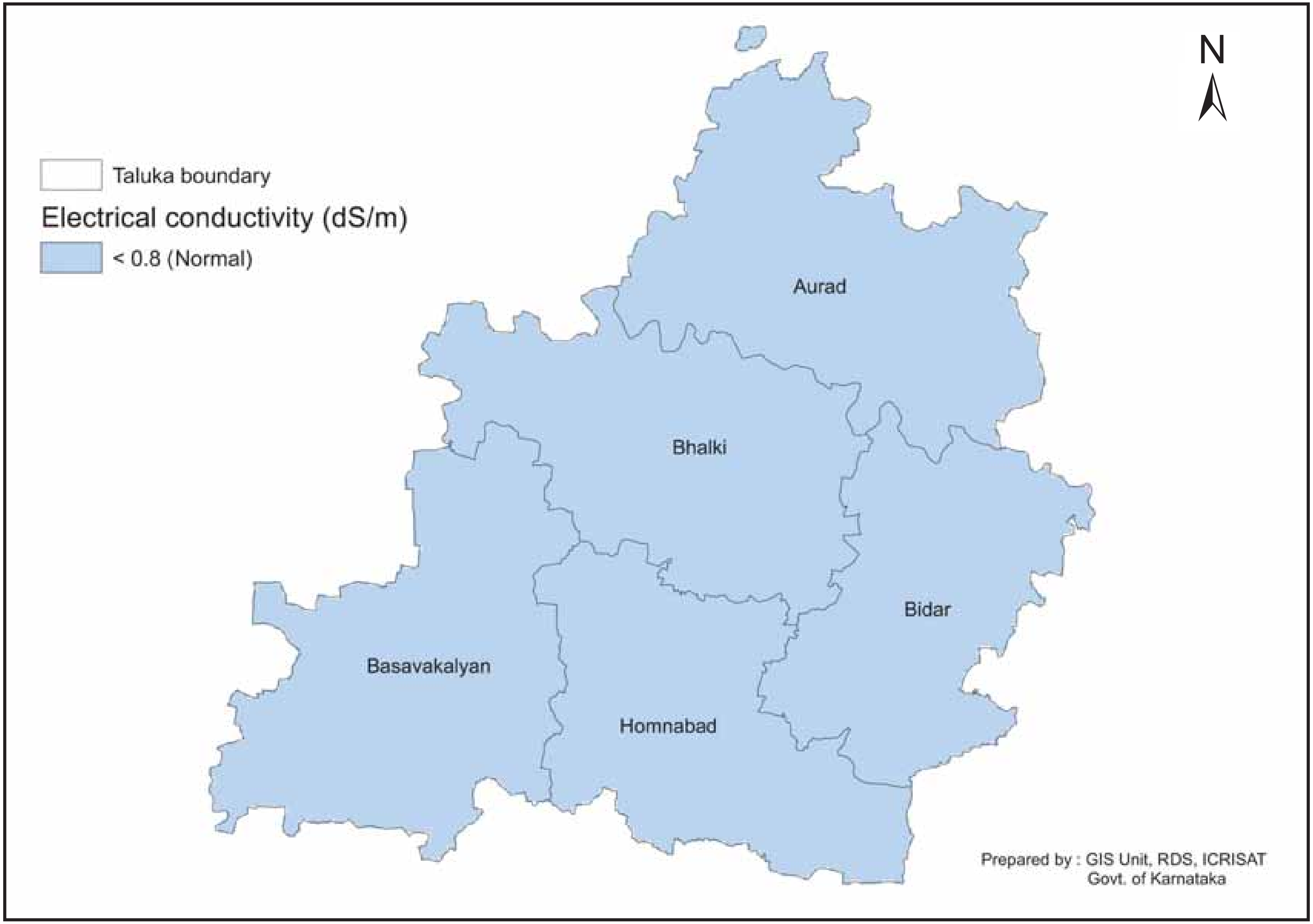


Figure 59. Electrical conductivity status in Bidar district

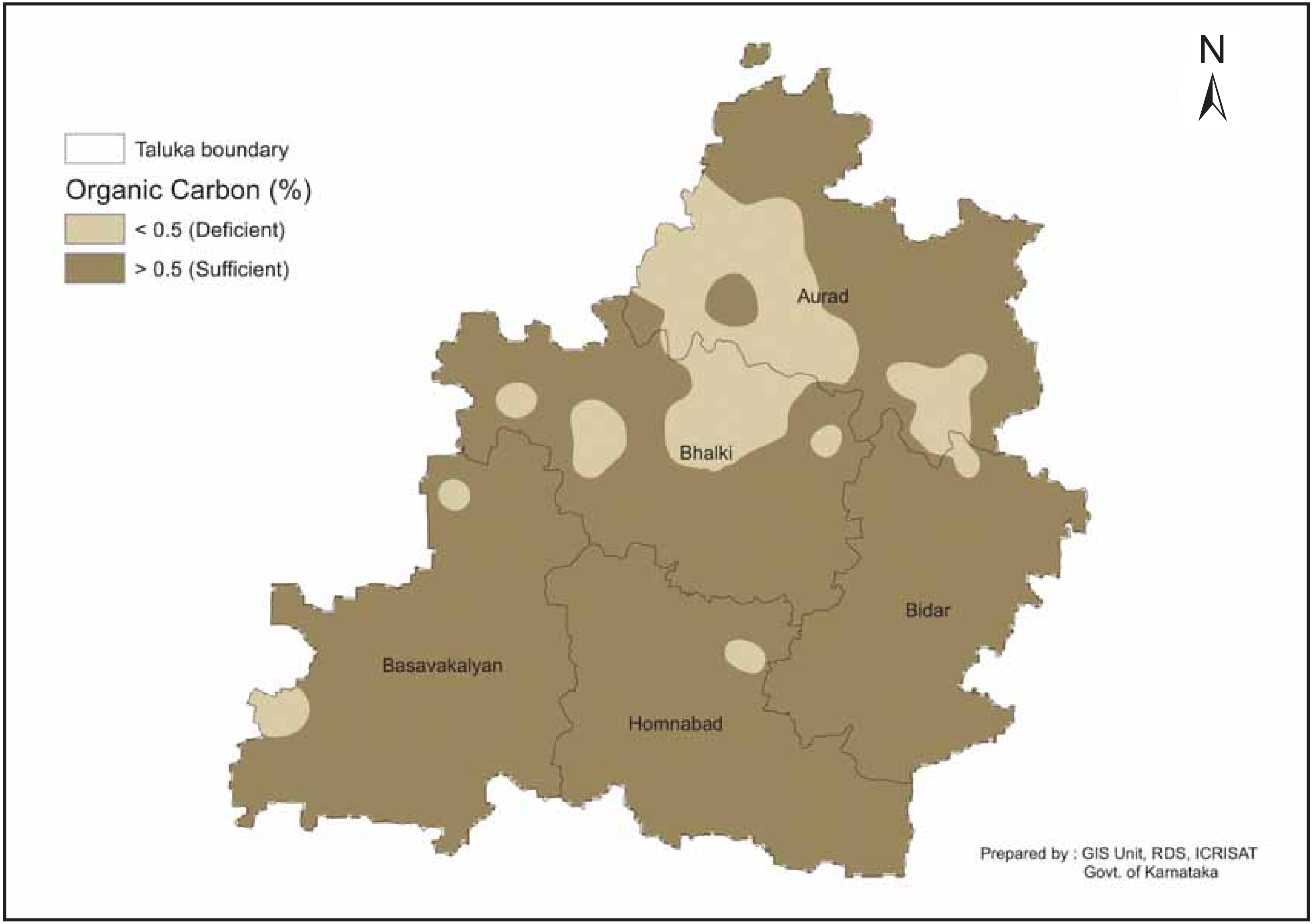


Figure 60. Organic carbon status in Bidar district

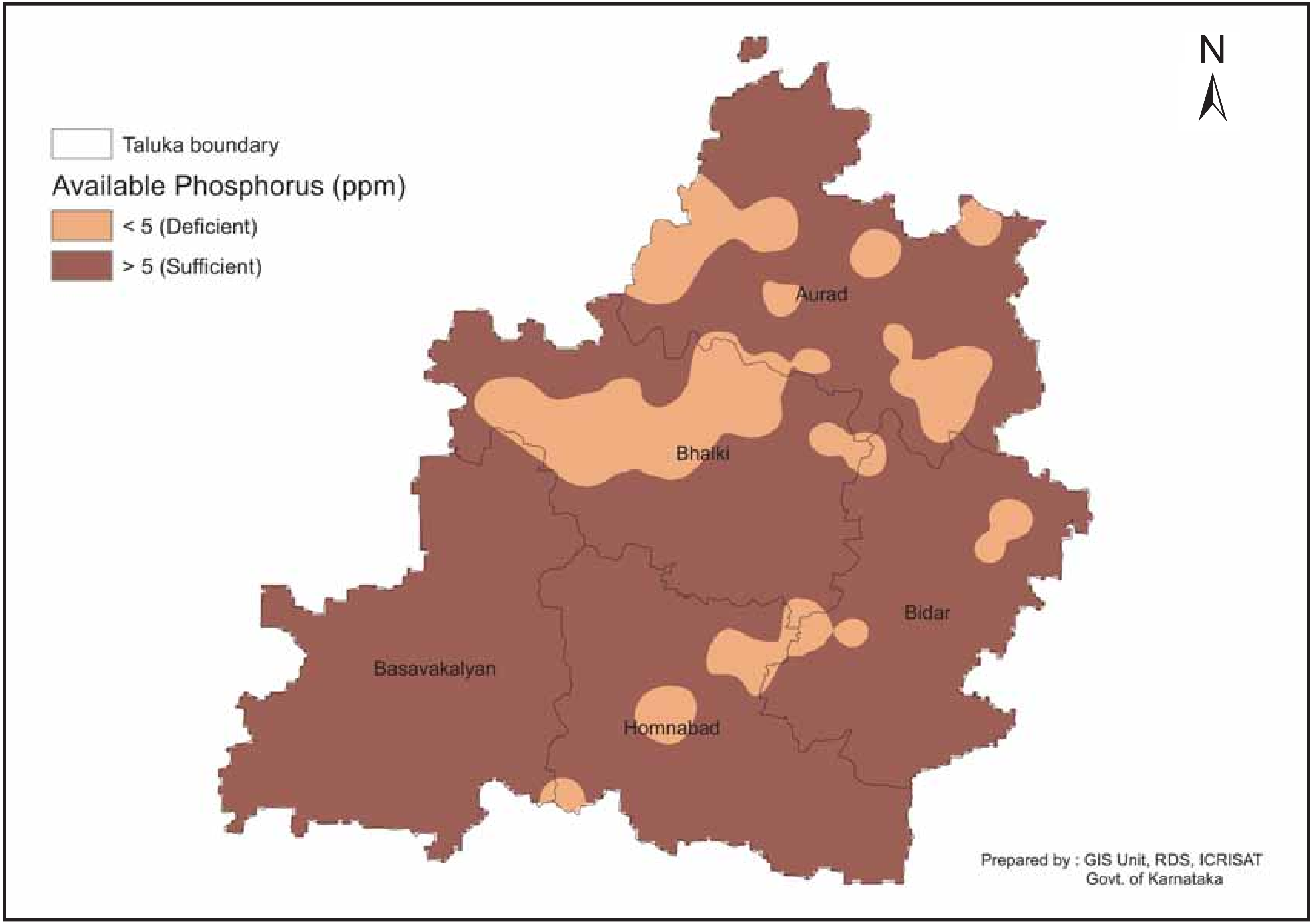


Figure 61. Available phosphorus status in Bidar district

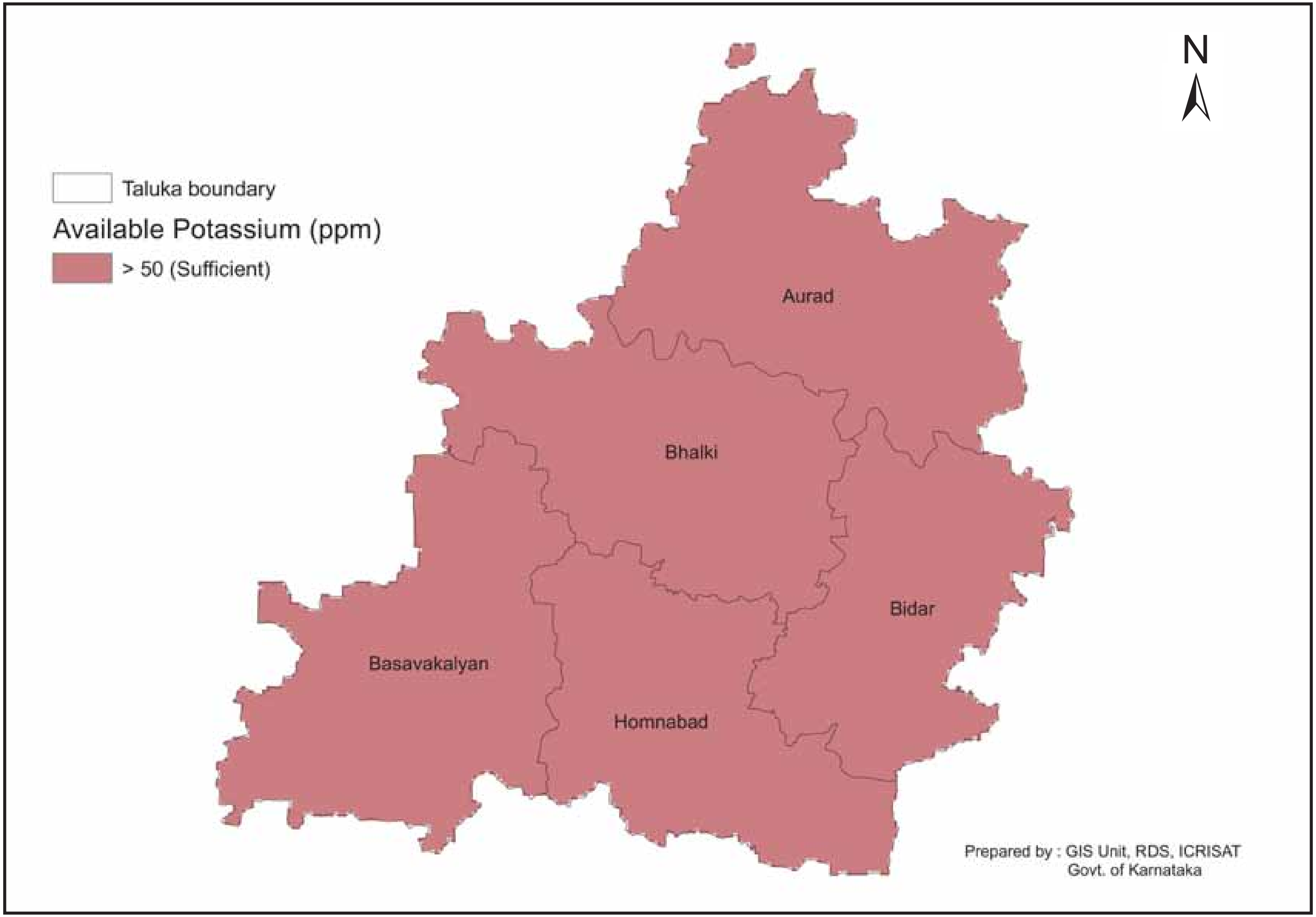


Figure 62. Available potassium status in Bidar district

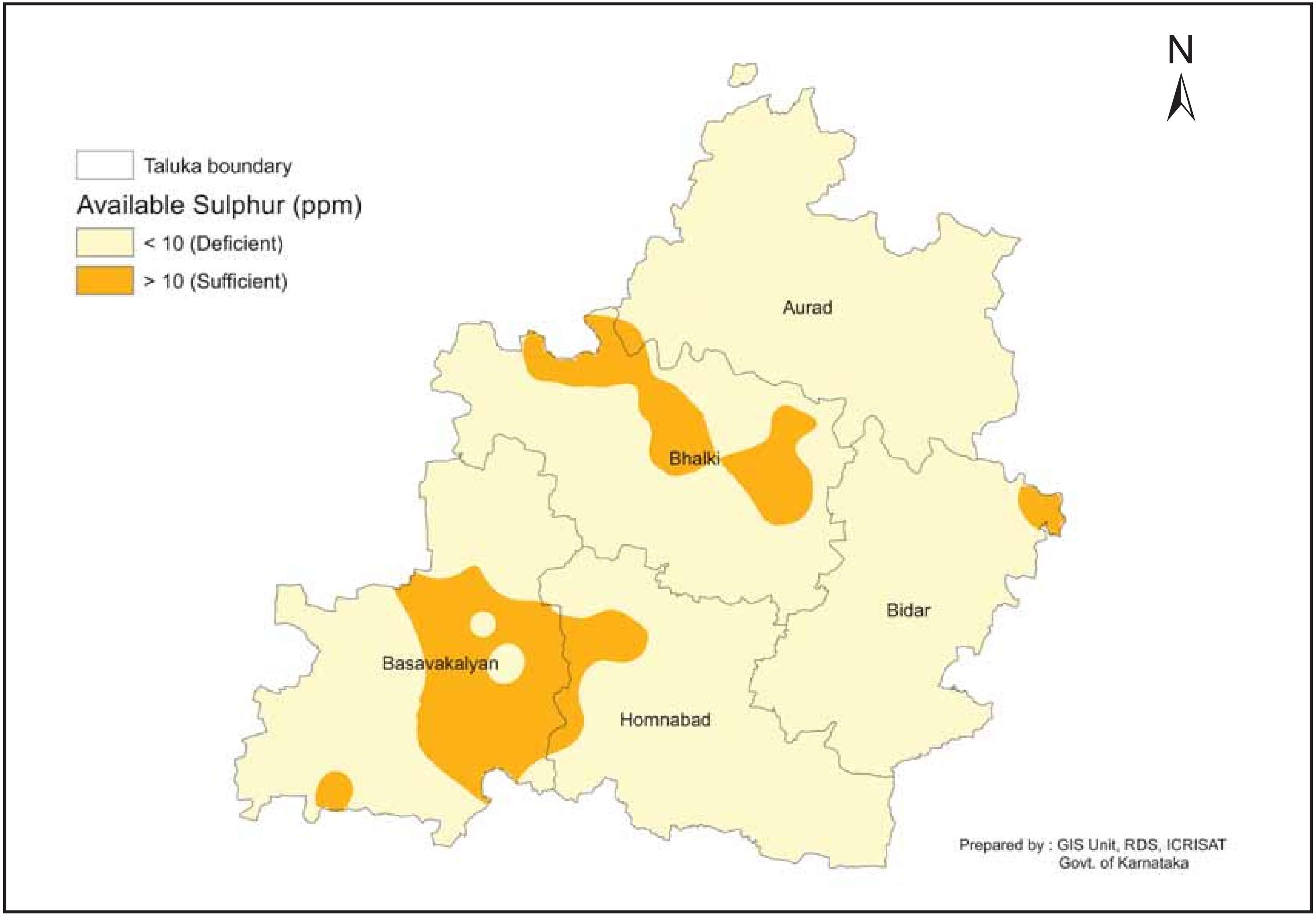


Figure 63. Available sulphur status in Bidar district

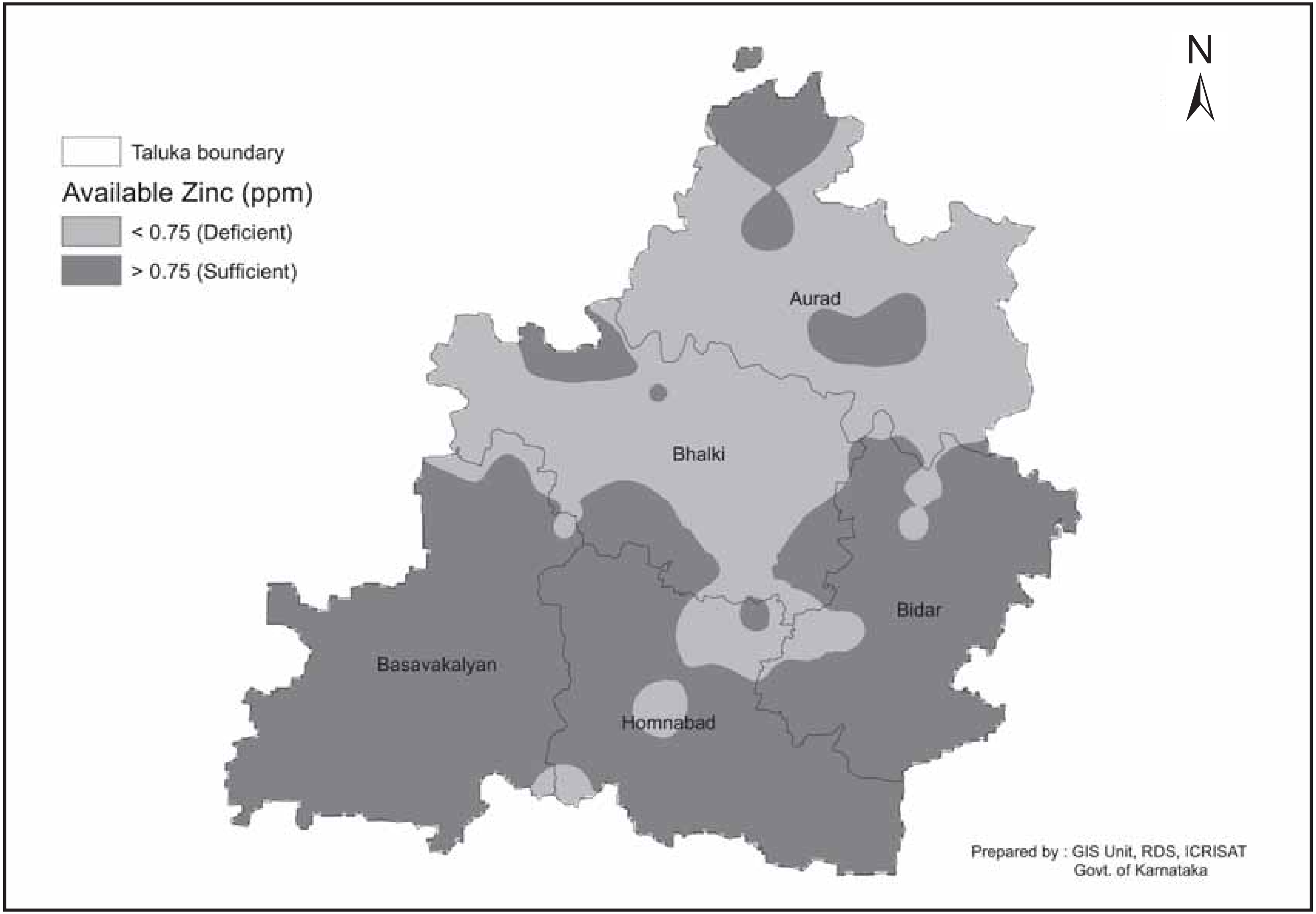


Figure 64. Available zinc status in Bidar district

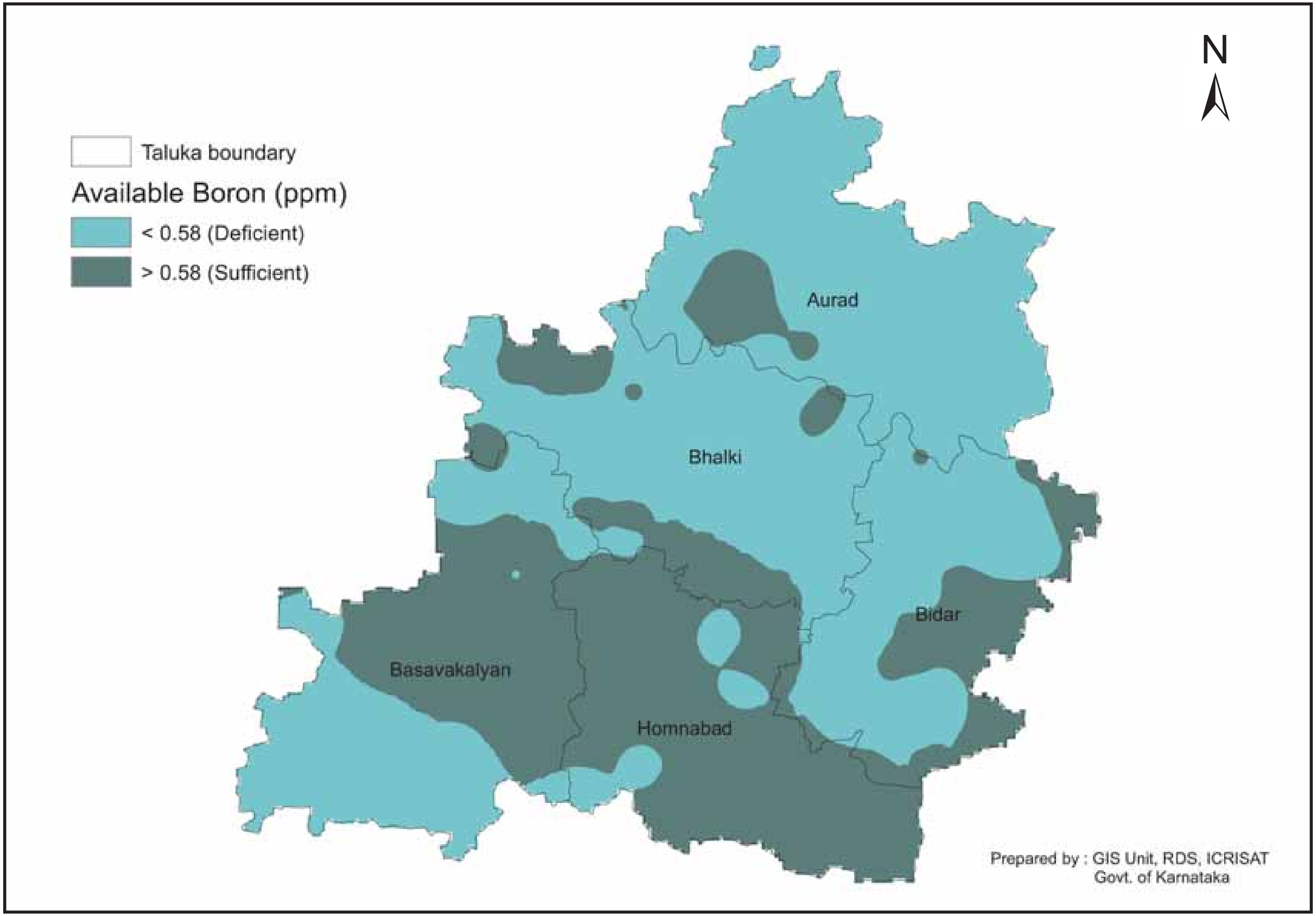


Figure 65. Available boron status in Bidar district

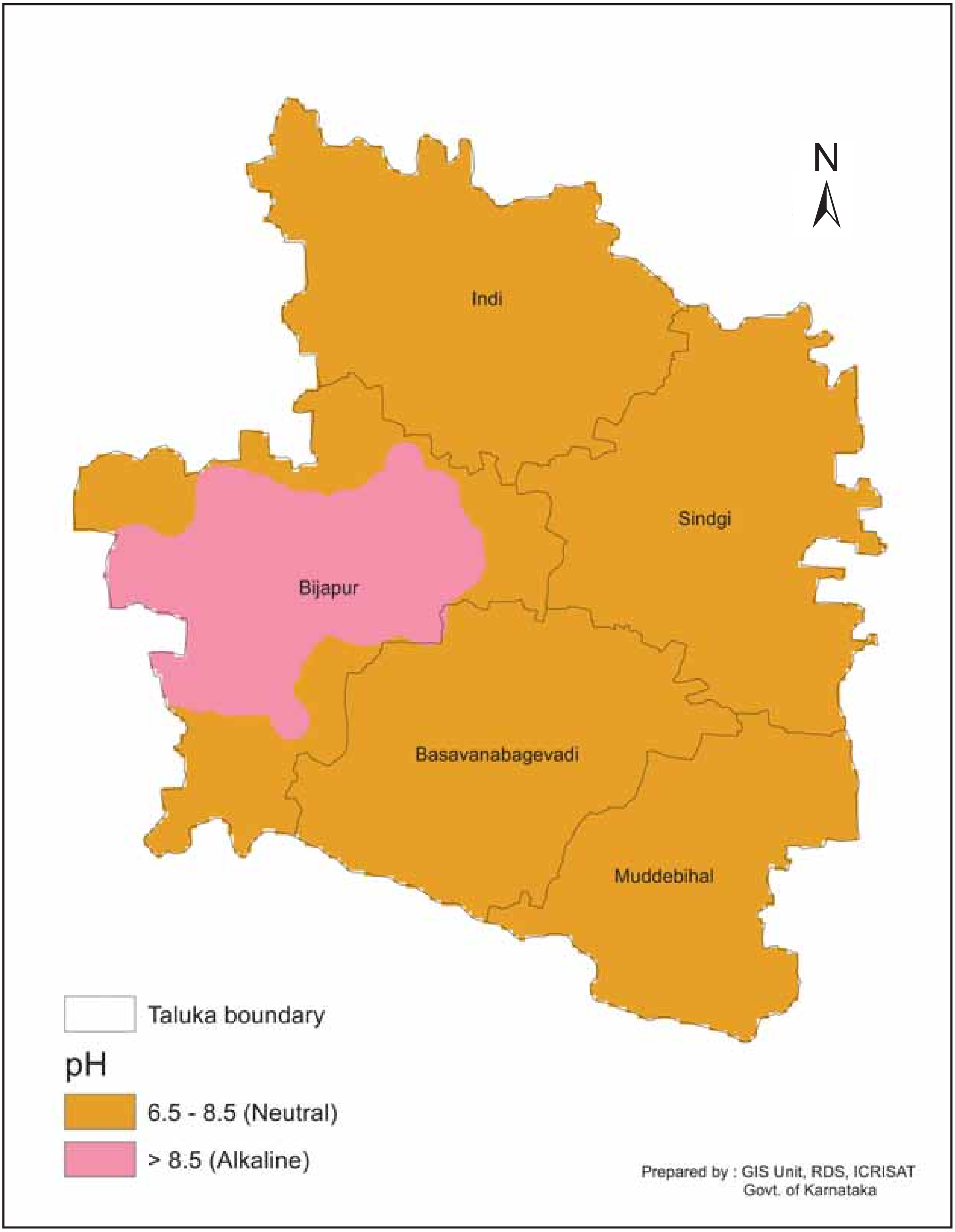


Figure 66. pH status in Bijapur district

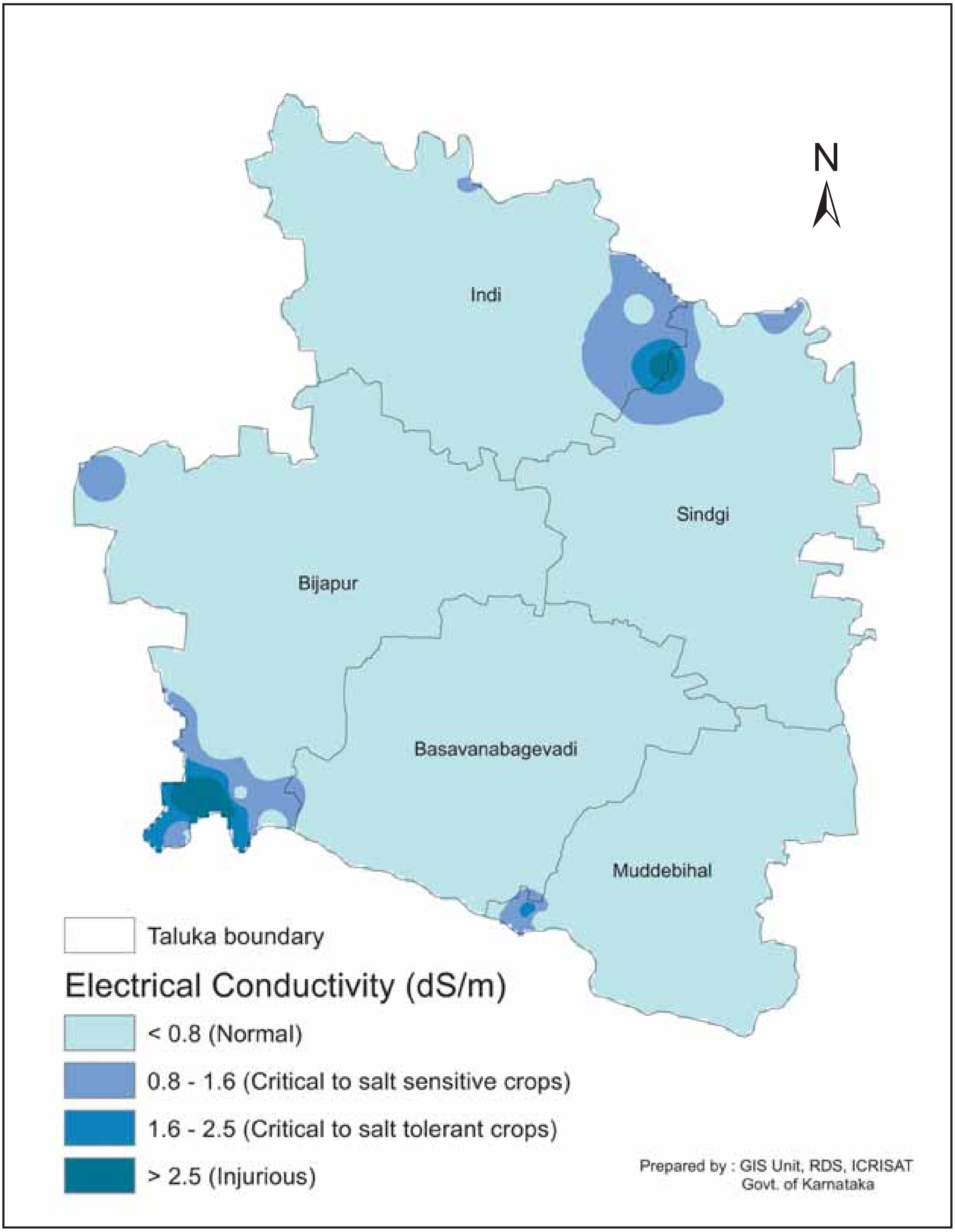


Figure 67. Electrical conductivity status in Bijapur district

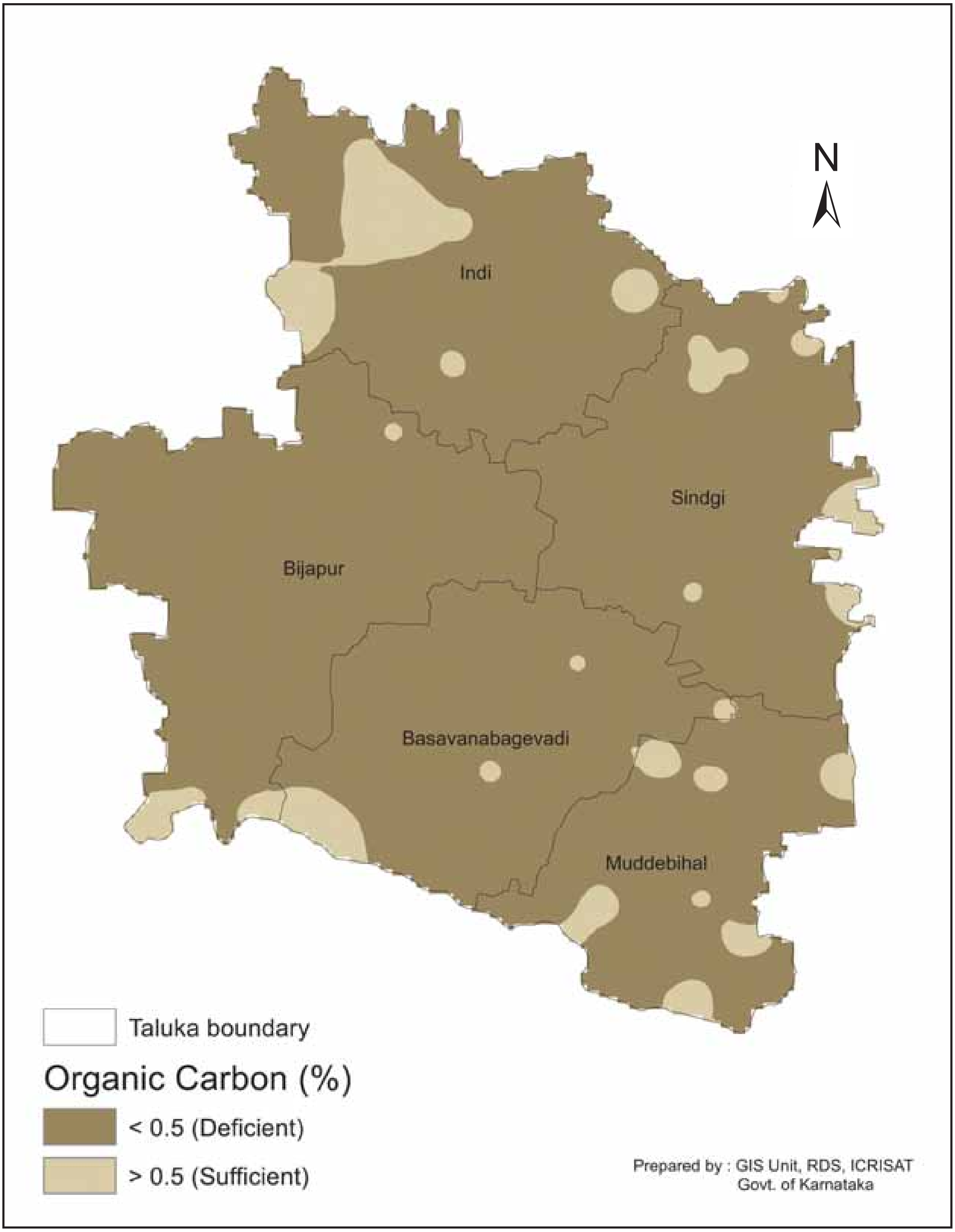


Figure 68. Organic carbon status in Bijapur district

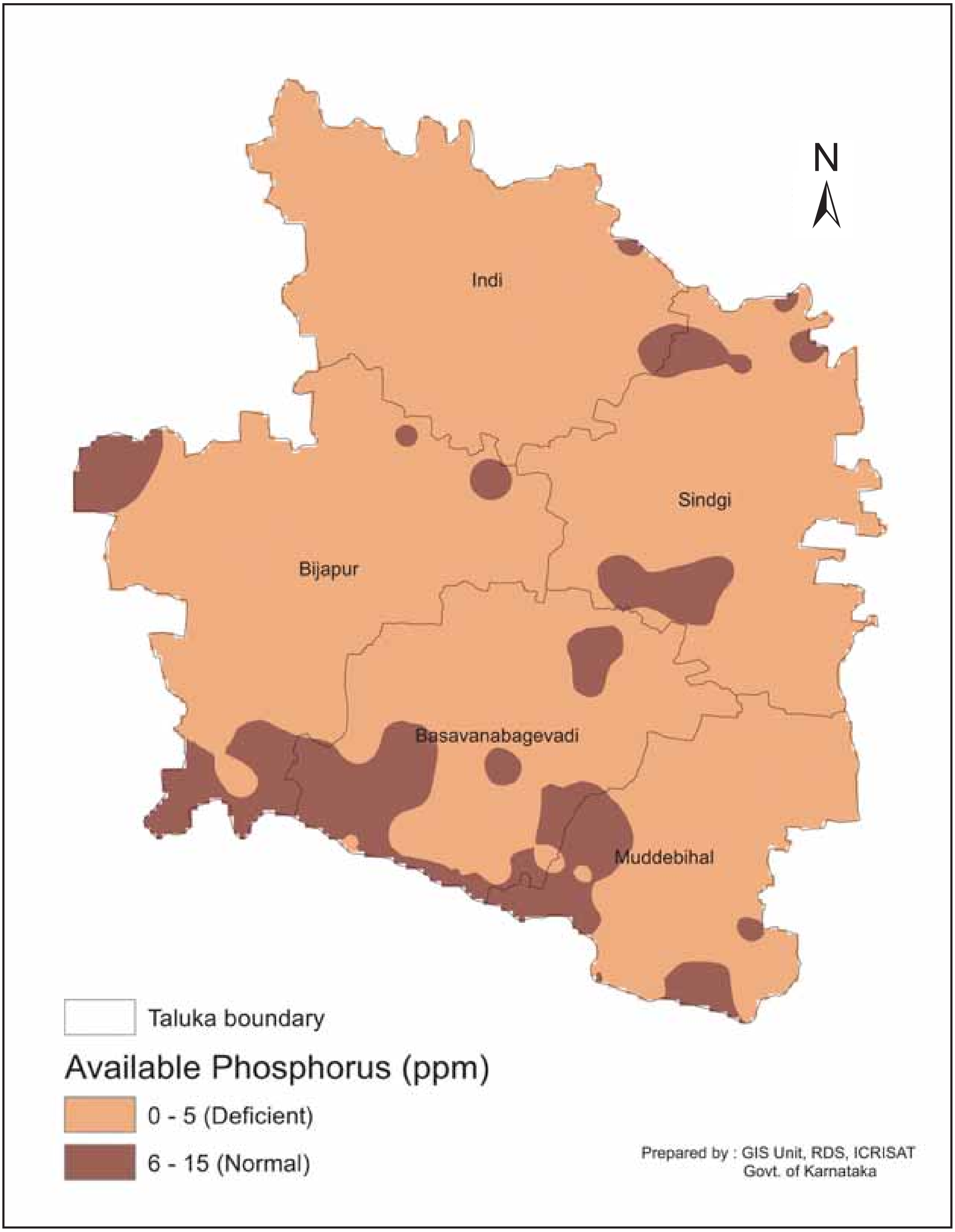


Figure 69. Available phosphorus status in Bijapur district

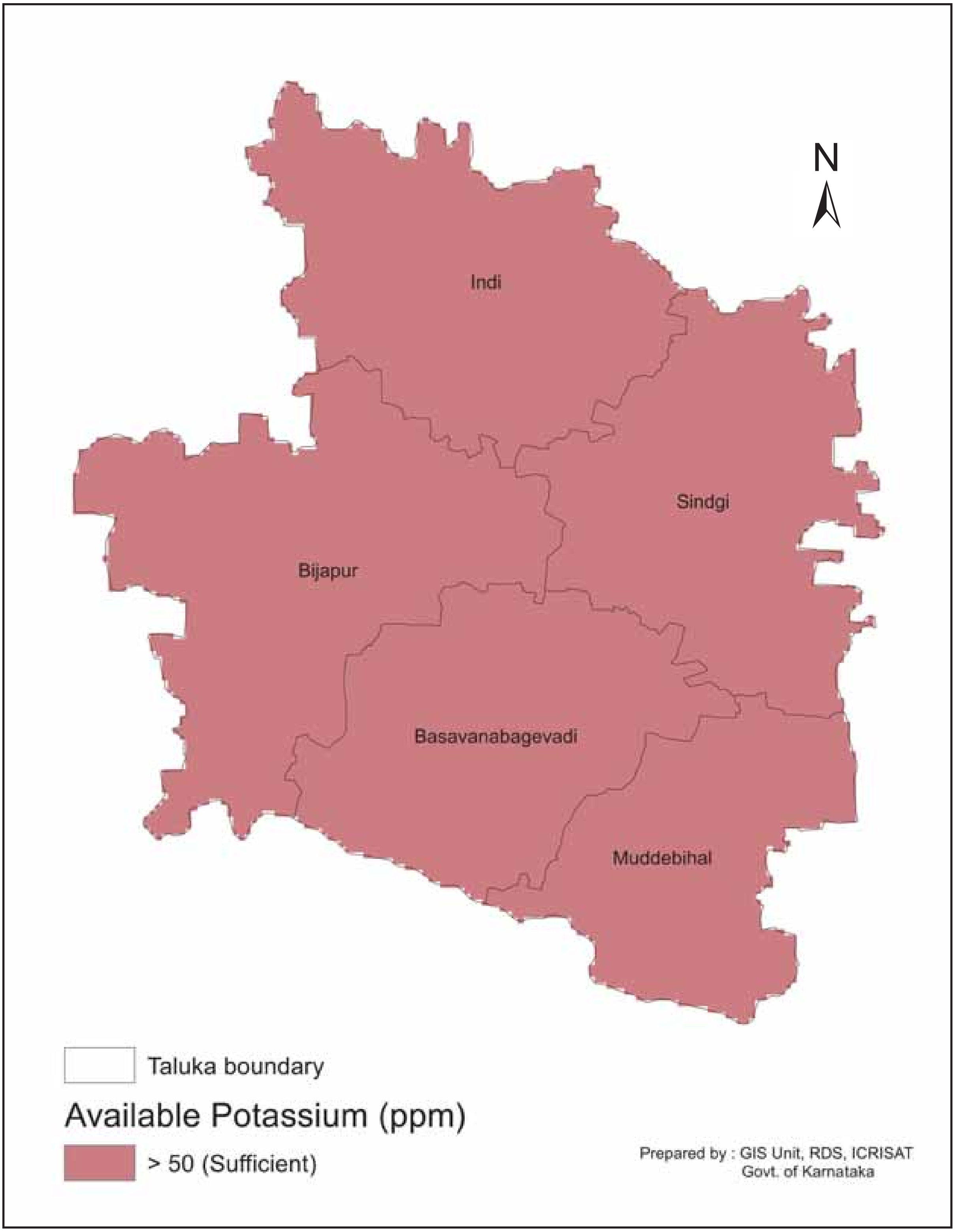


Figure 70. Available potassium status in Bijapur district

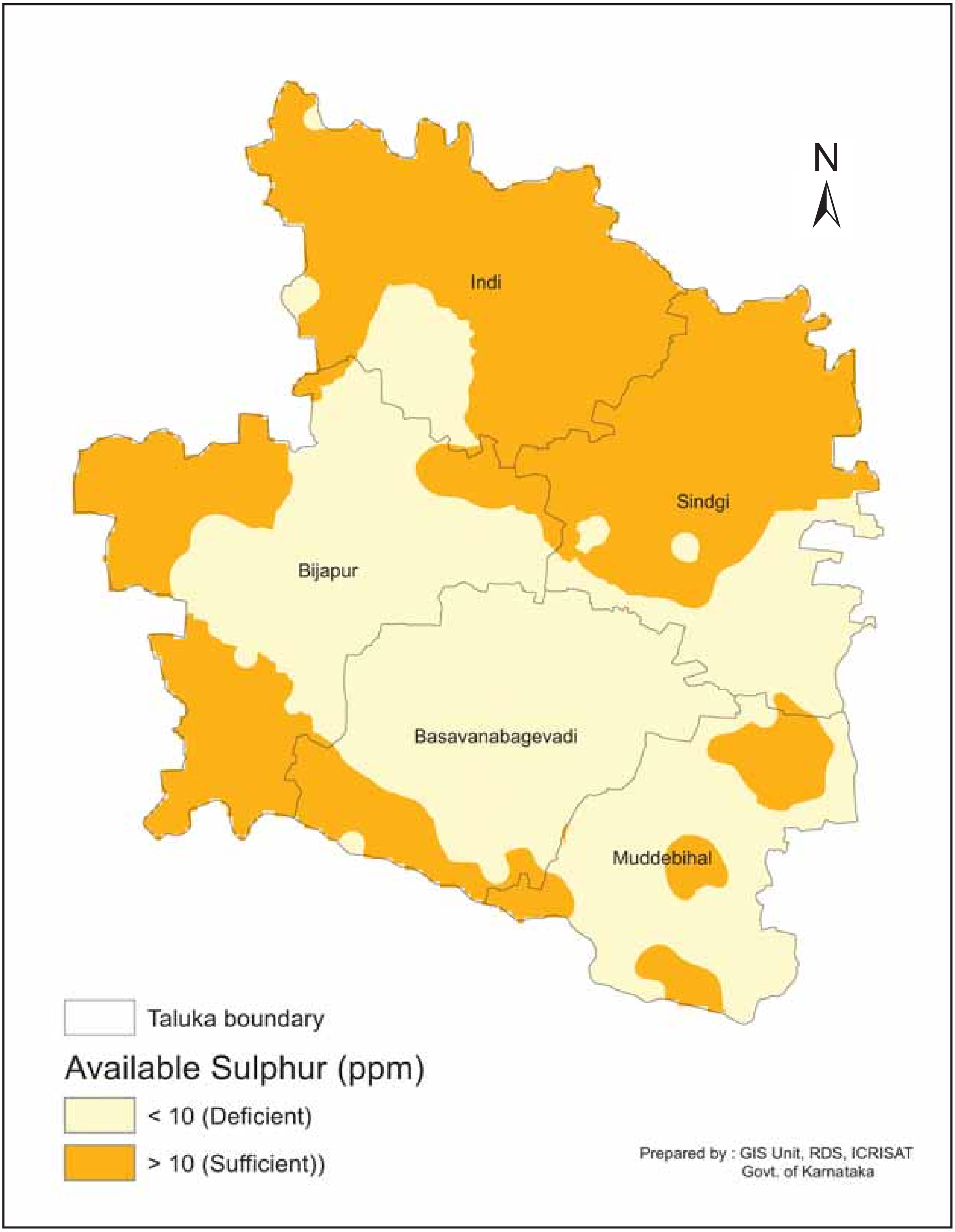


Figure 71. Available sulphur status in Bijapur district

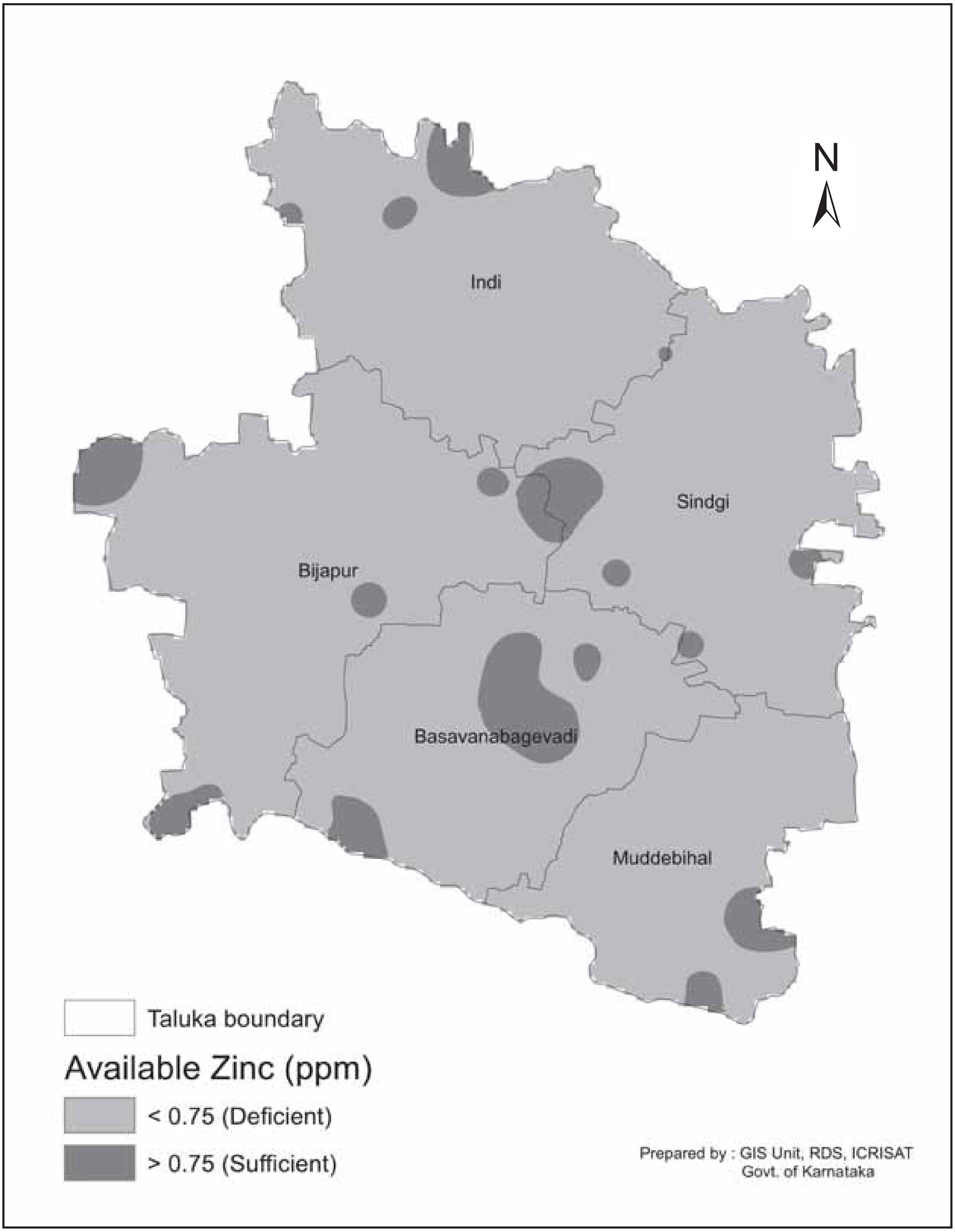


Figure 72. Available zinc status in Bijapur district

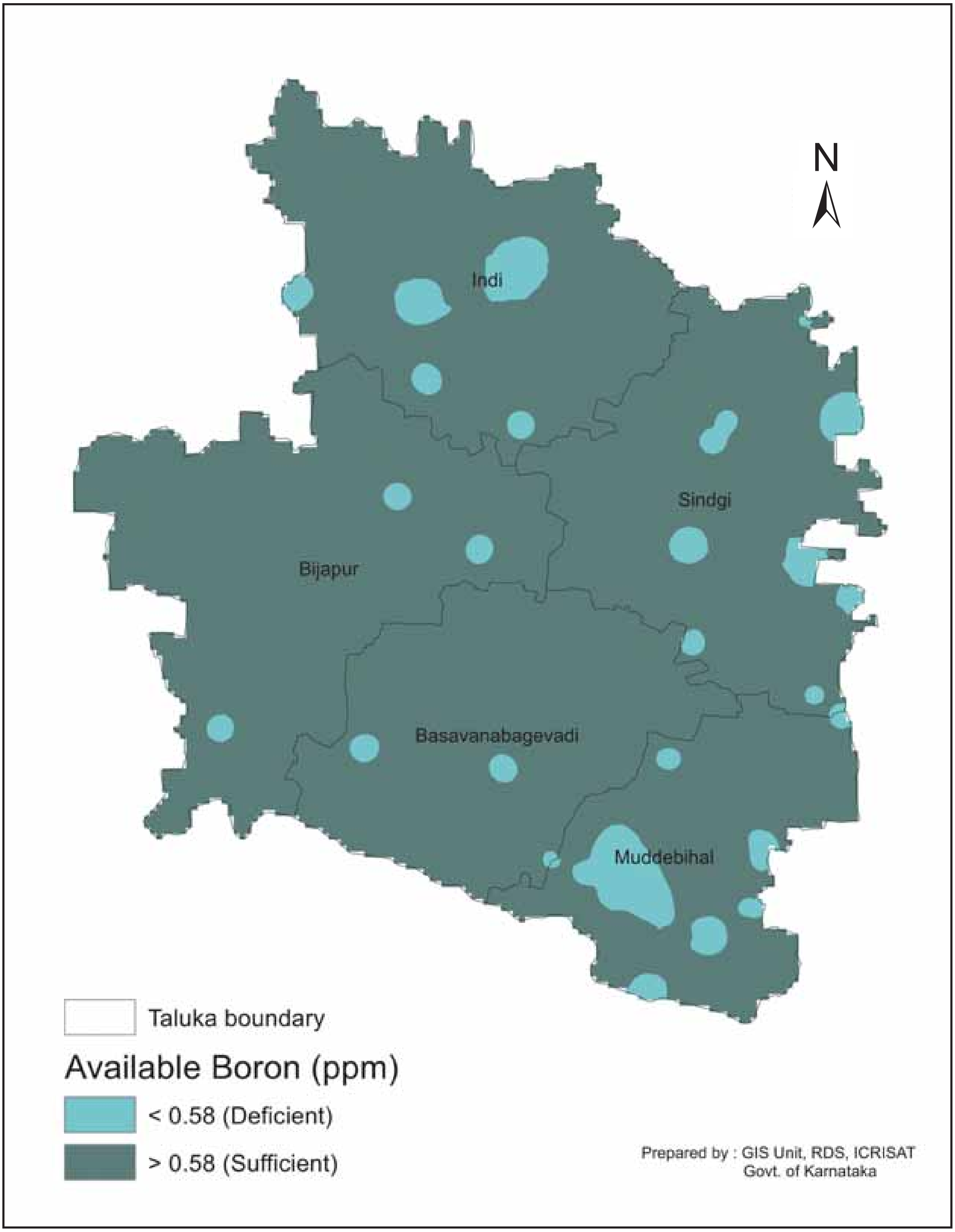


Figure 73. Available boron status in Bijapur district

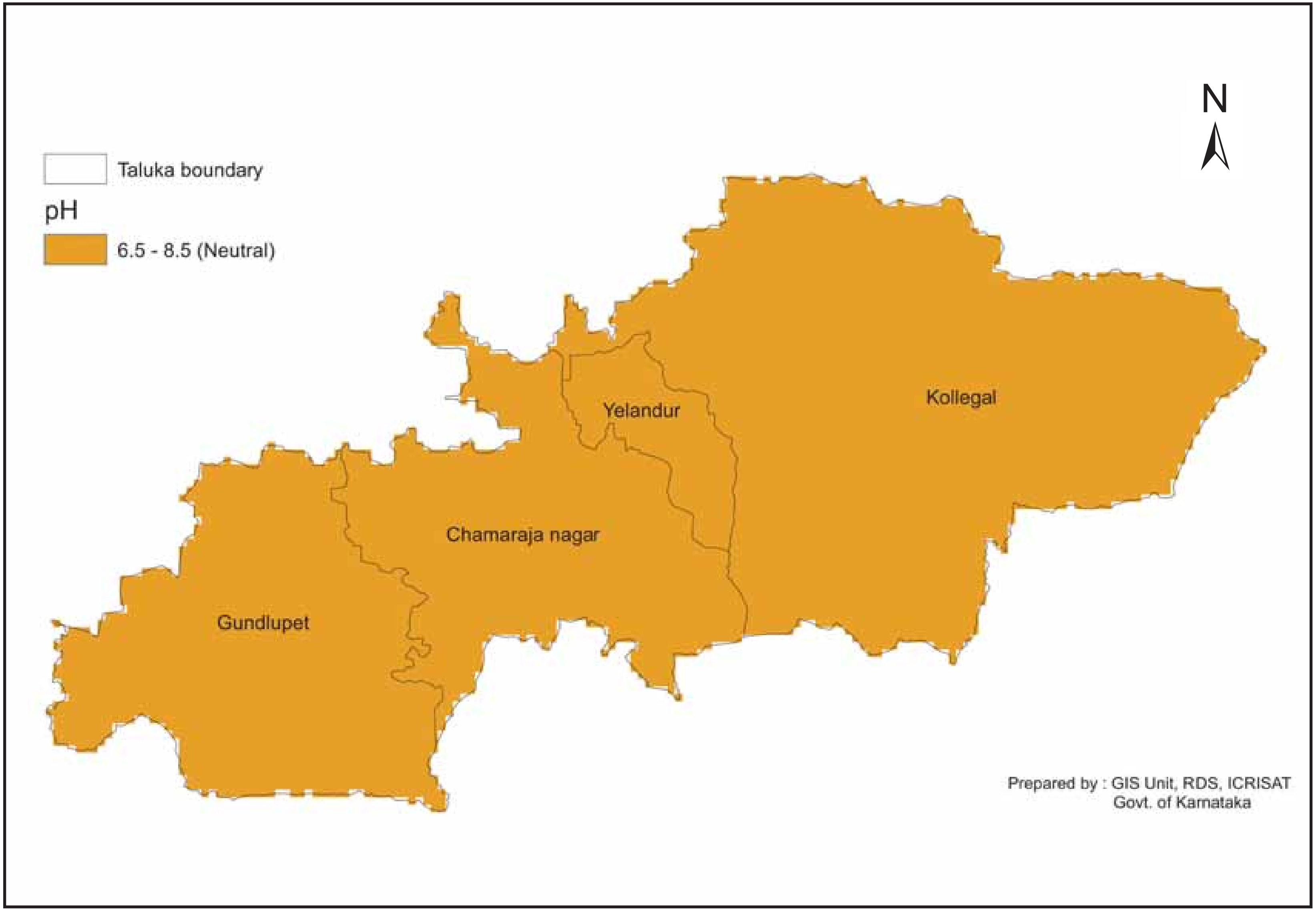


Figure 74. pH status in Chamarajanagar district

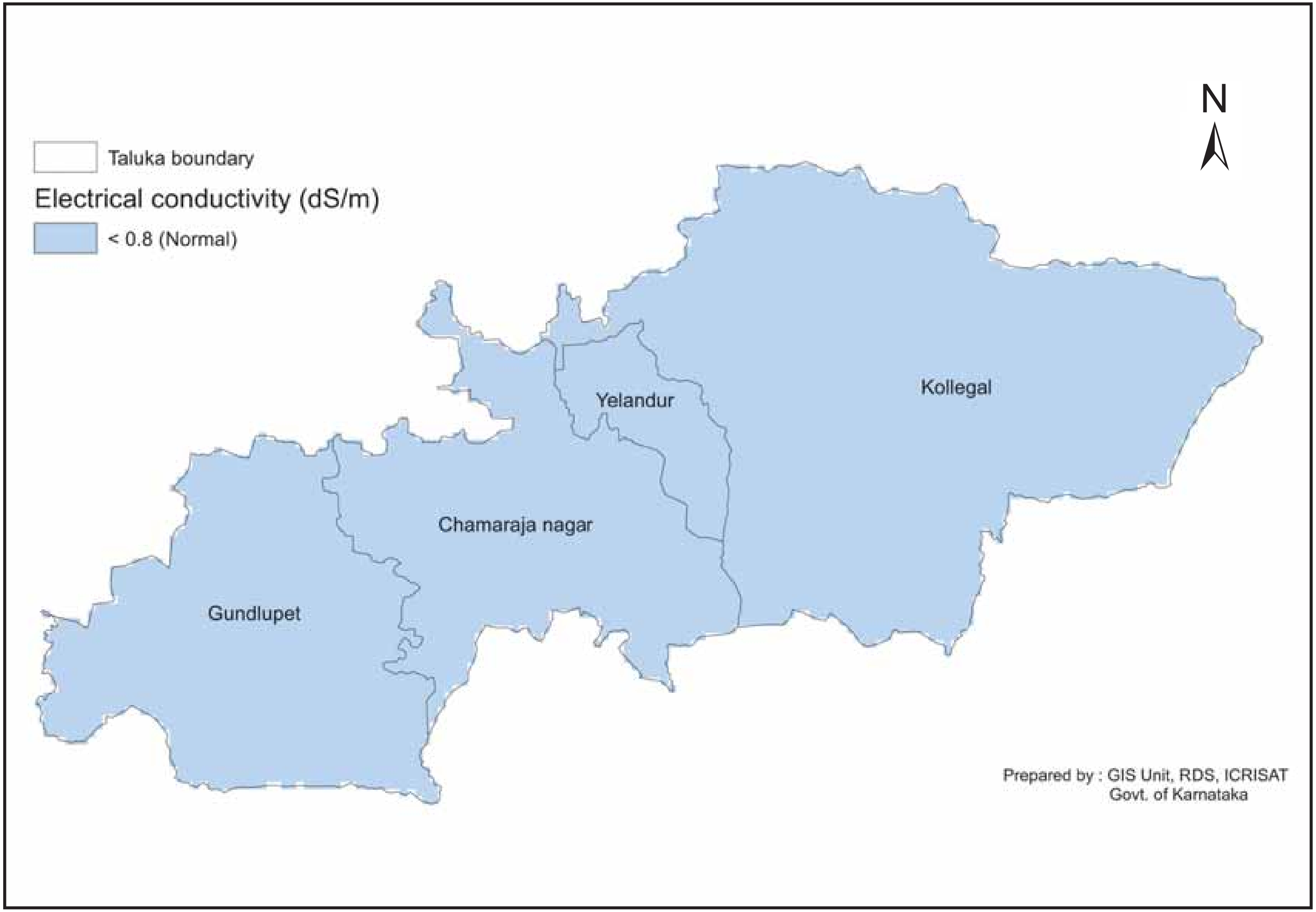


Figure 75. Electrical conductivity status in Chamarajanagar district

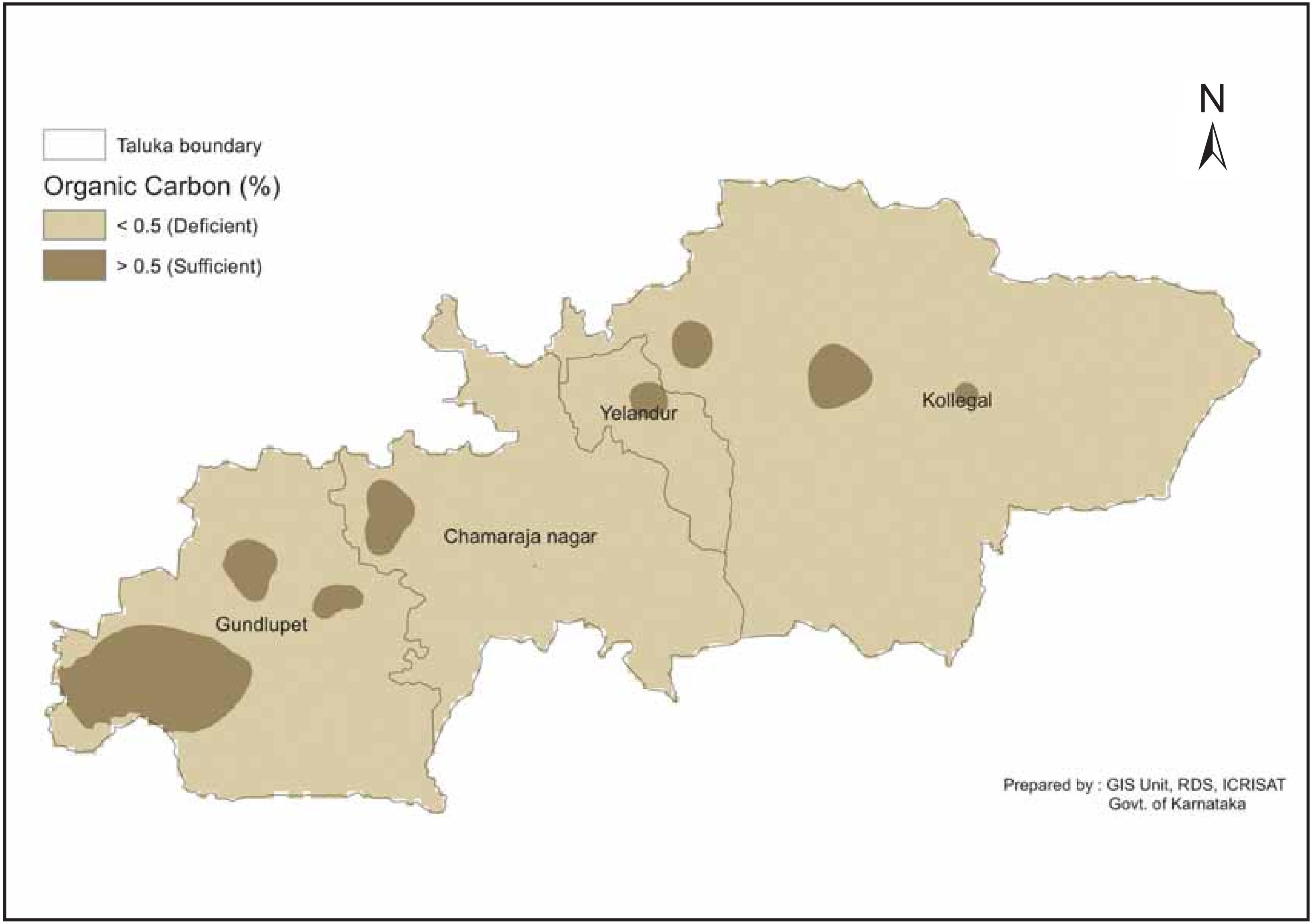


Figure 76. Organic carbon status in Chamarajanagar district

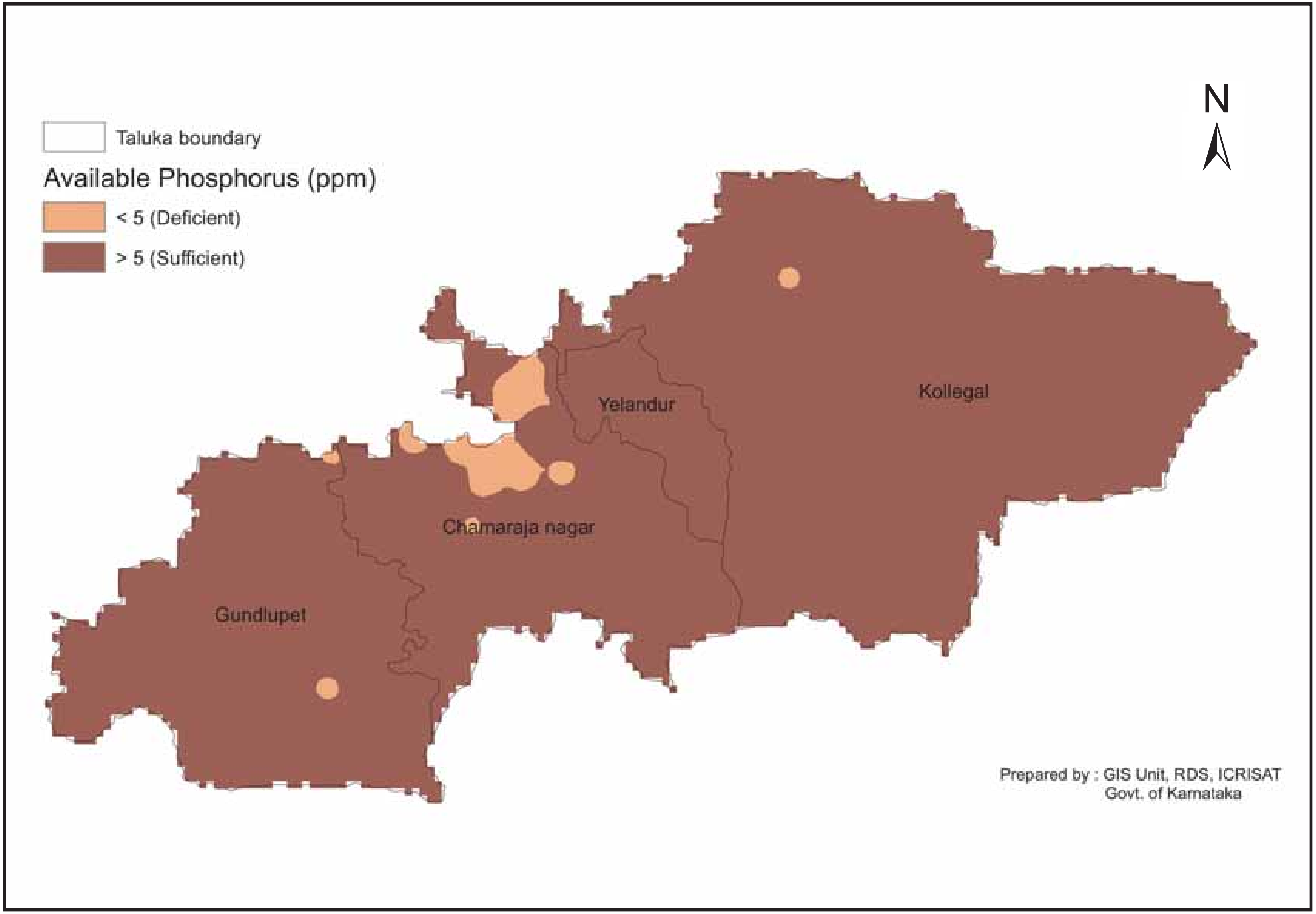


Figure 77. Available phosphorus status in Chamarajanagar district

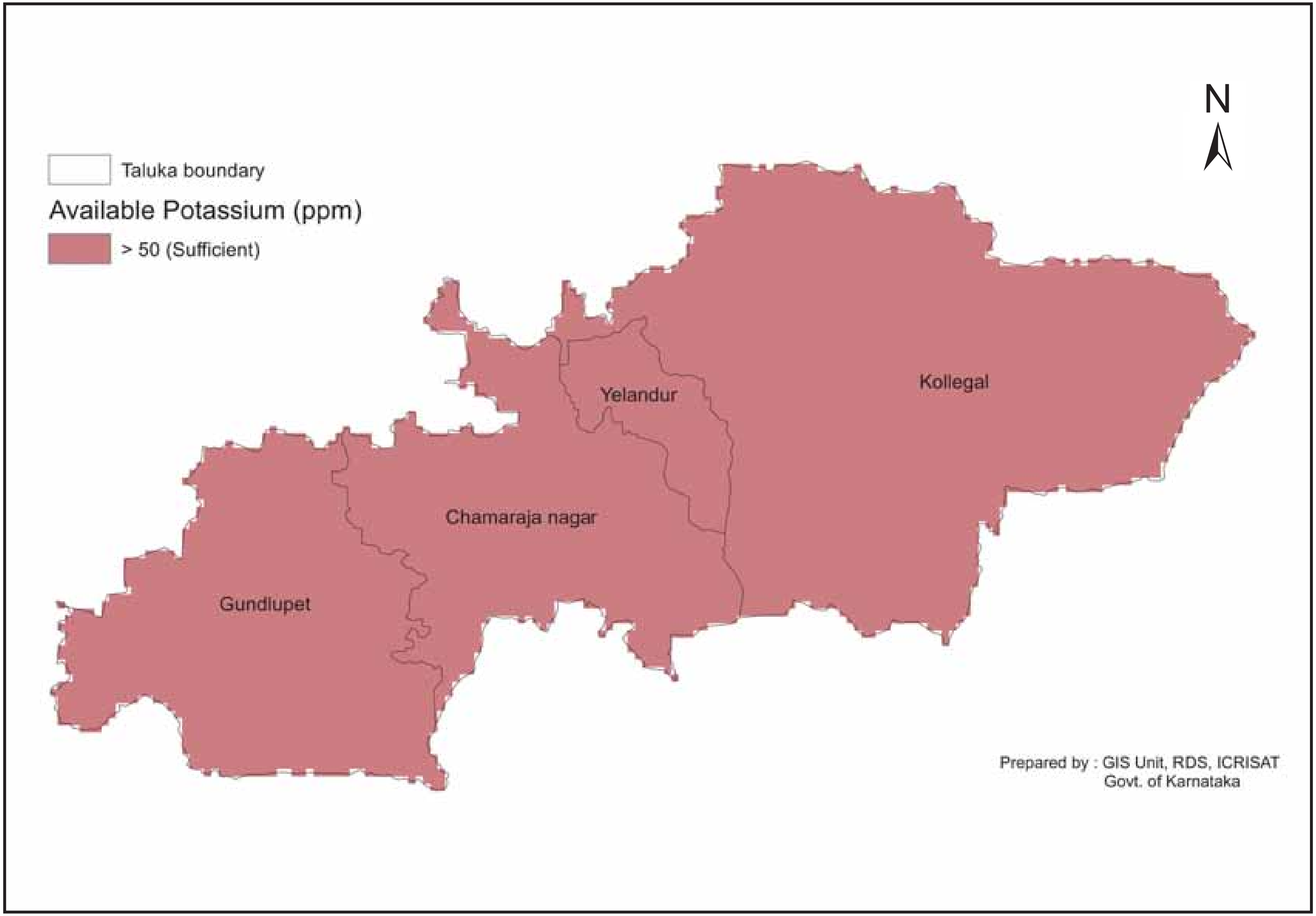


Figure 78. Available potassium status in Chamarajanagar district

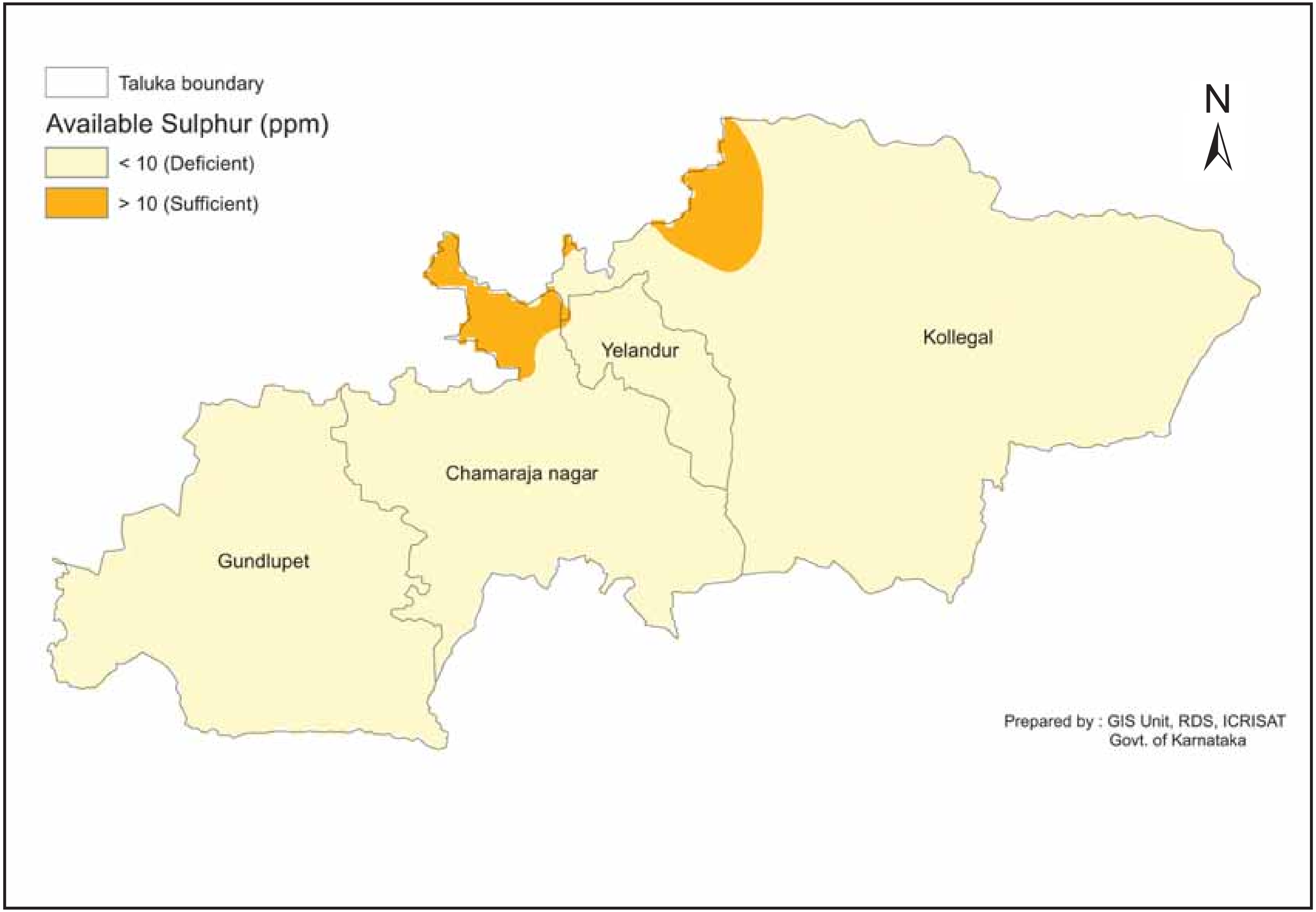


Figure 79. Available sulphur status in Chamarajanagar district

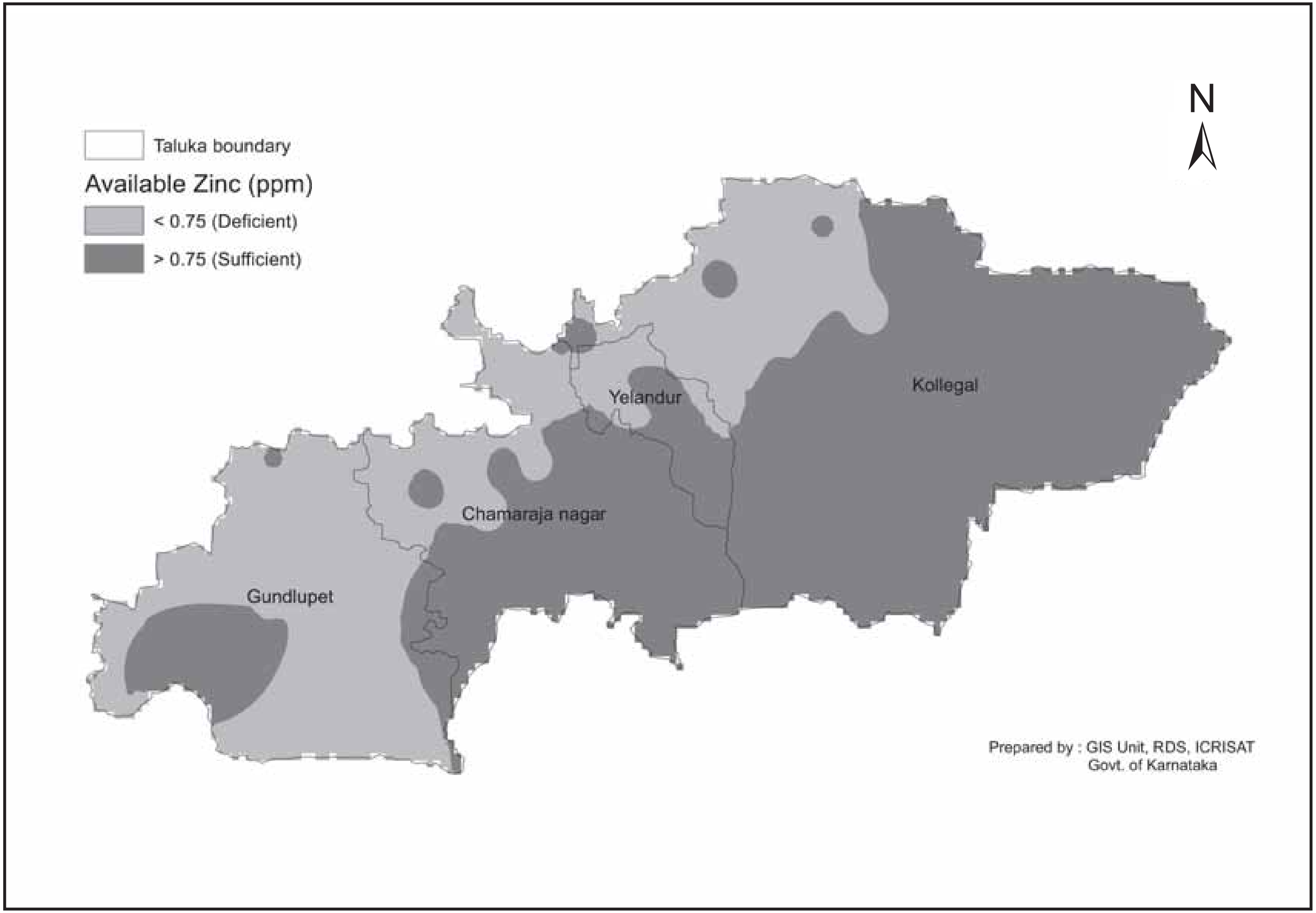


Figure 80. Available zinc status in Chamarajanagar district

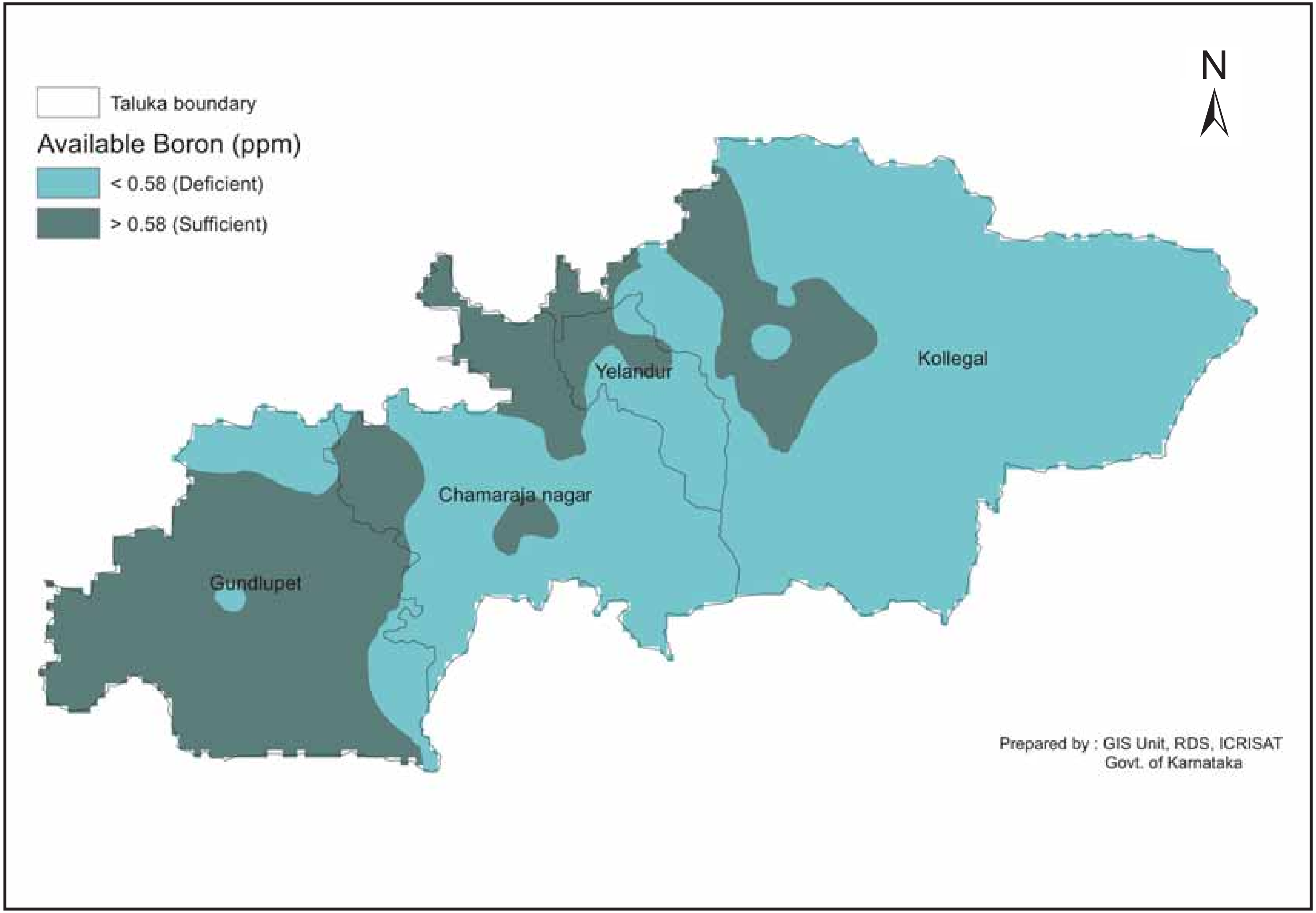


Figure 81. Available boron status in Chamarajanagar district

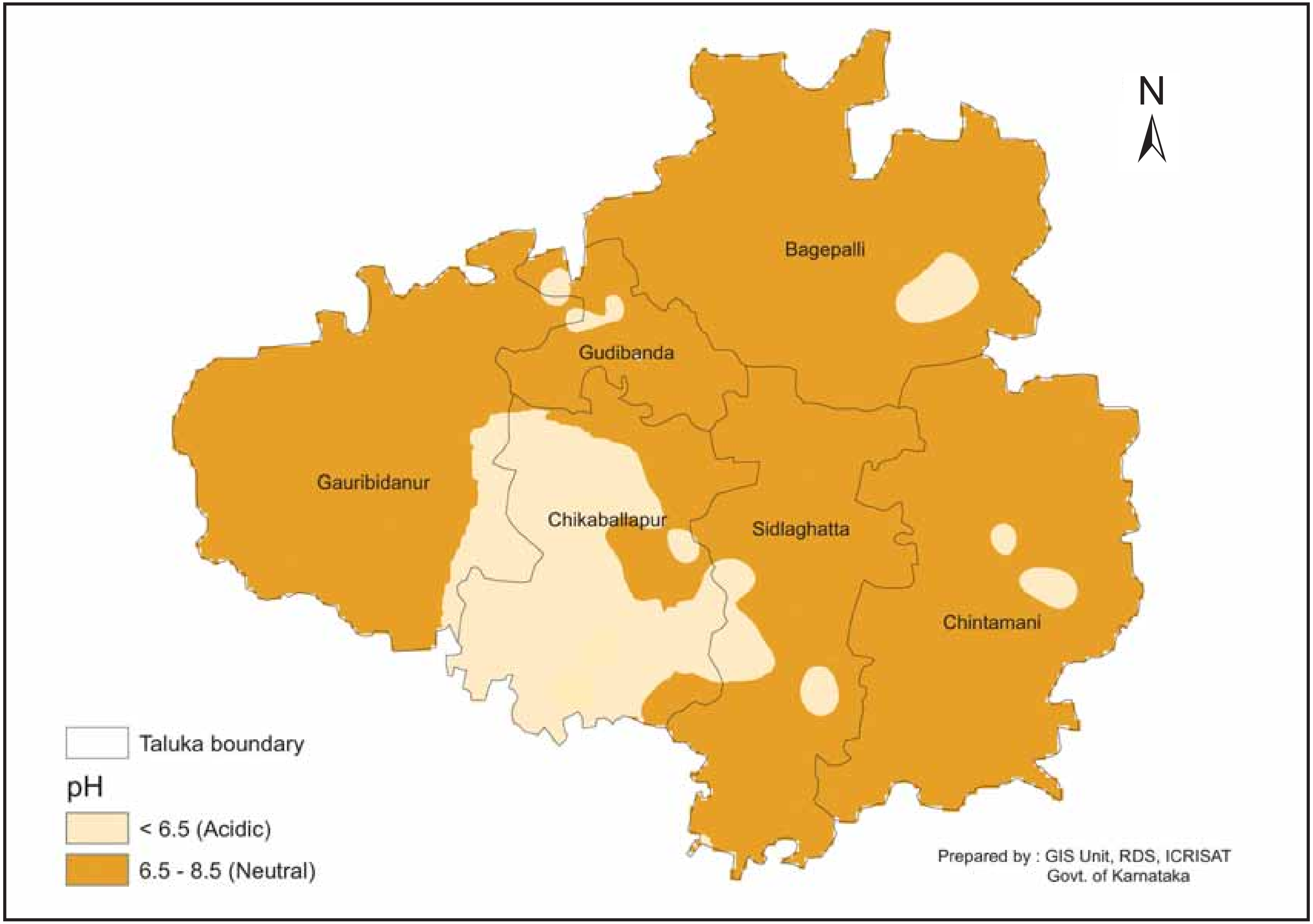


Figure 82. pH status in Chikaballapur district

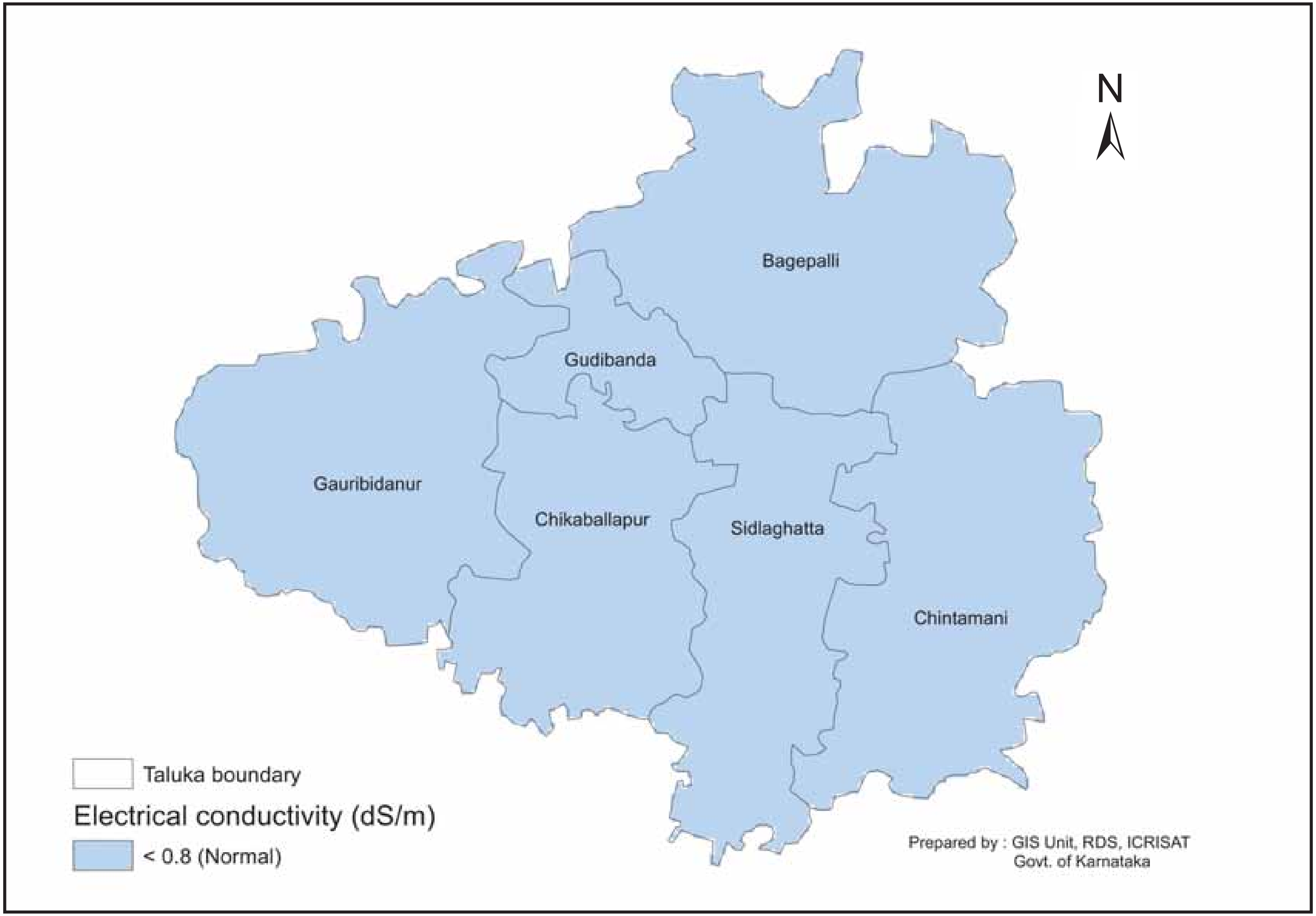


Figure 83. Electrical conductivity status in Chikaballapur district

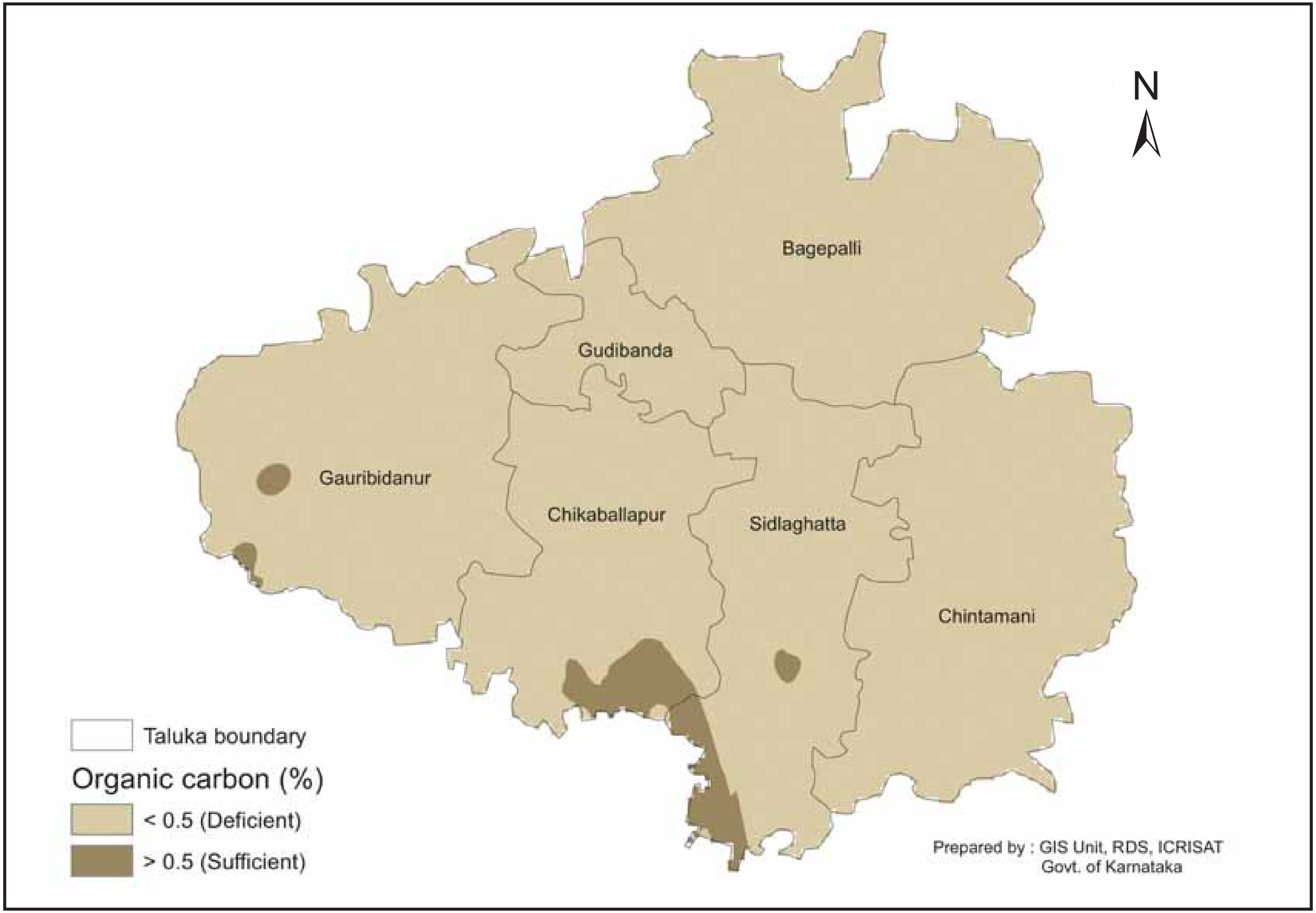


Figure 84. Organic carbon status in Chikaballapur district

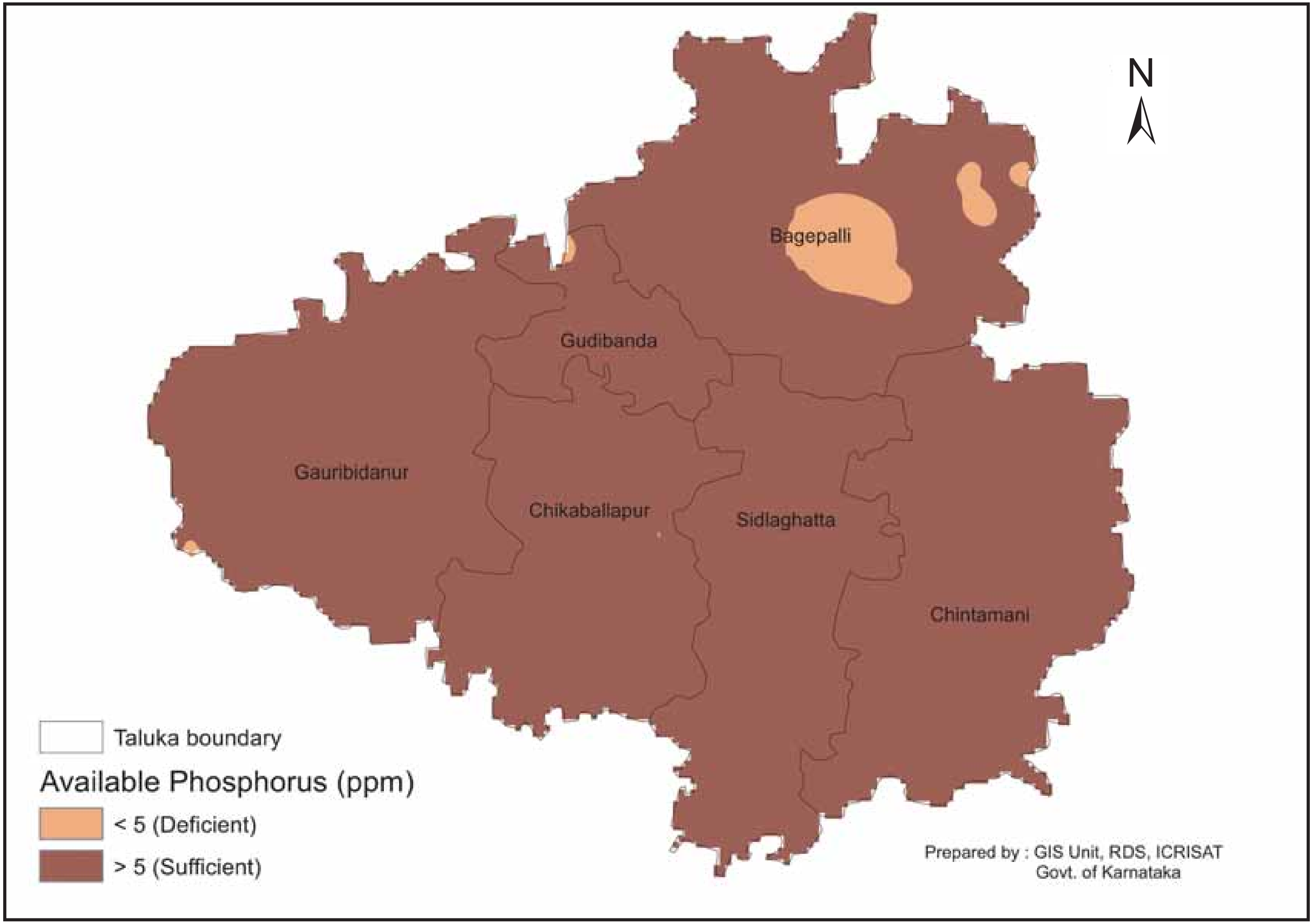


Figure 85. Available phosphorus status in Chikaballapur district

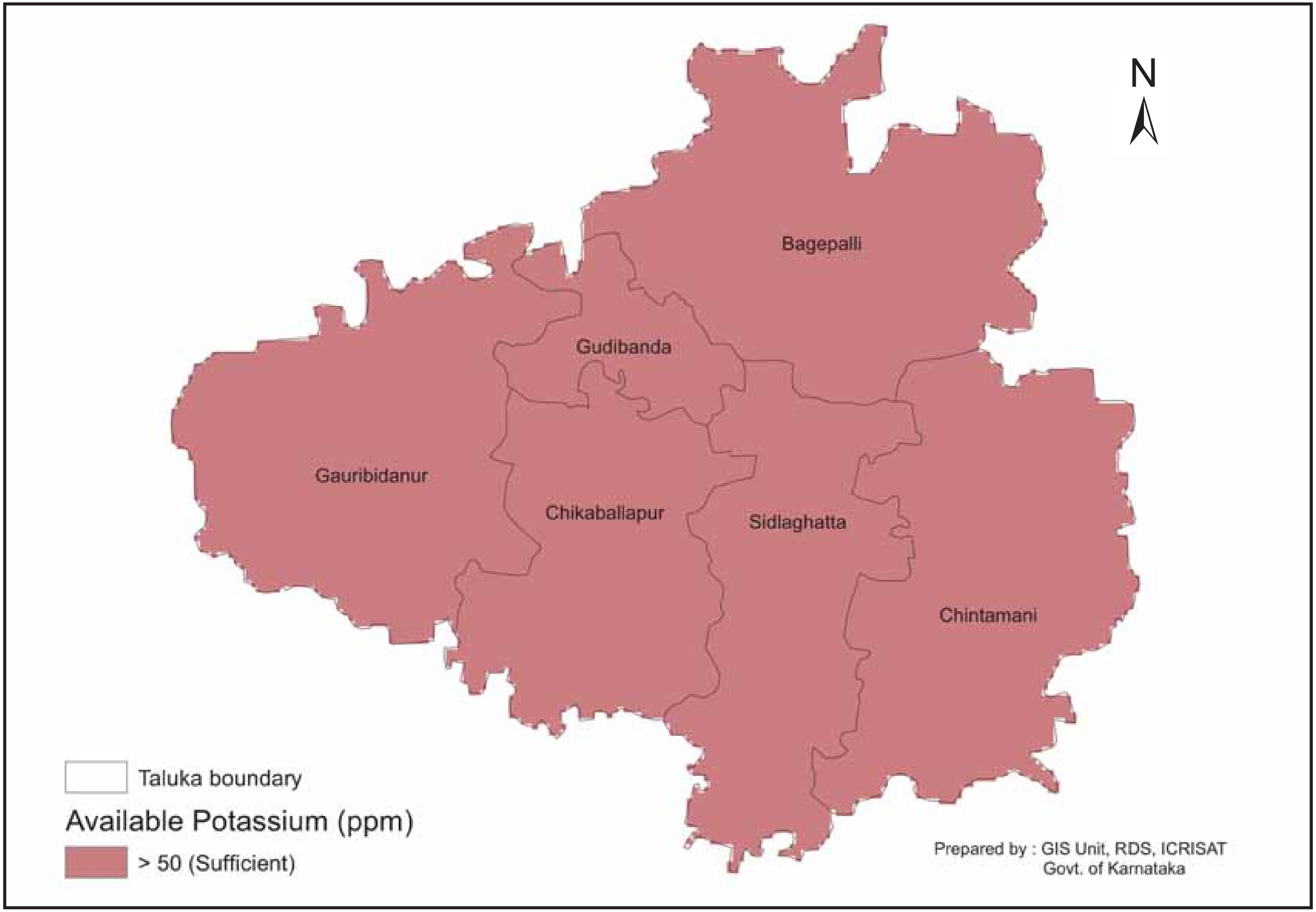


Figure 86. Available potassium status in Chikaballapur district

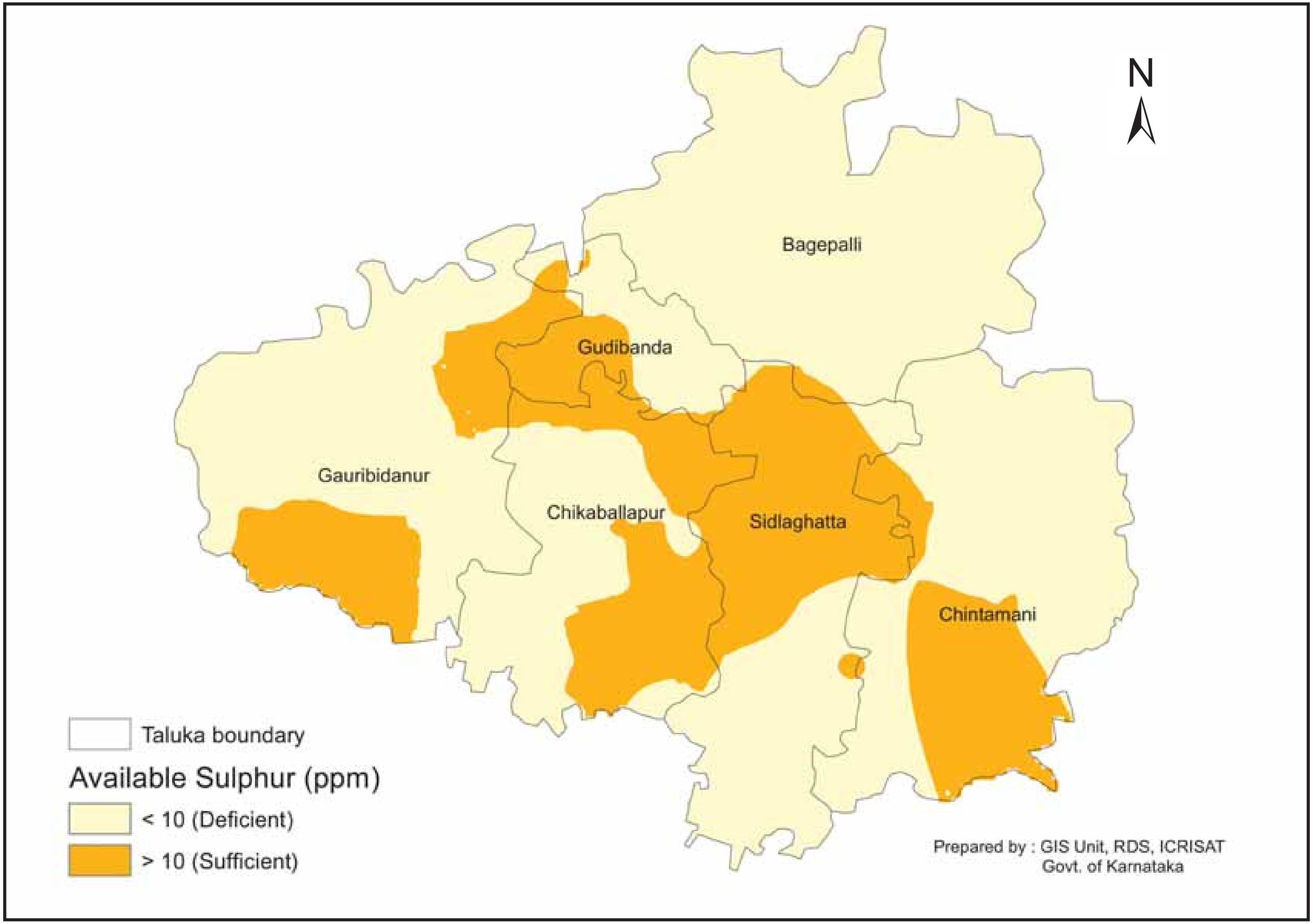


Figure 87. Available sulphur status in Chikaballapur district

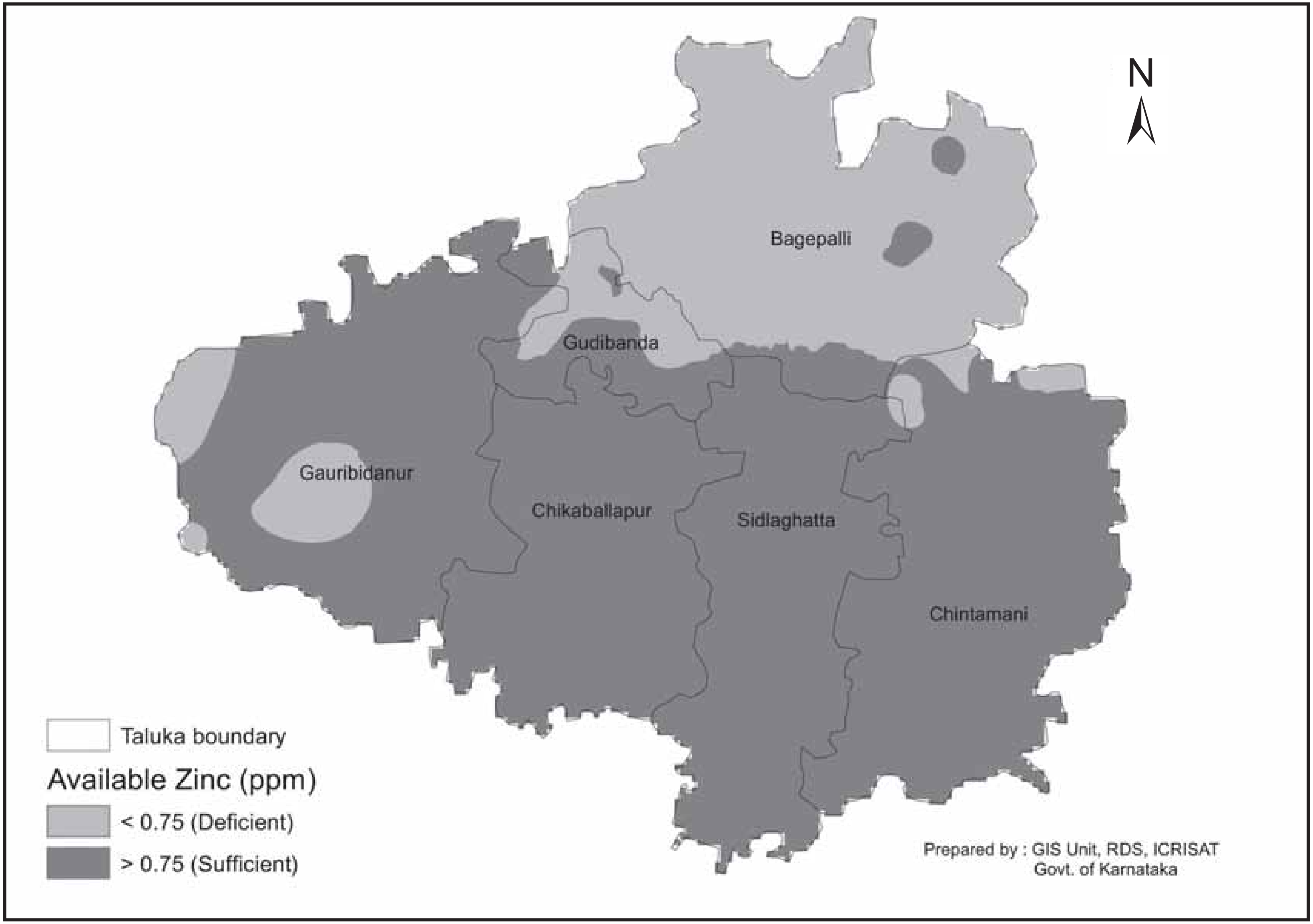


Figure 88. Available zinc status in Chikaballapur district

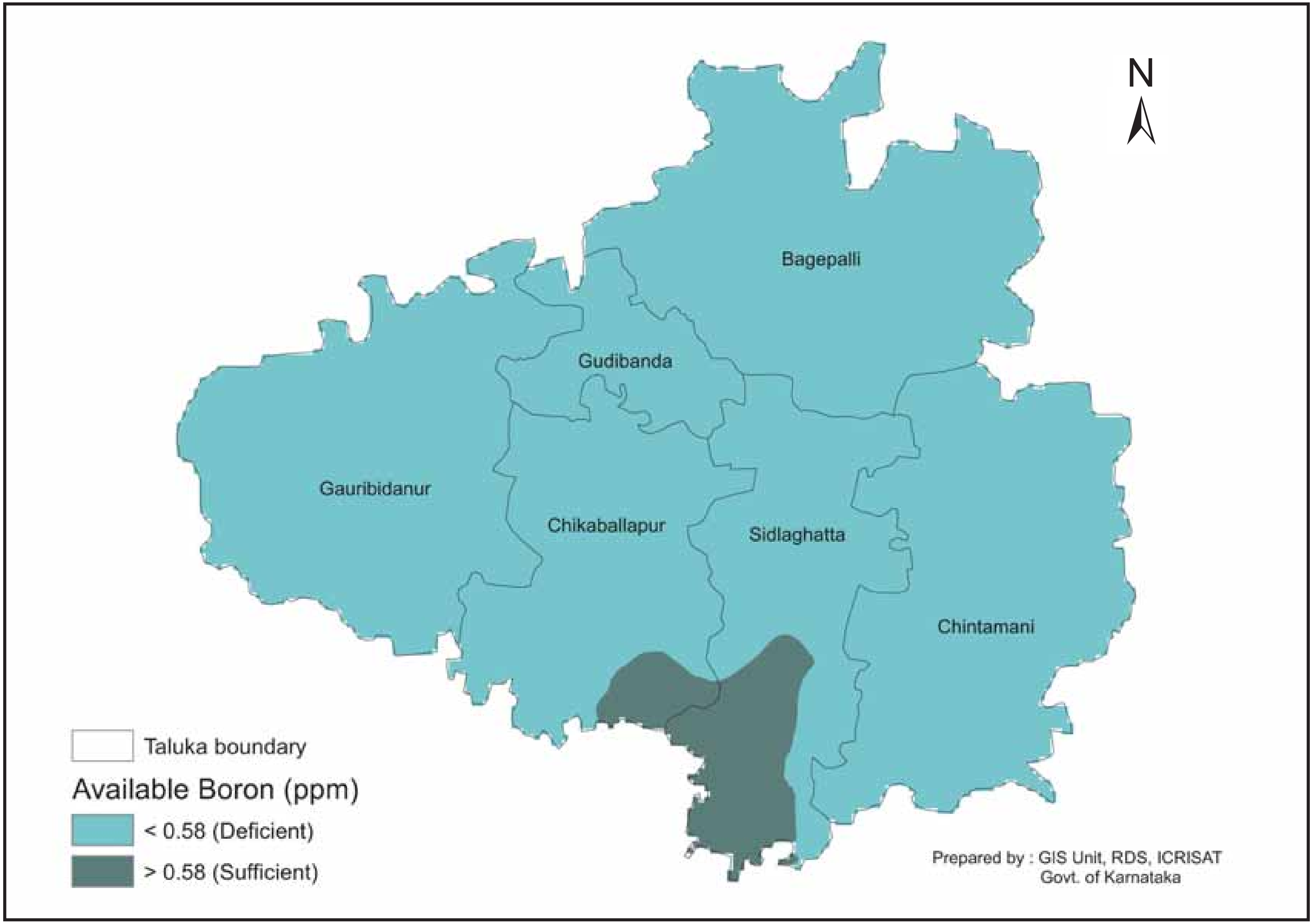


Figure 89. Available boron status in Chikaballapur district

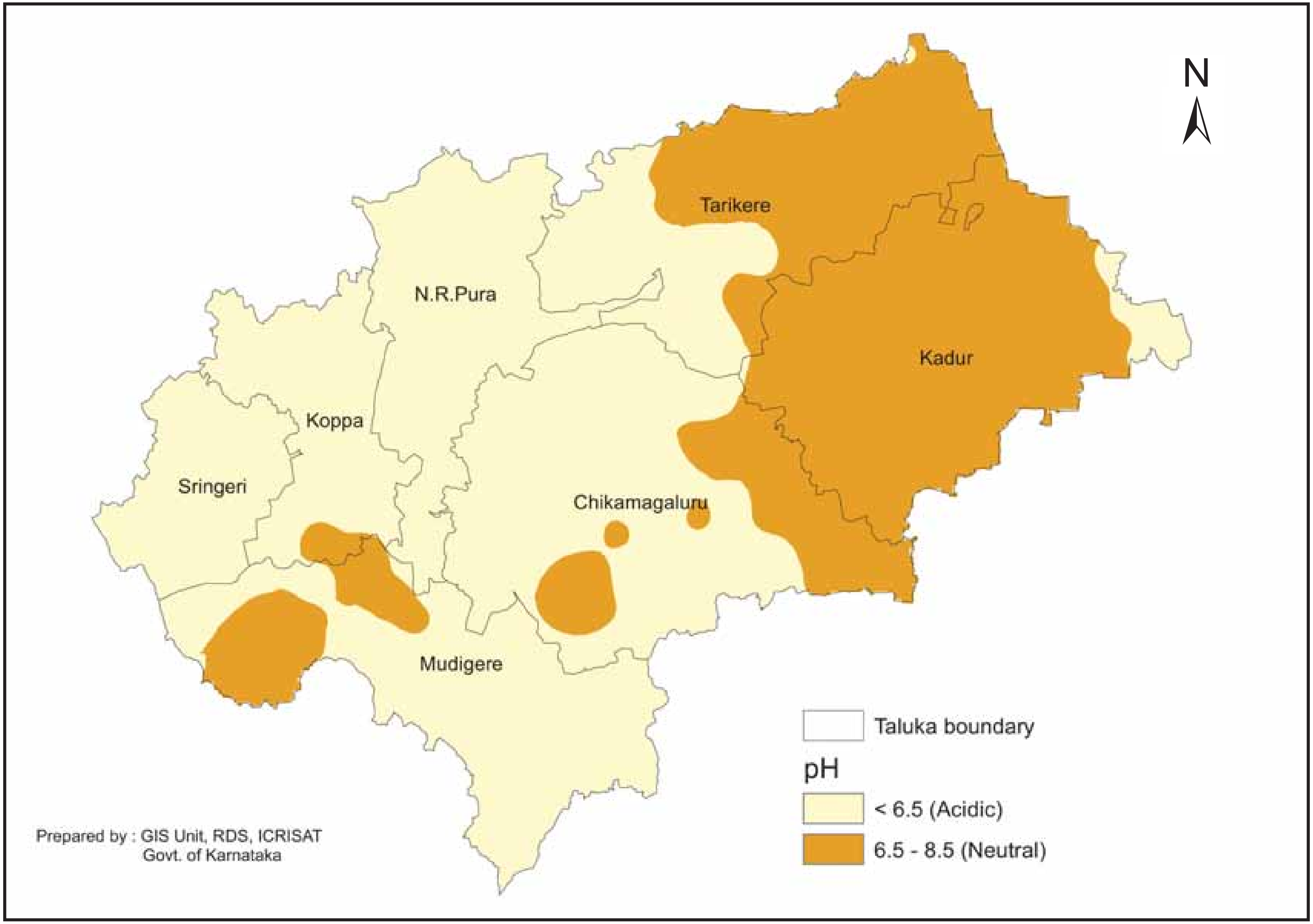


Figure 90. pH status in Chikamagalur district

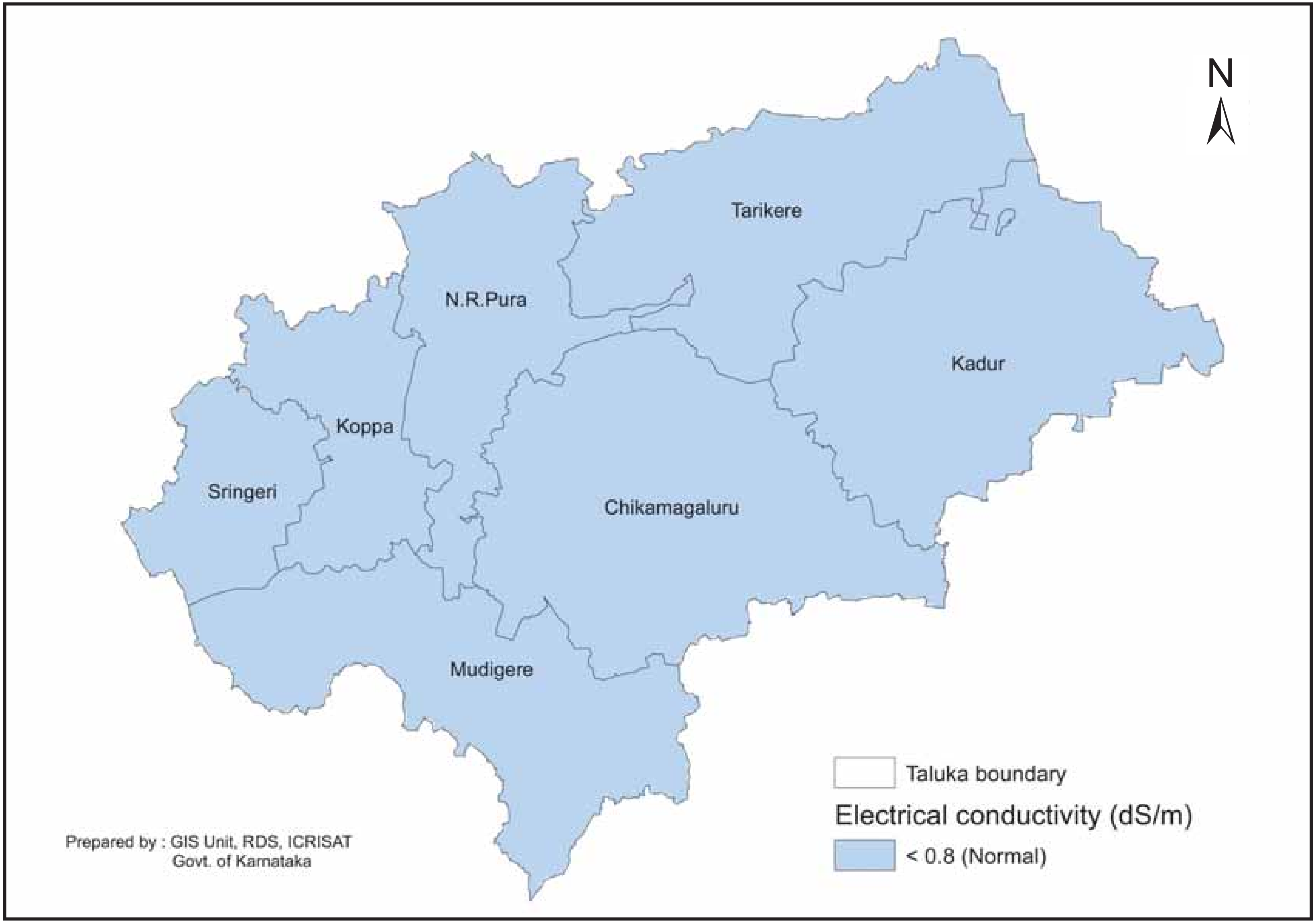


Figure 91. Electrical conductivity status in Chikamagalur district

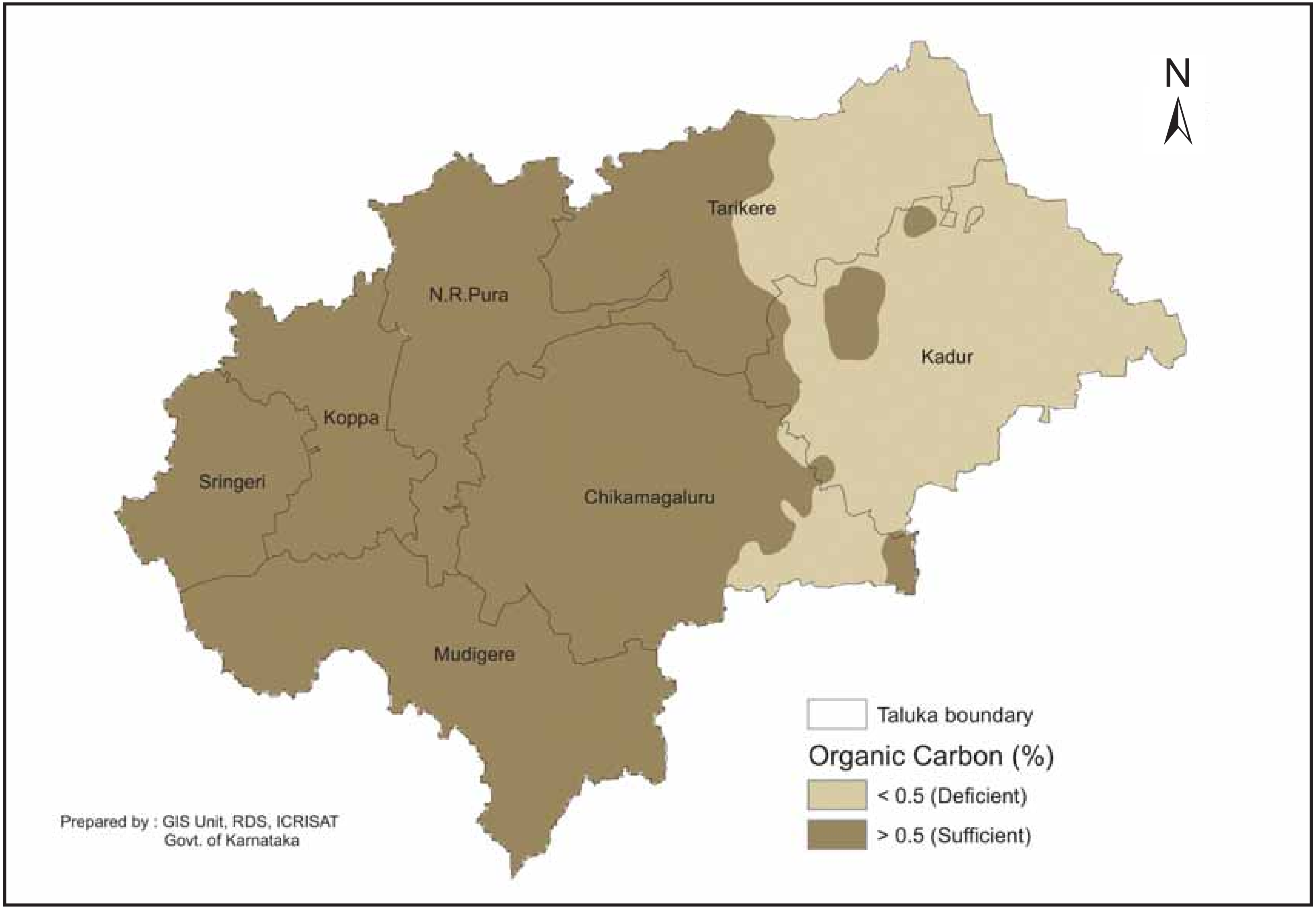


Figure 92. Organic carbon status in Chikamagalur district

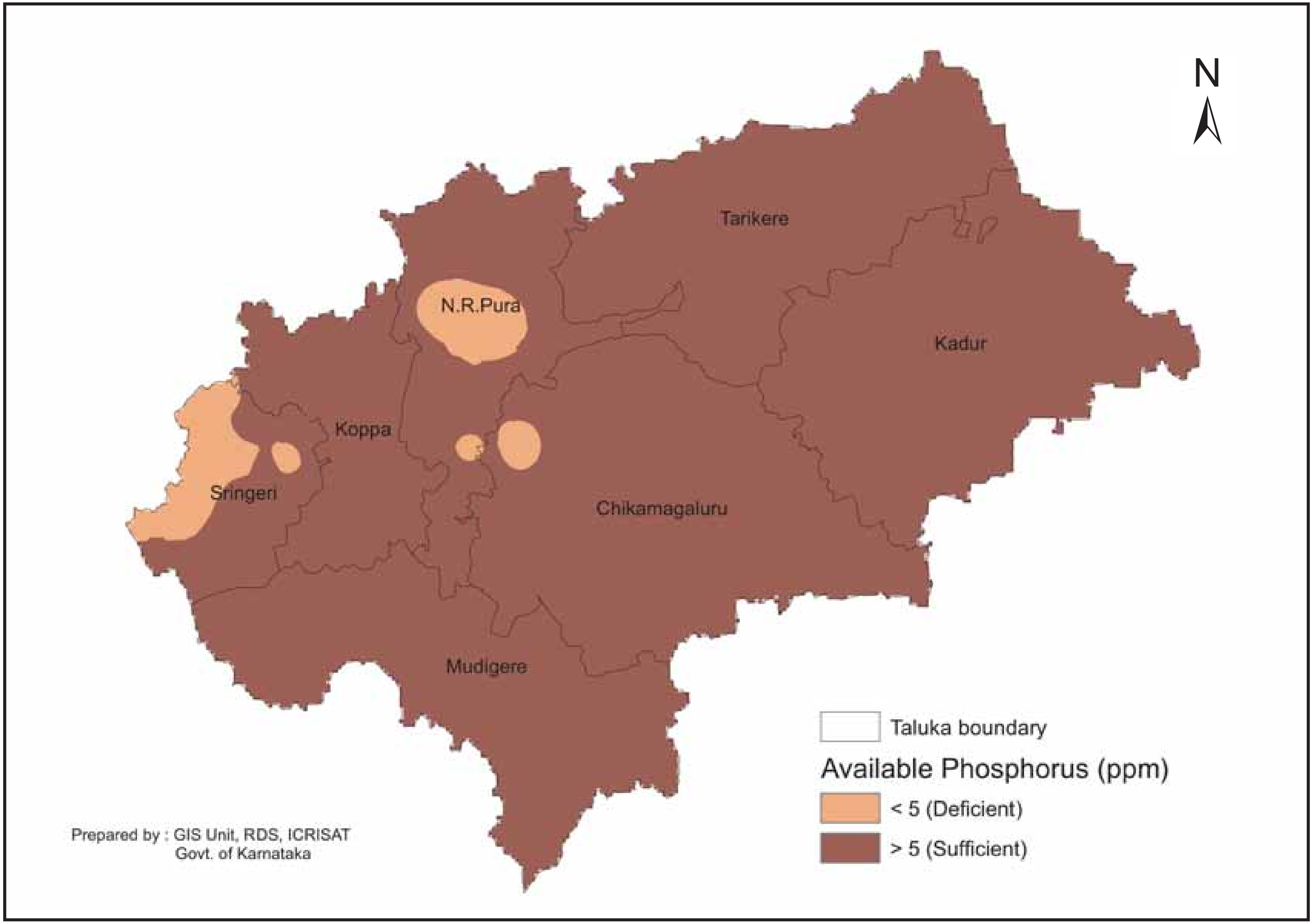


Figure 93. Available phosphorus status in Chikamagalur district

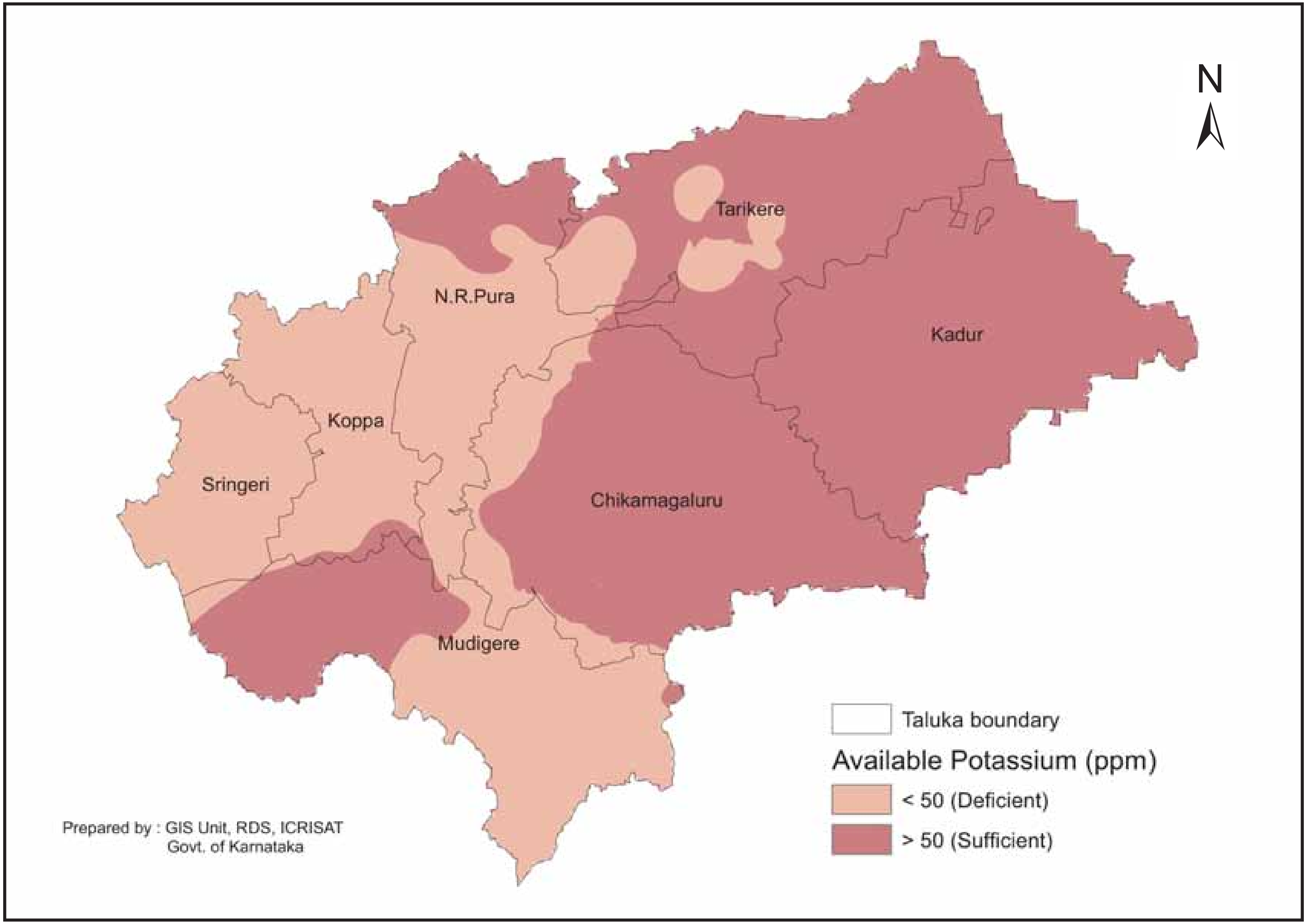


Figure 94. Available potassium status in Chikamagalur district

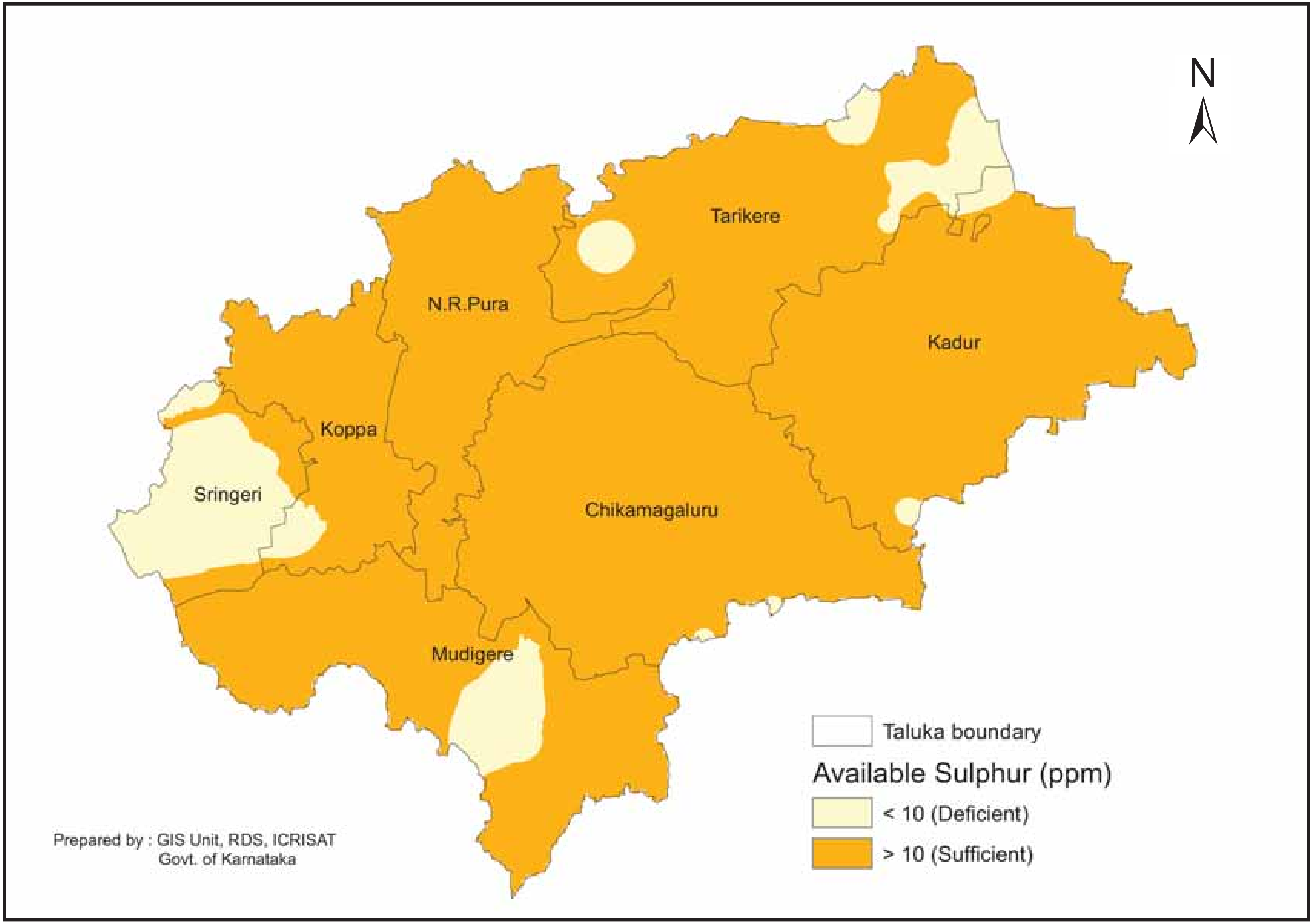


Figure 95. Available sulphur status in Chikamagalur district

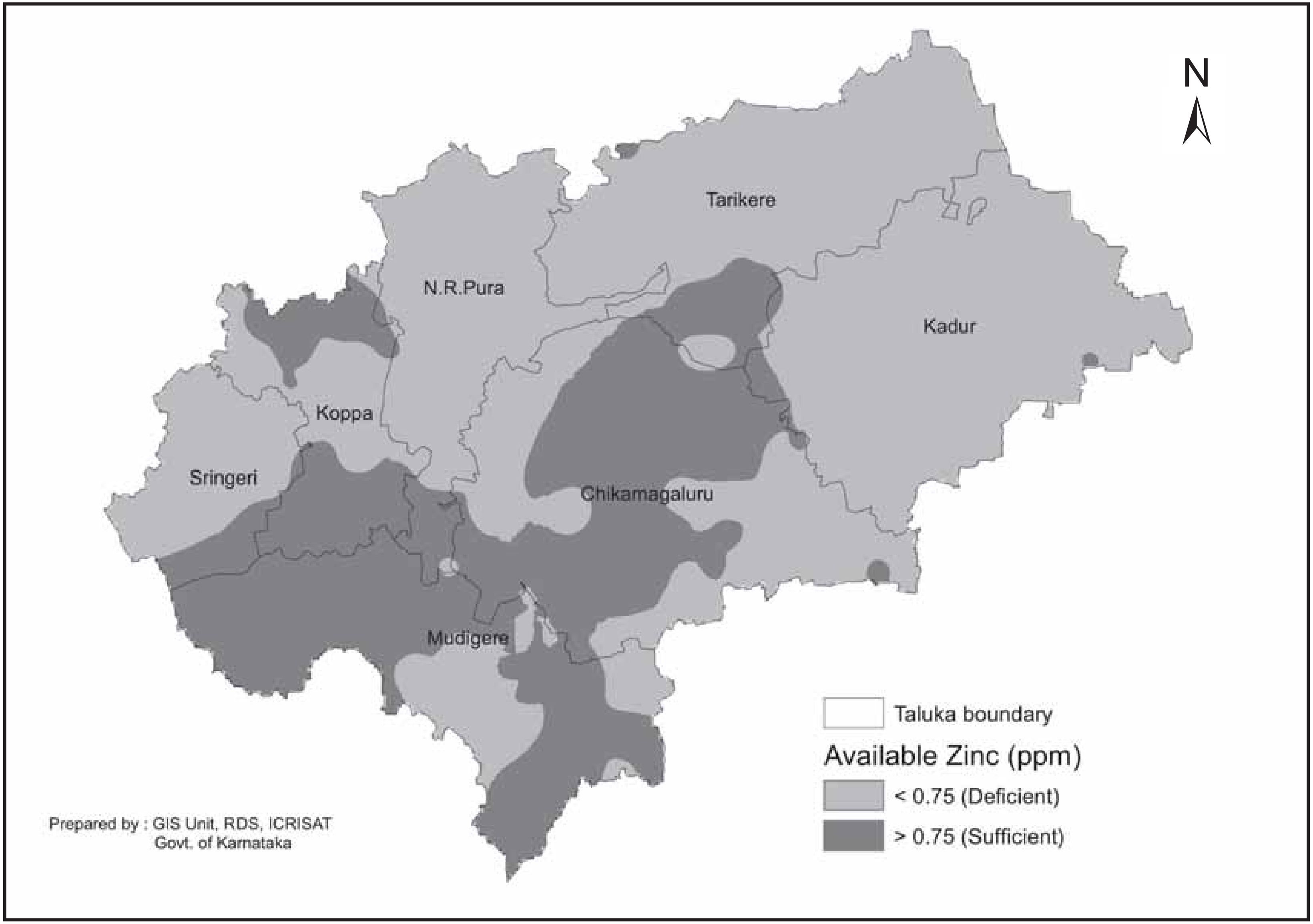


Figure 96. Available zinc status in Chikamagalur district

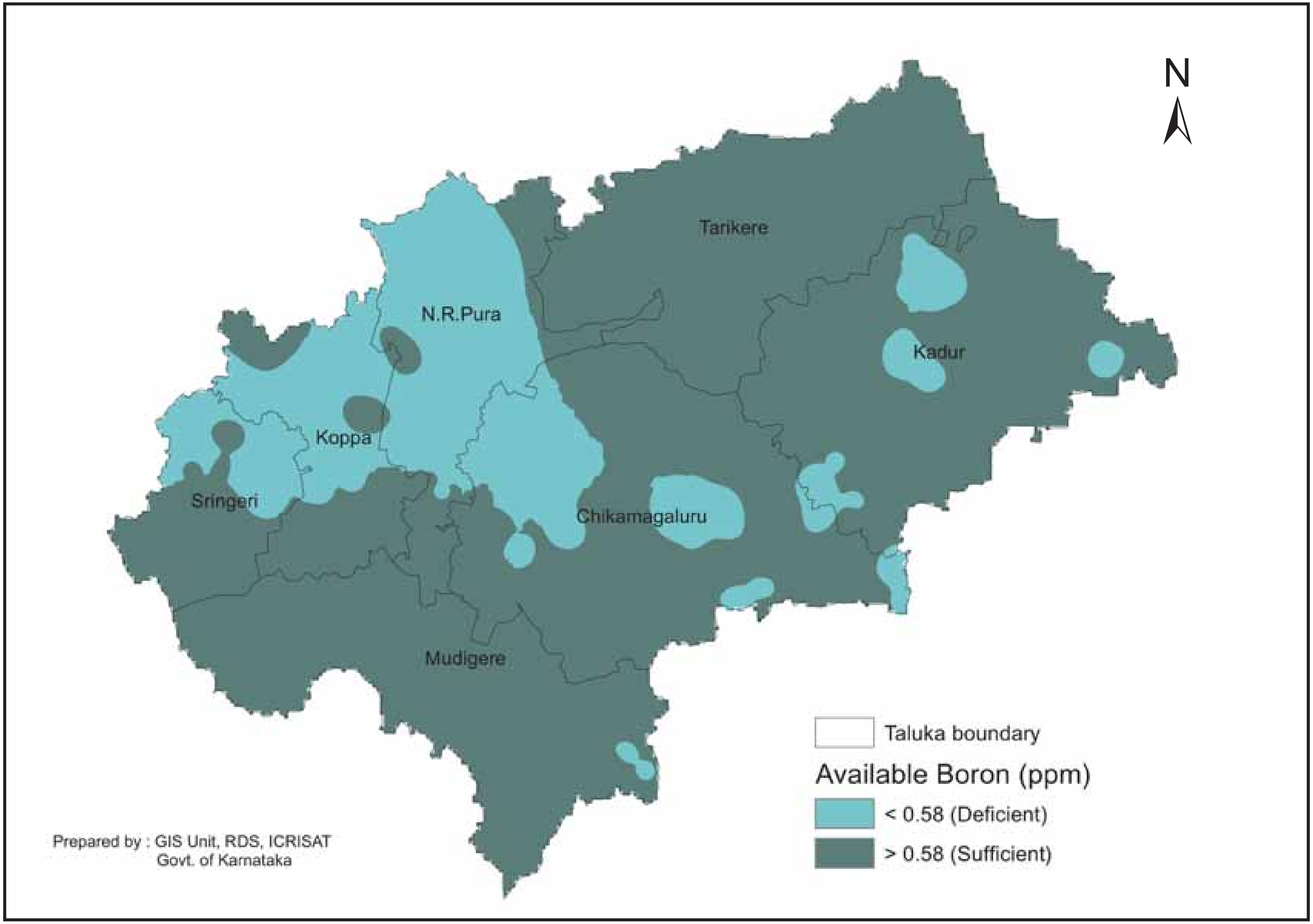


Figure 97. Available boron status in Chikamagalur district

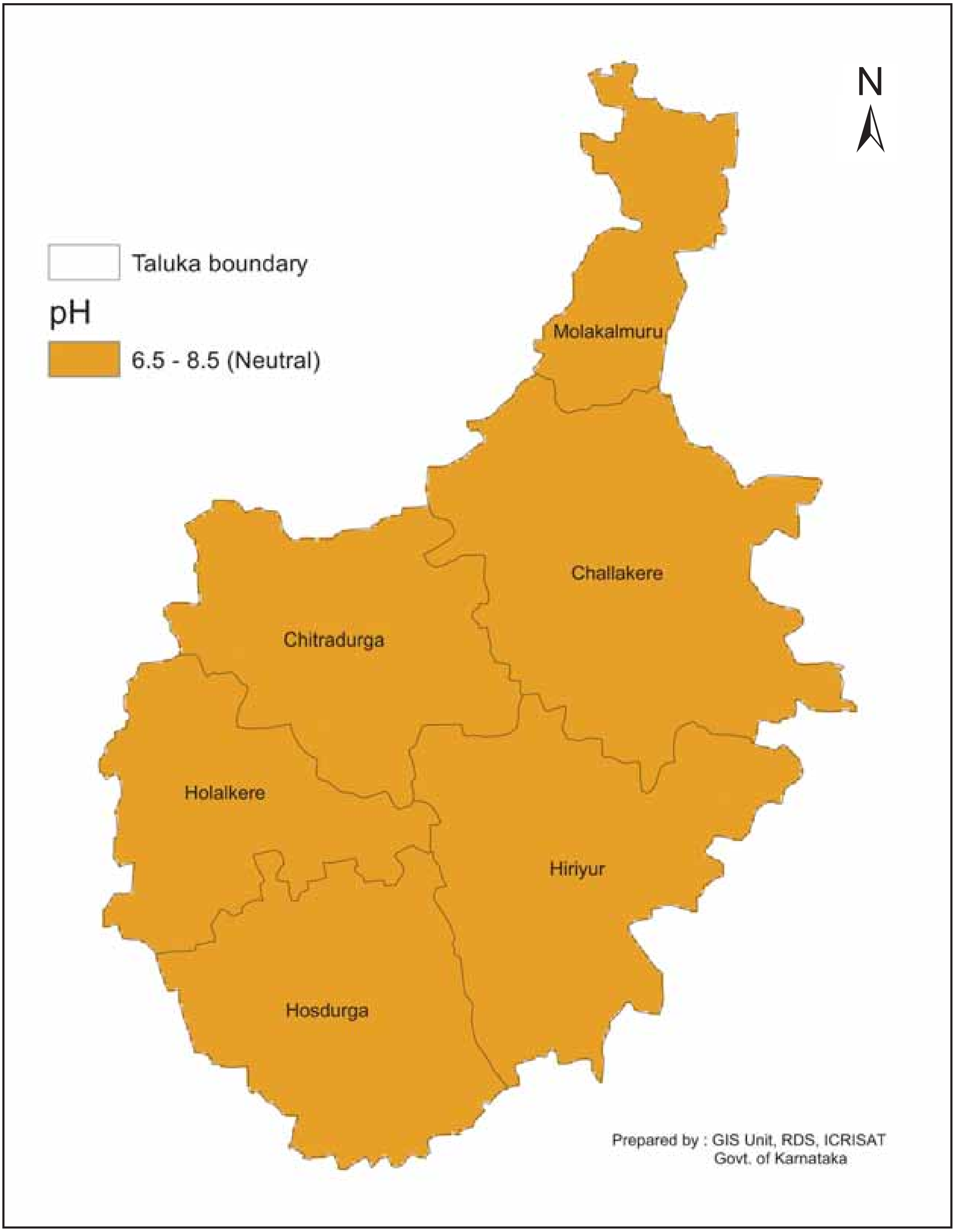


Figure 98. pH status in Chitradurga district

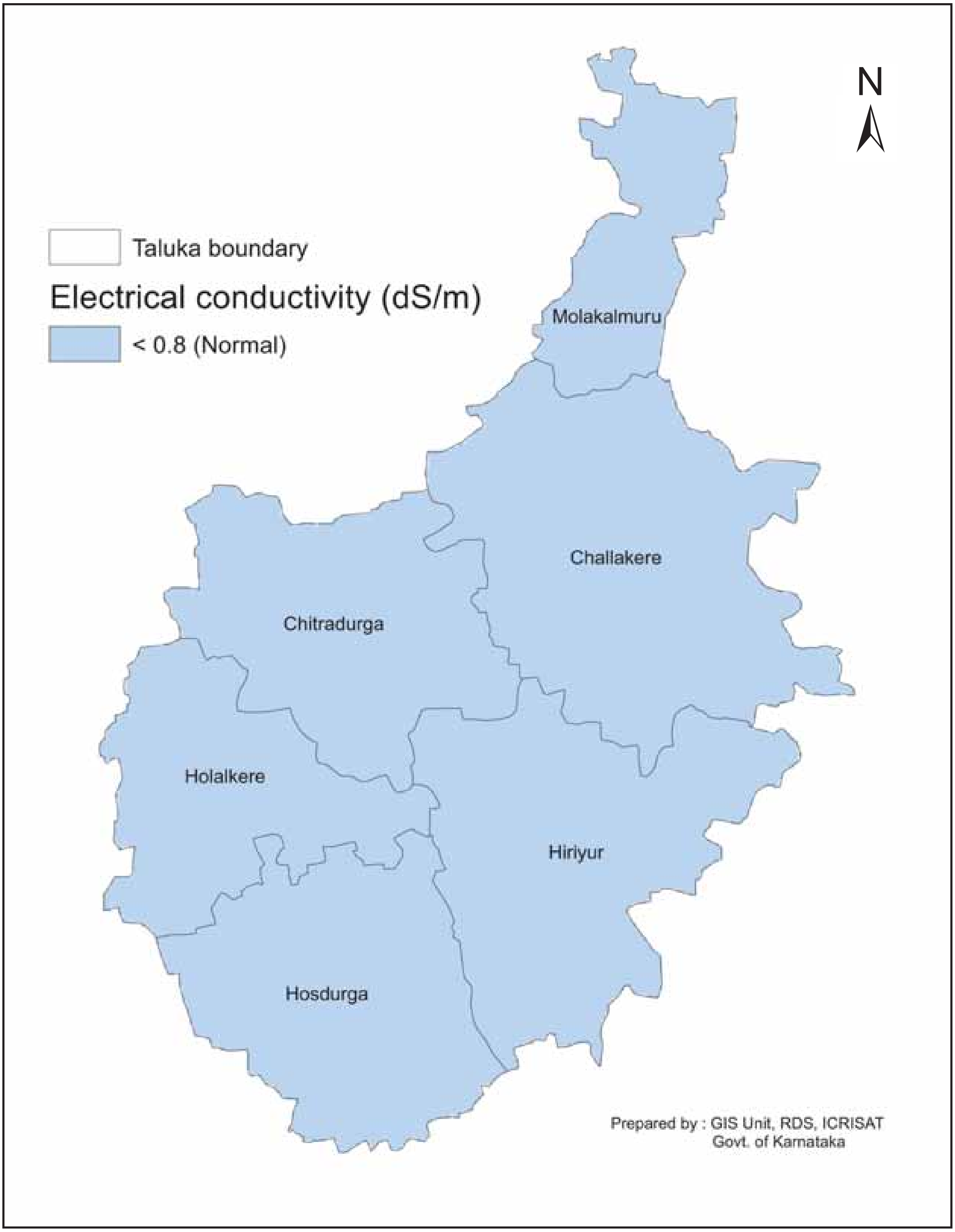


Figure 99. Electrical conductivity status in Chitradurga district

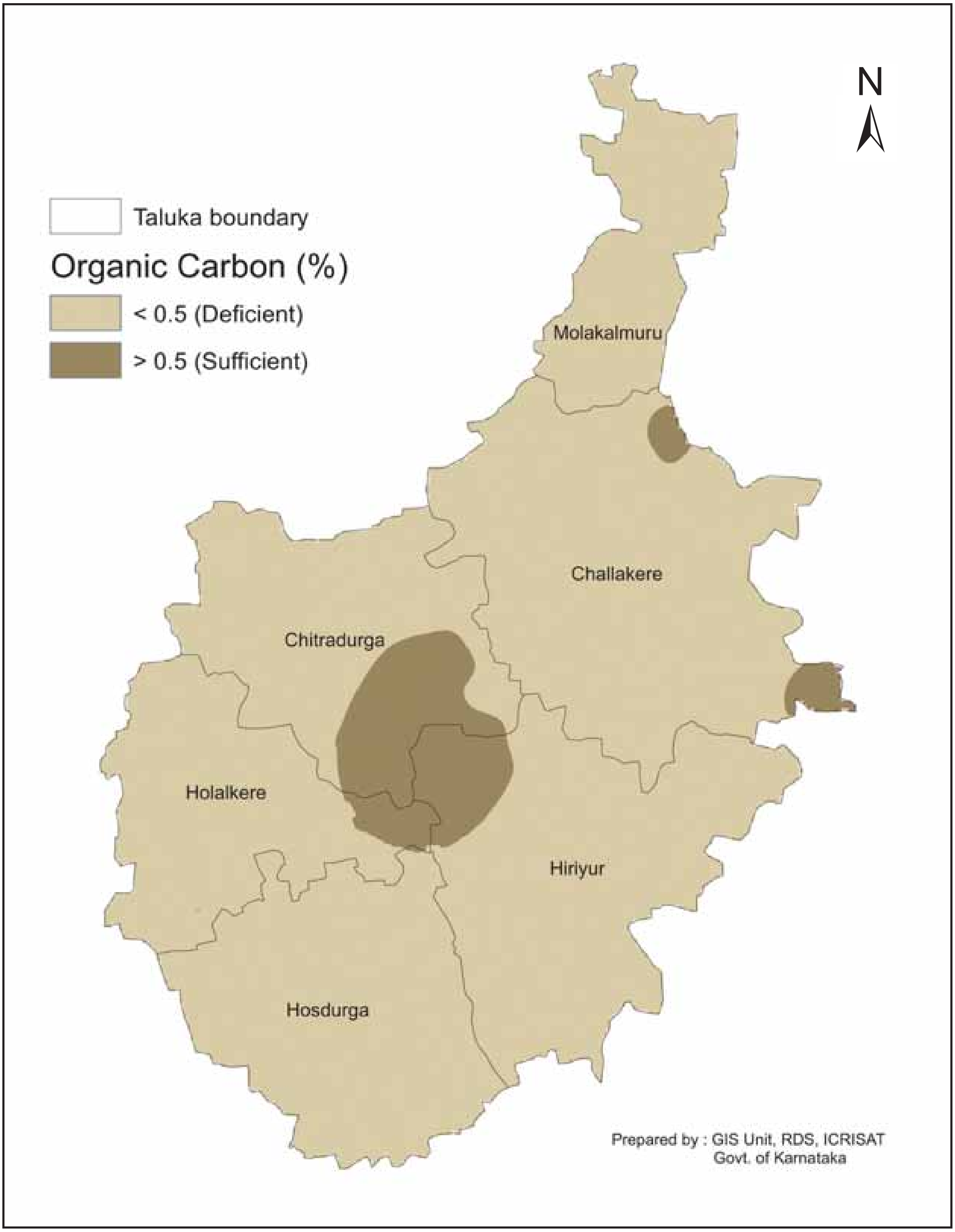


Figure 100. Organic carbon status in Chitradurga district

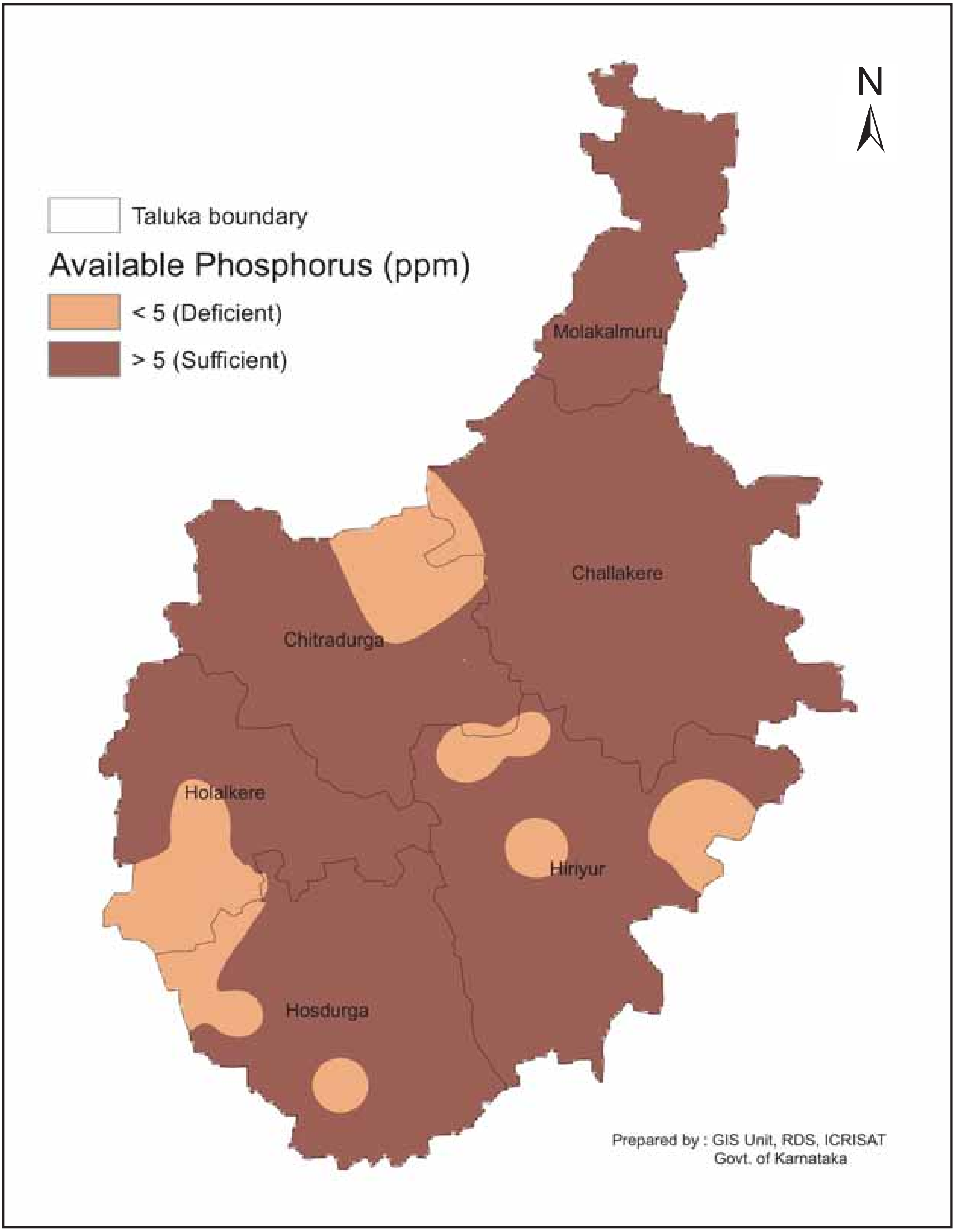


Figure 101. Available phosphorus status in Chitradurga district

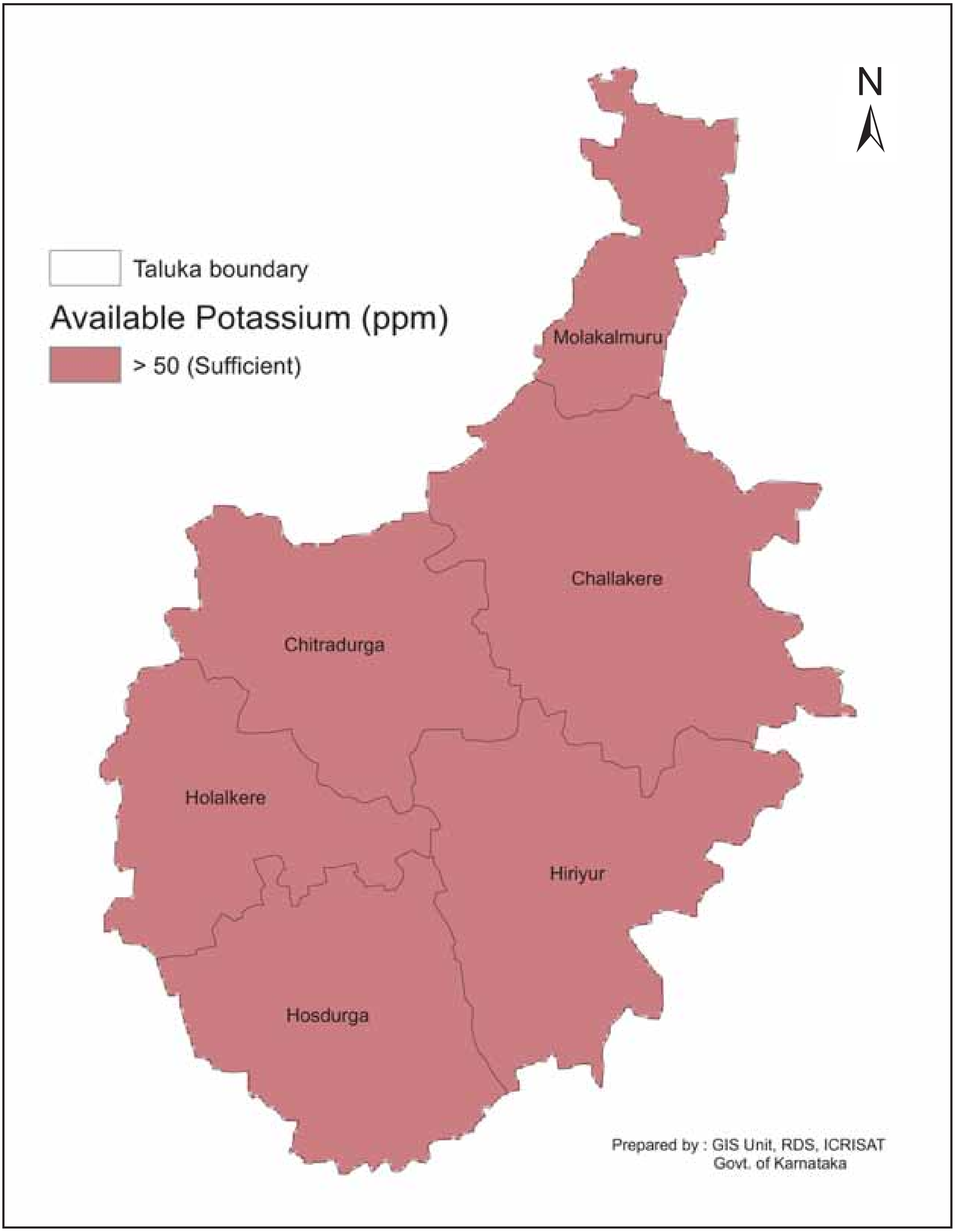


Figure 102. Available potassium status in Chitradurga district

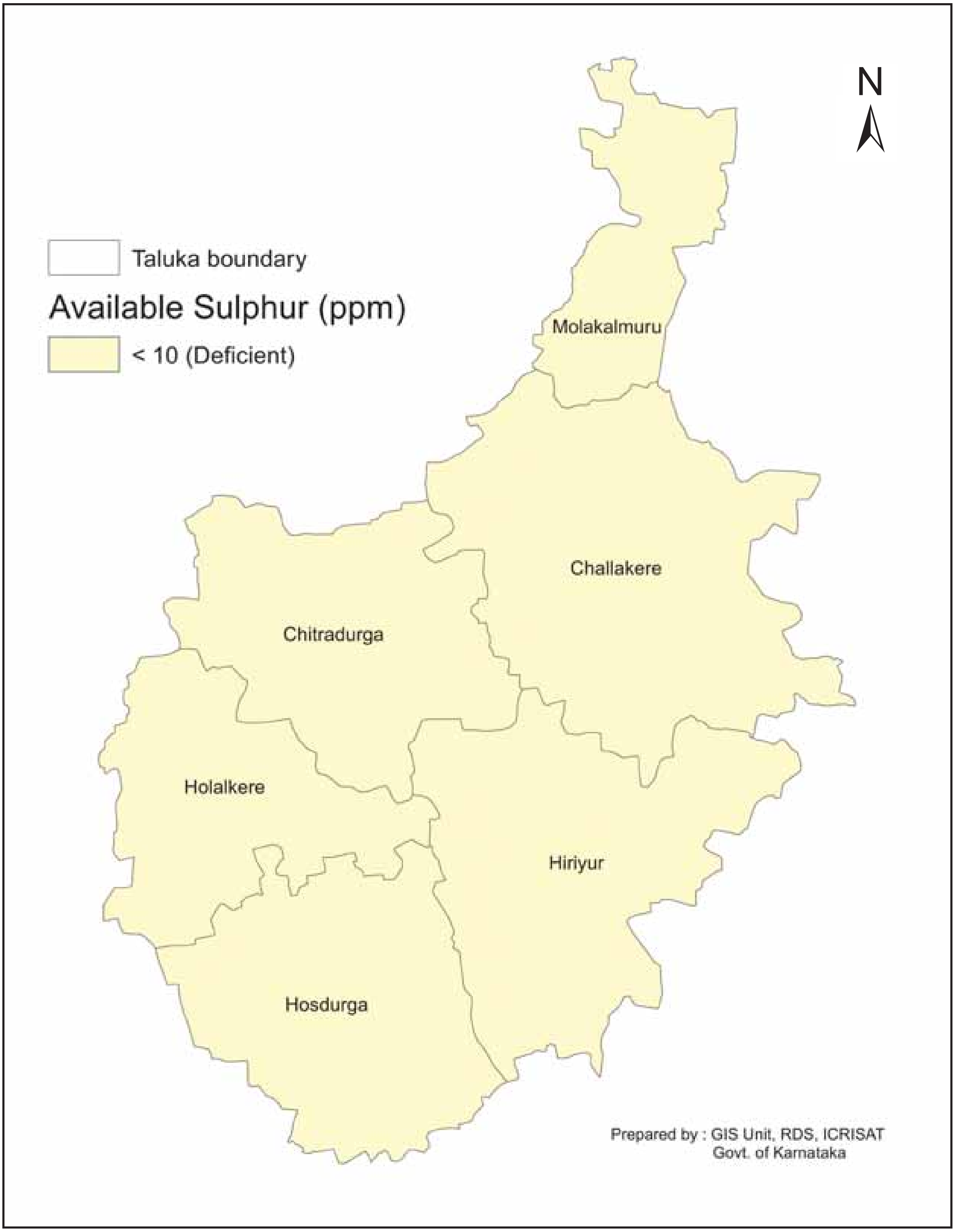


Figure 103. Available sulphur status in Chitradurga district

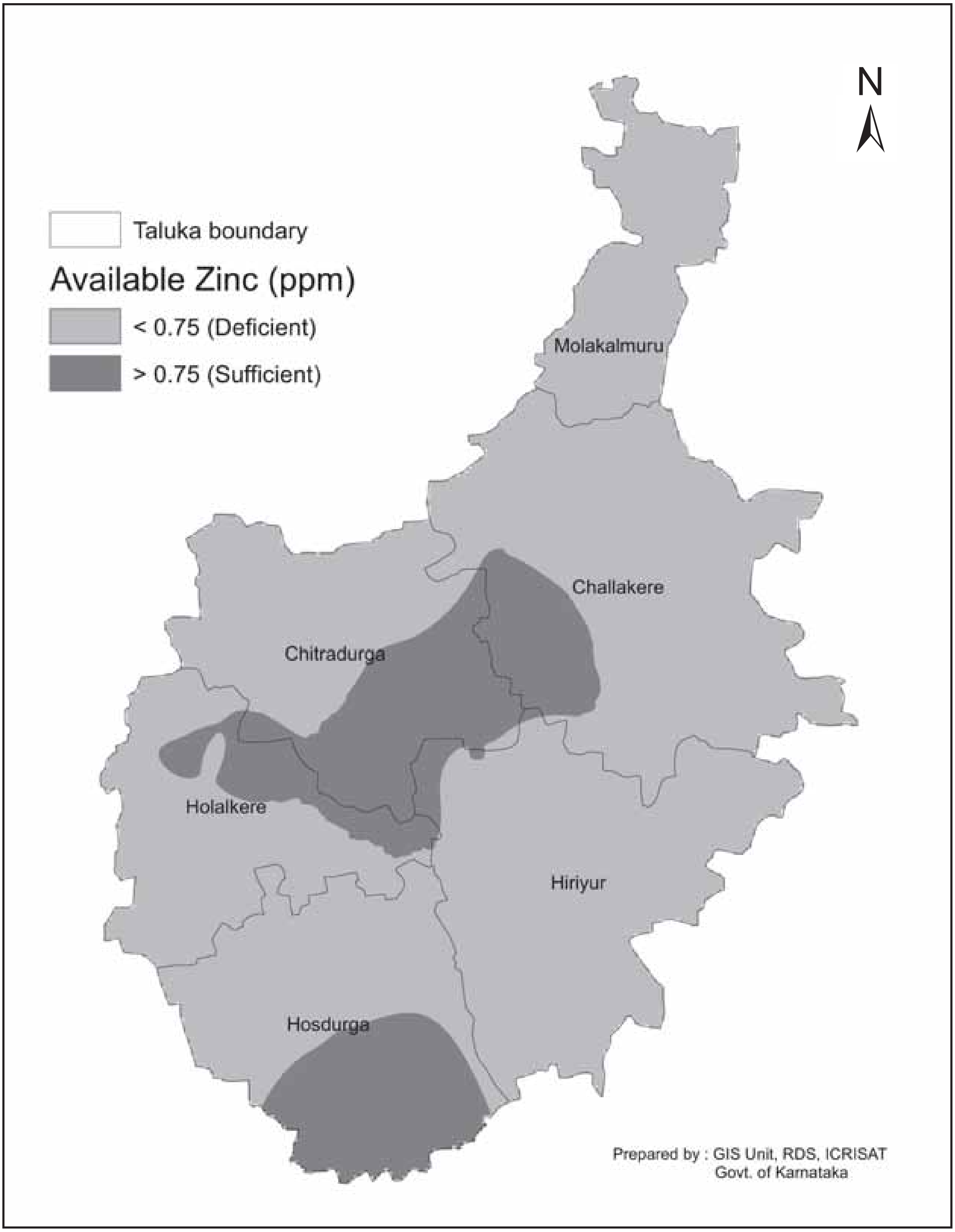


Figure 104. Available zinc status in Chitradurga district

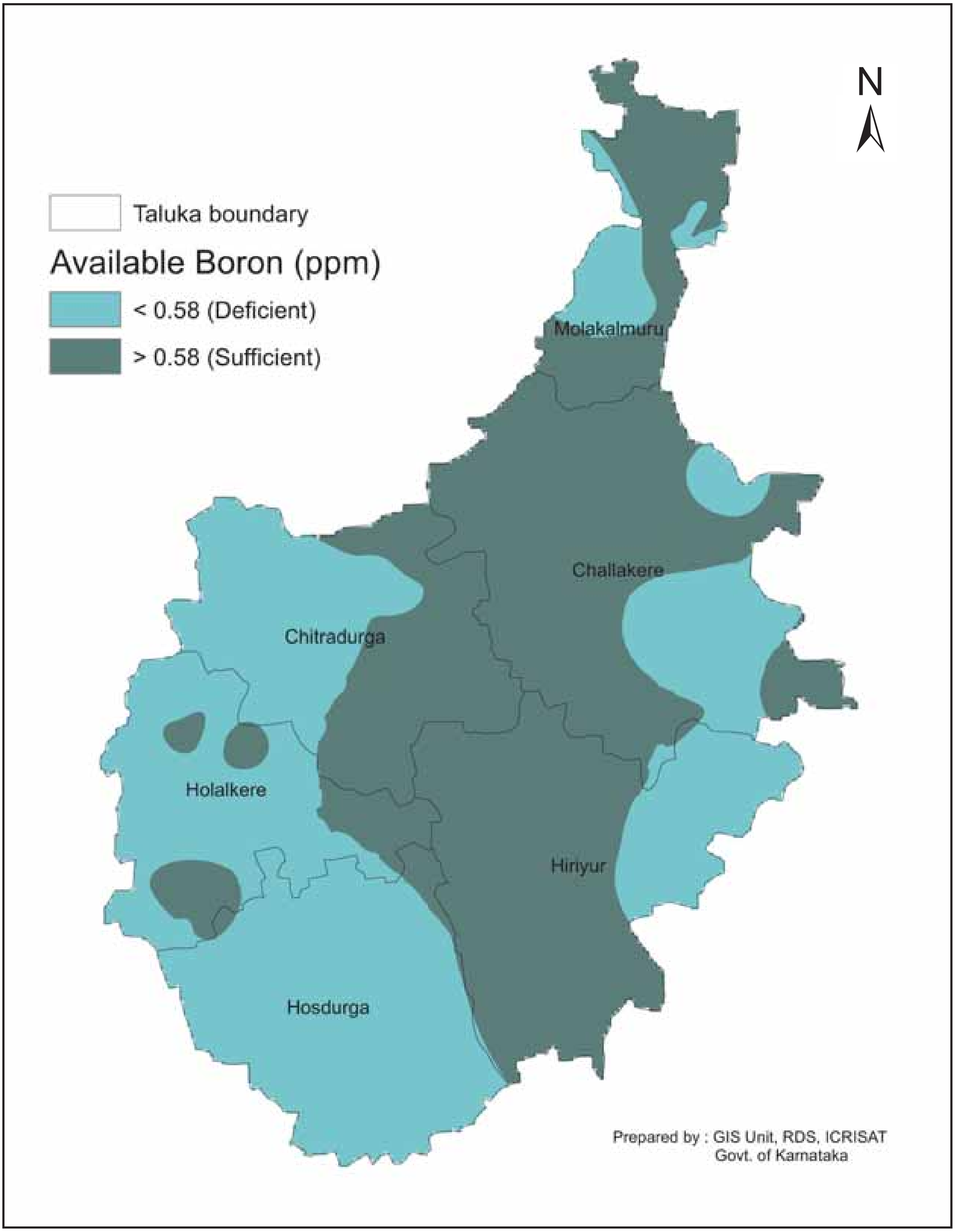


Figure 105. Available boron status in Chitradurga district

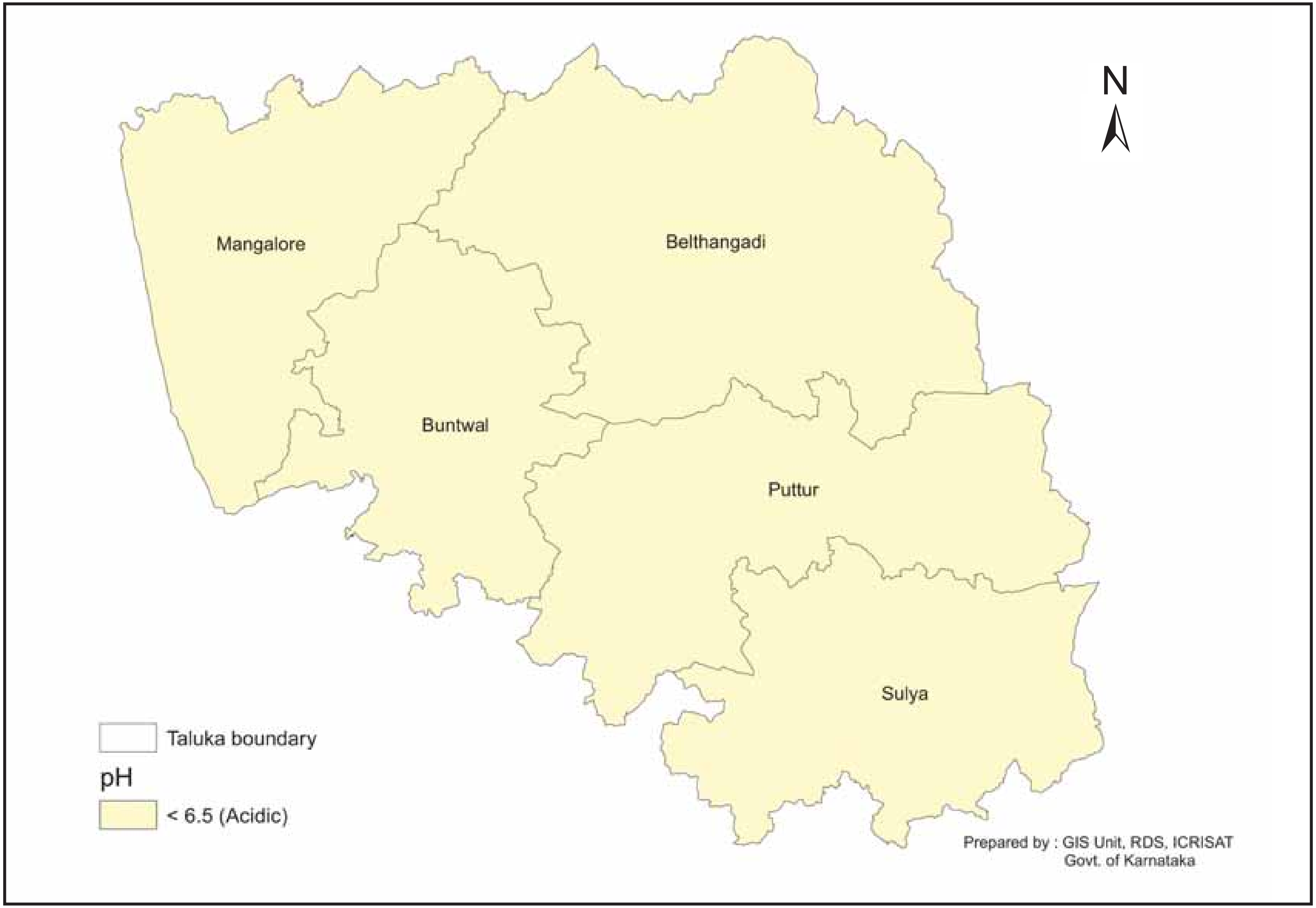


Figure 106. pH status in Dakshina Kannada district

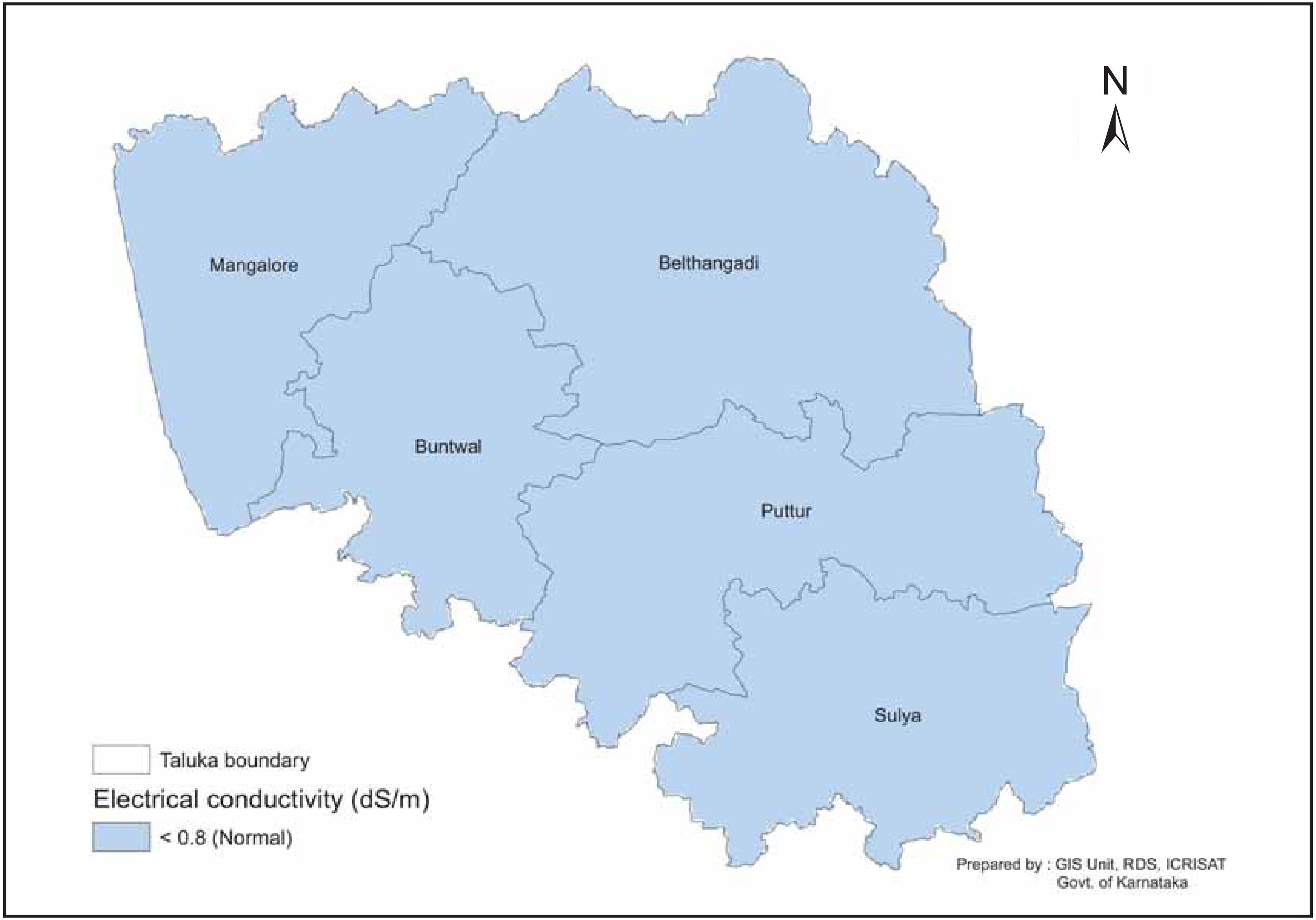


Figure 107. Electrical conductivity status in Dakshina Kannada district

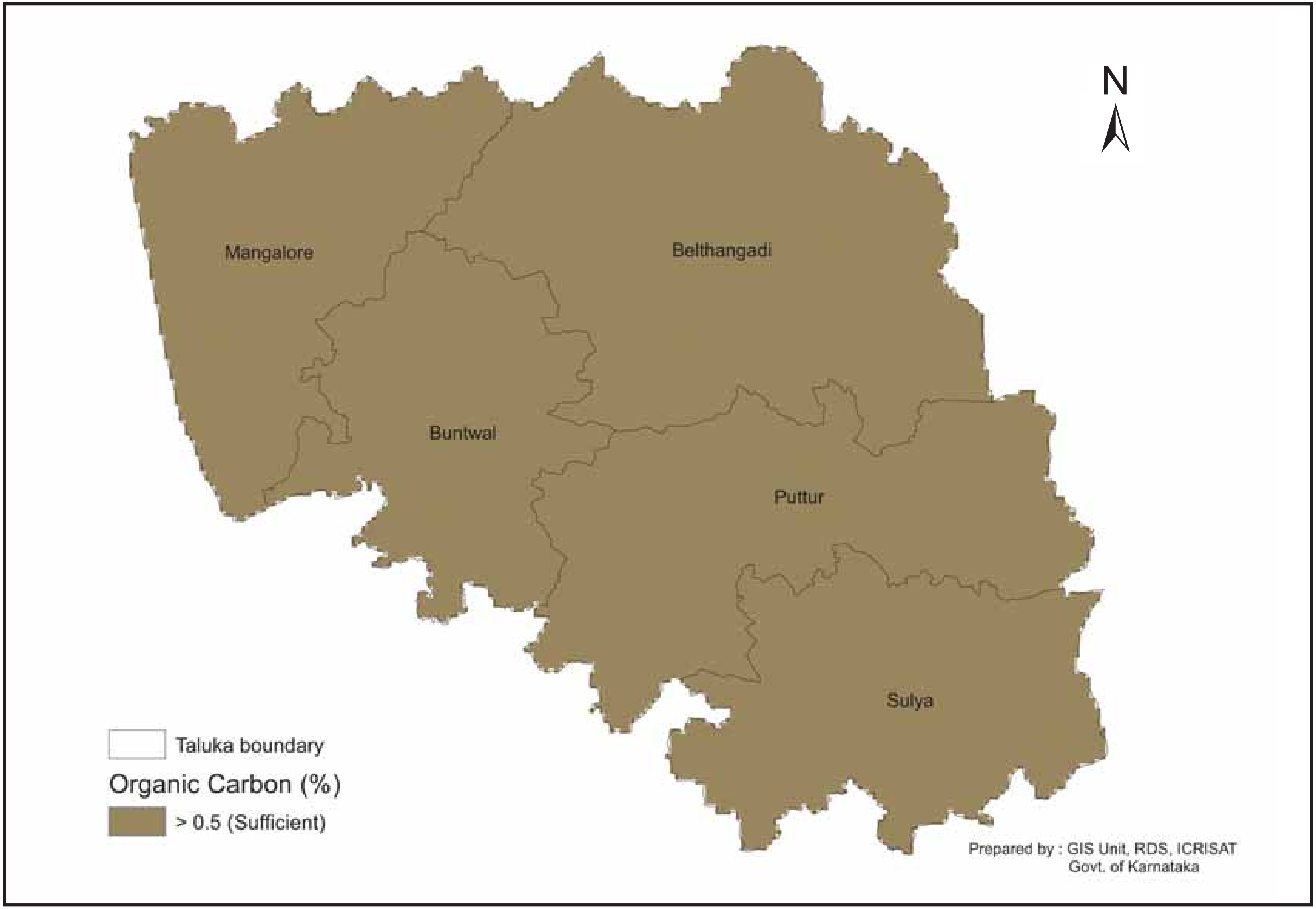


Figure 108. Organic carbon status in Dakshina Kannada district

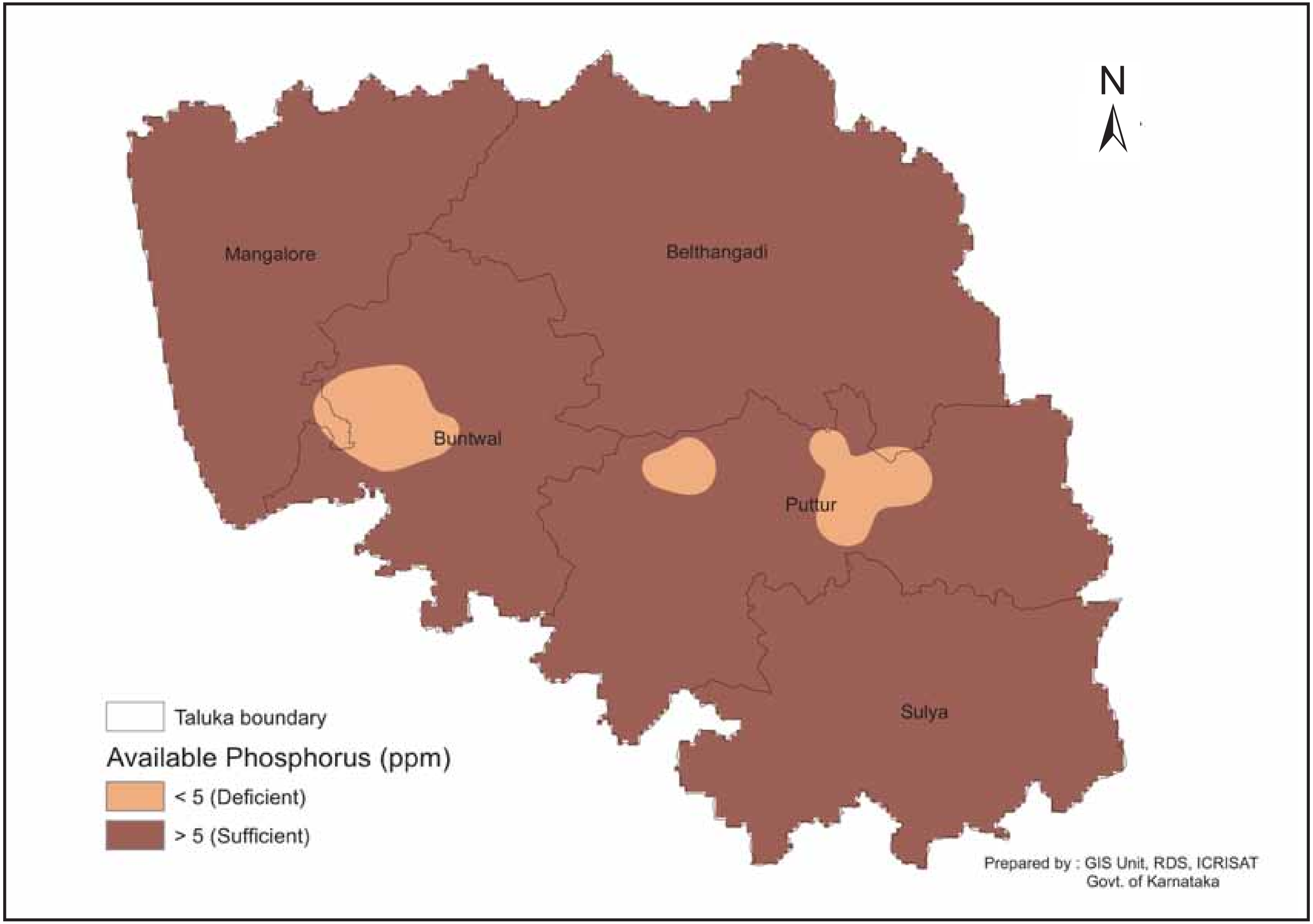


Figure 109. Available phosphorus status in Dakshina Kannada district

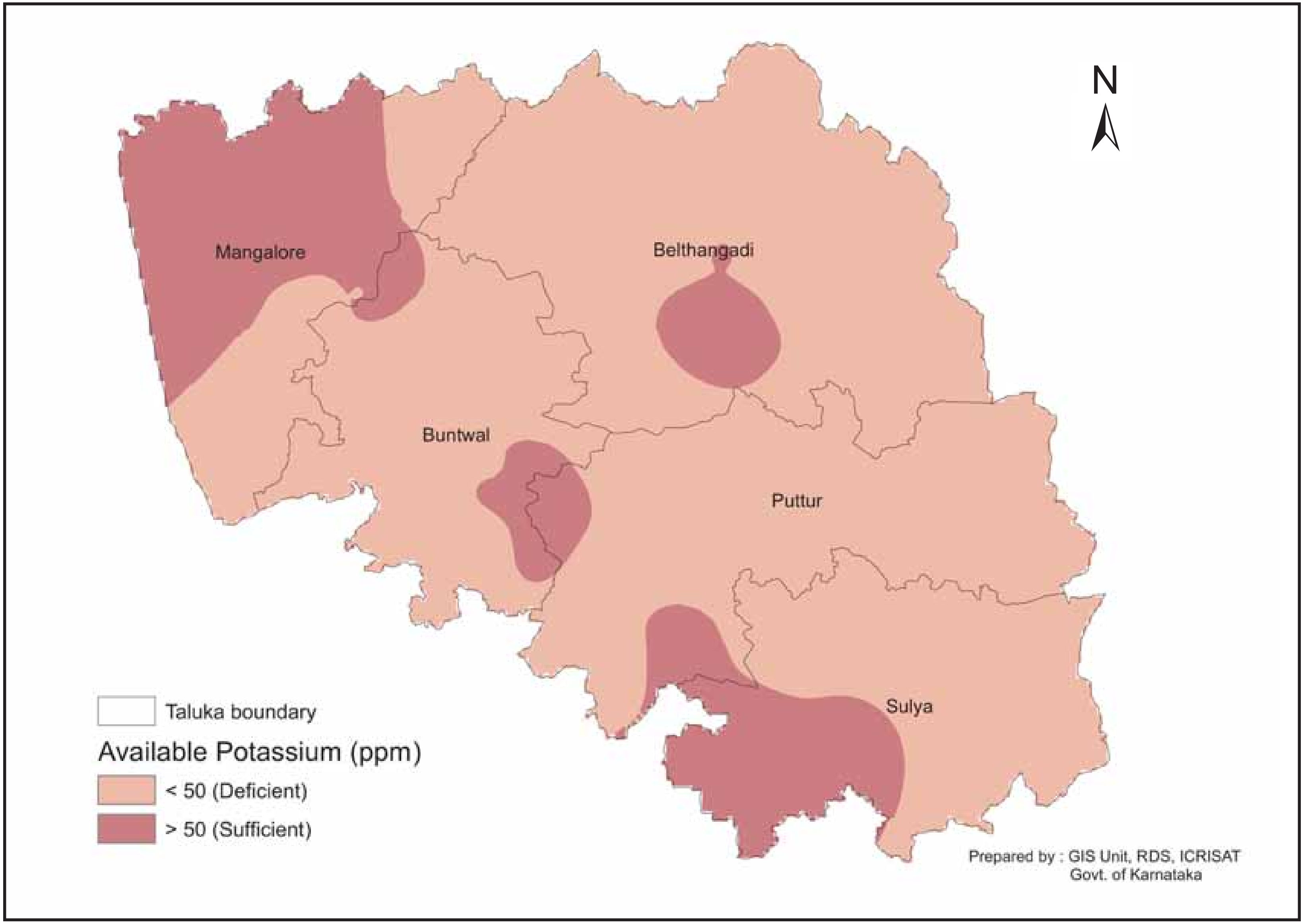


Figure 110. Available potassium status in Dakshina Kannada district

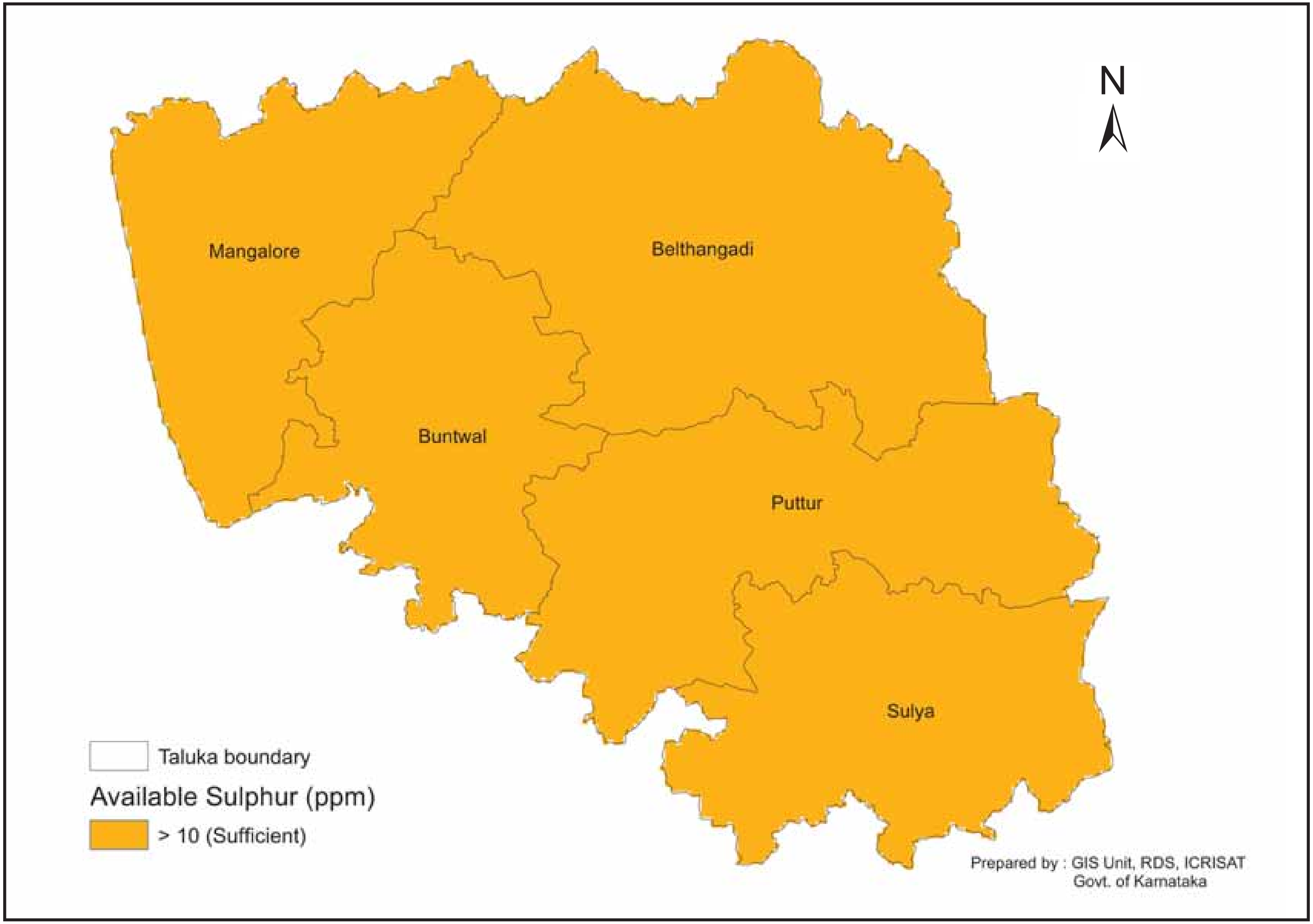


Figure 111. Available sulphur status in Dakshina Kannada district

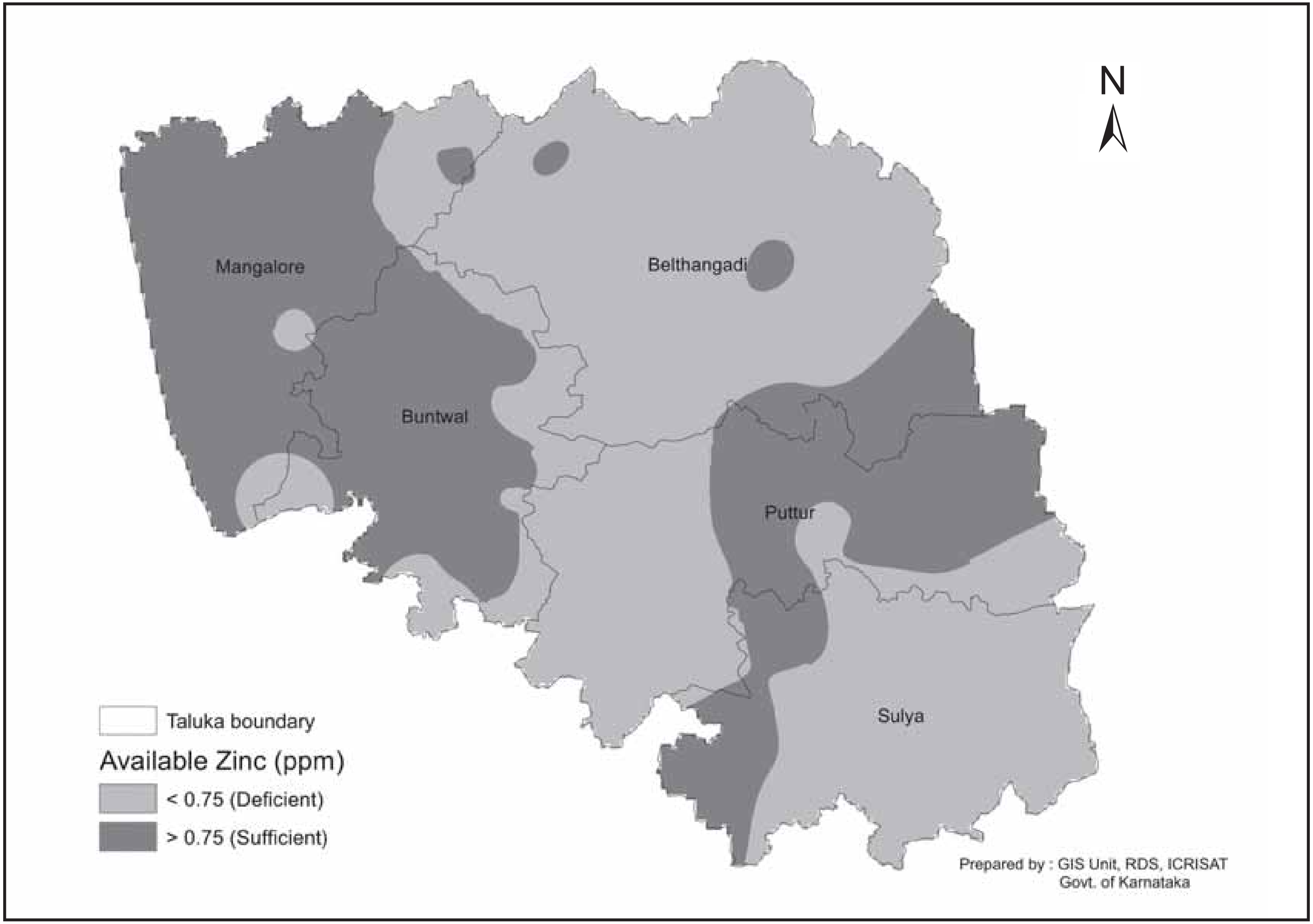


Figure 112. Available zinc status in Dakshina Kannada district

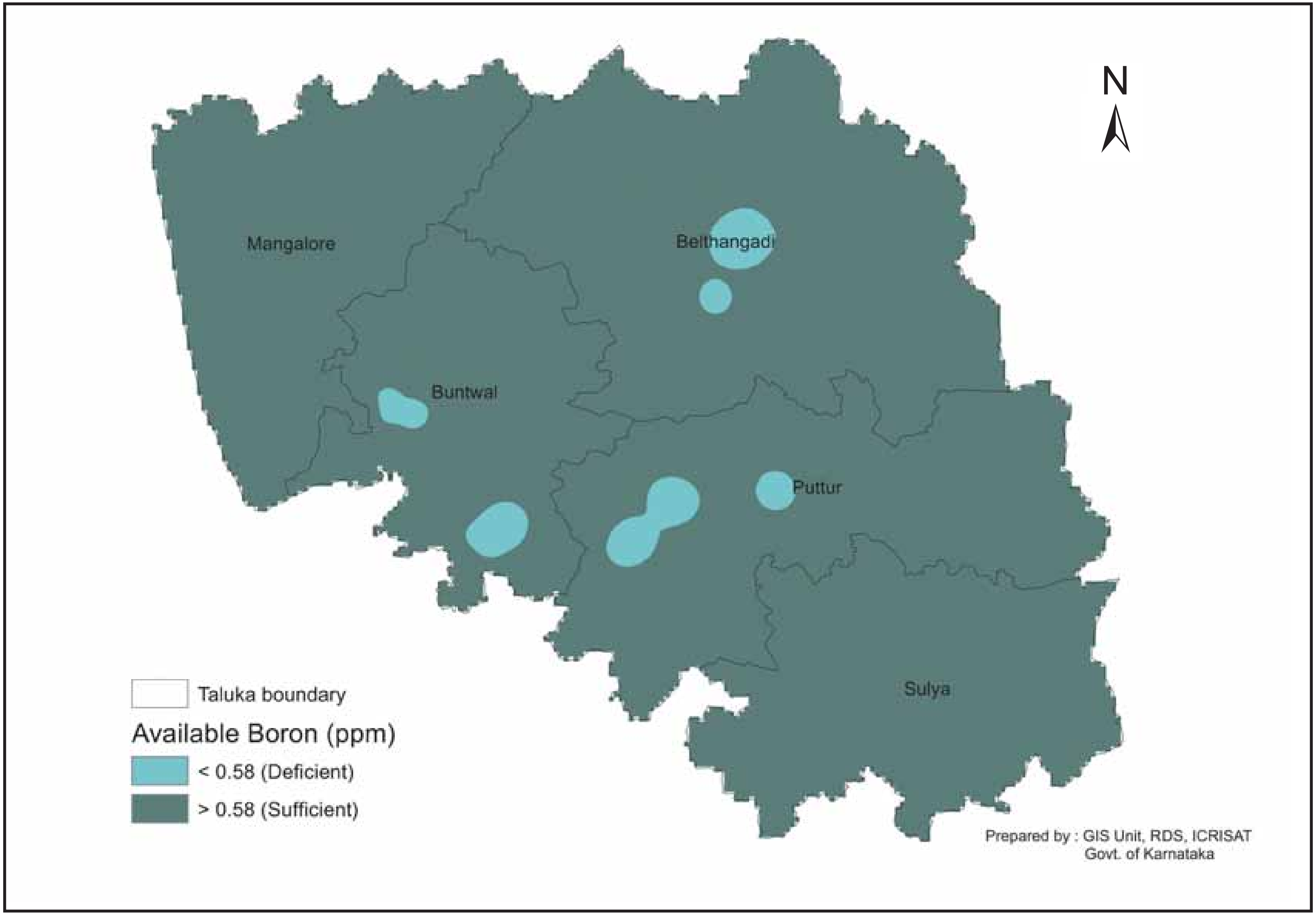


Figure 113. Available boron status in Dakshina Kannada district

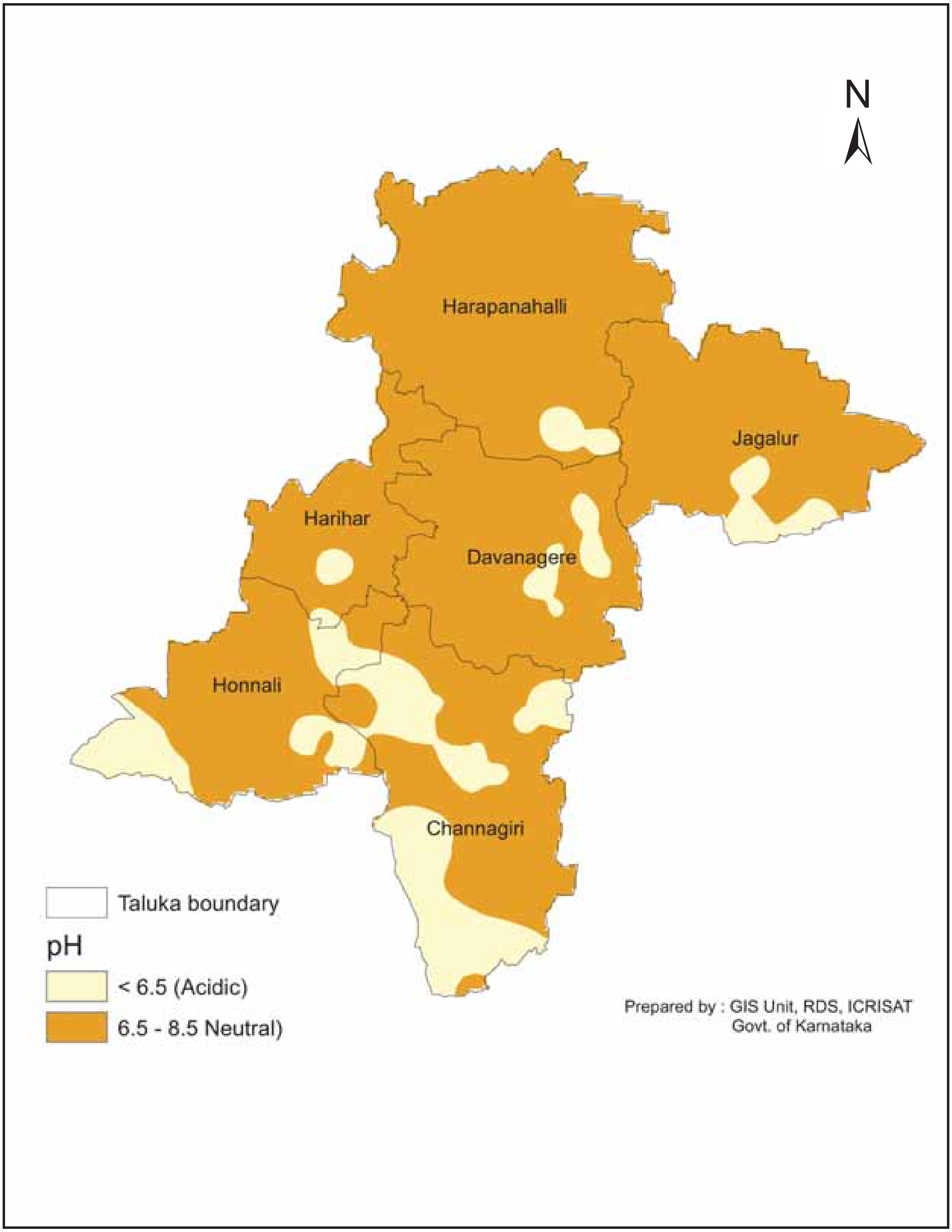


Figure 114. pH status in Davangere district

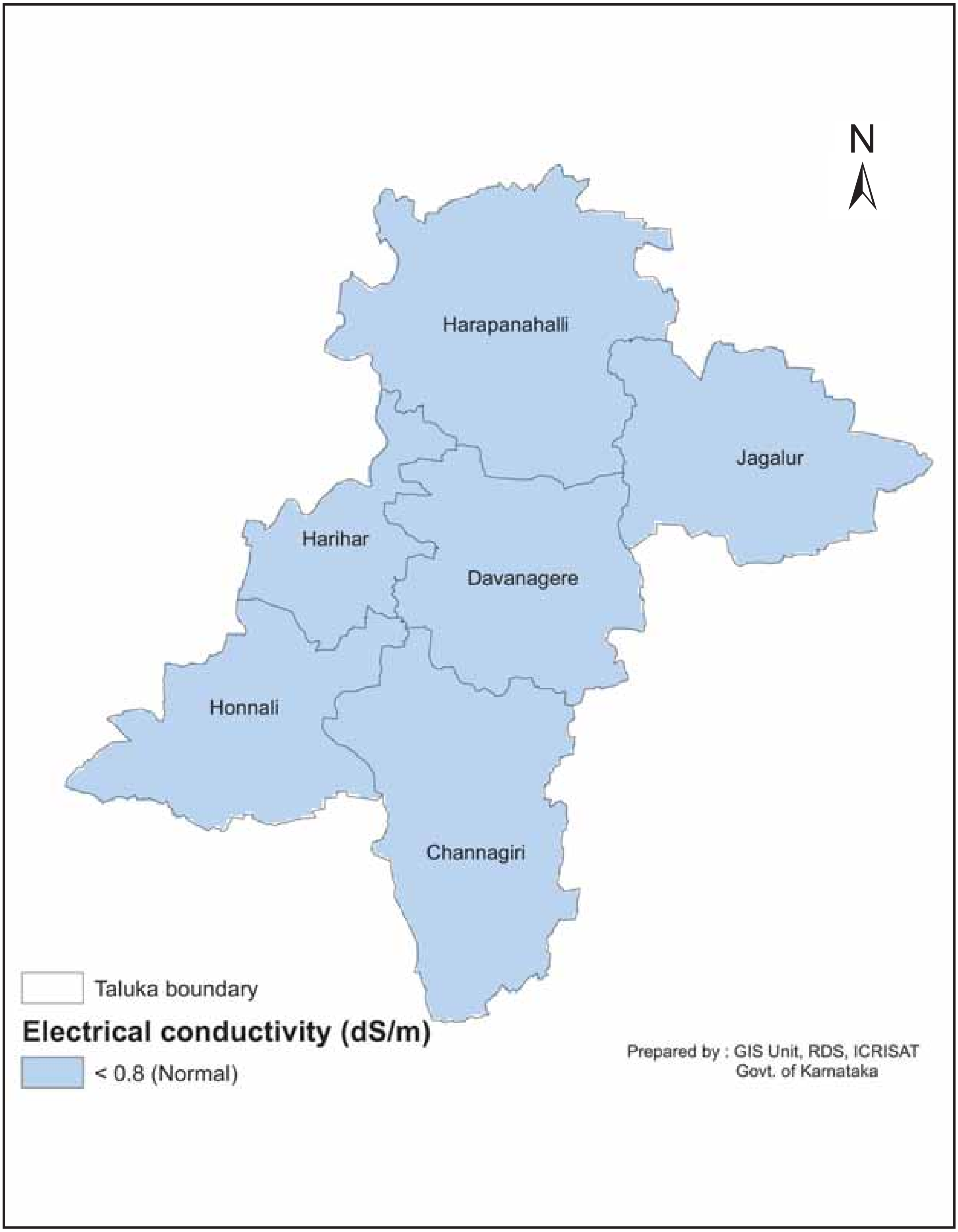


Figure 115. Electrical conductivity status in Davangere district

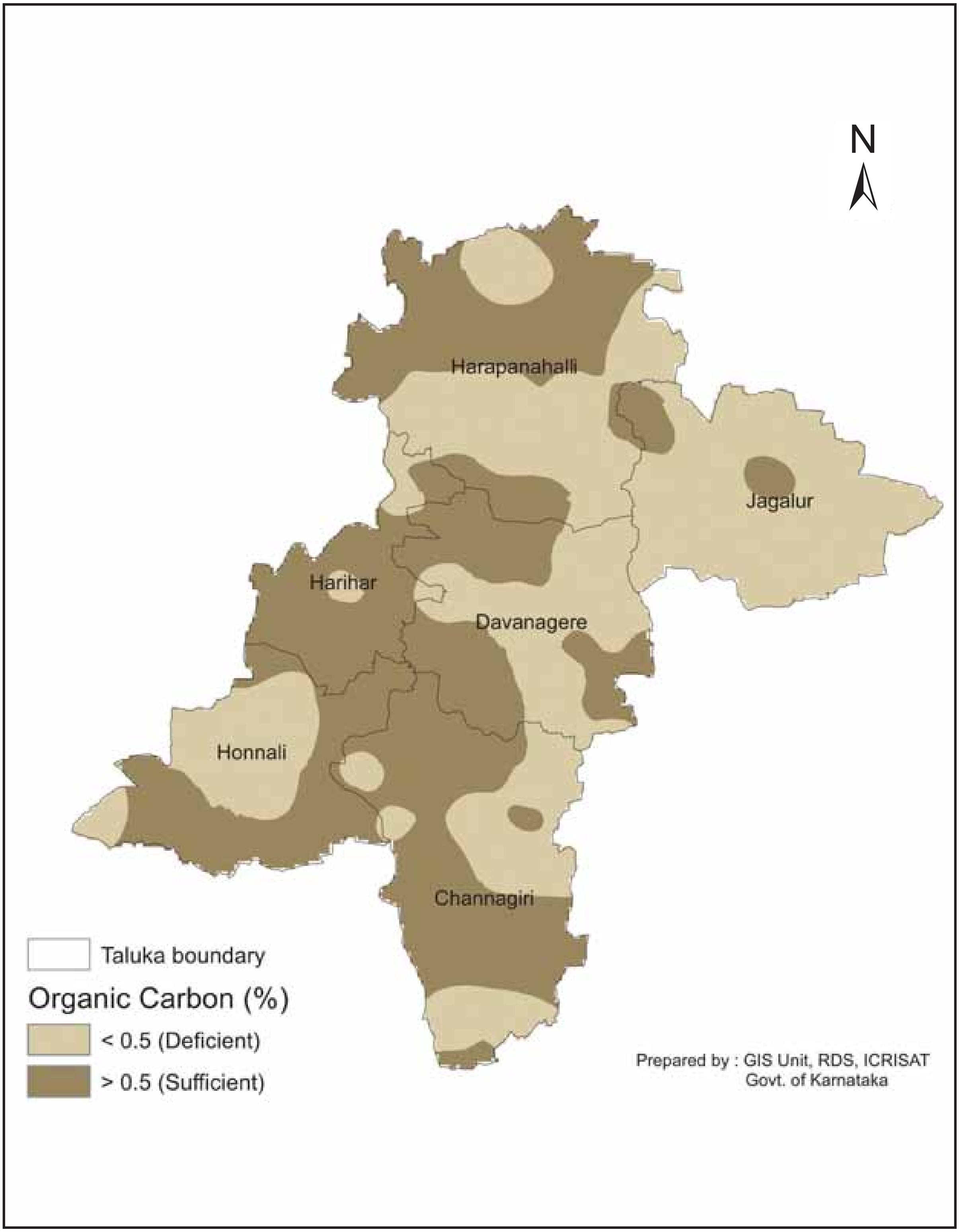


Figure 116. Organic carbon status in Davangere district

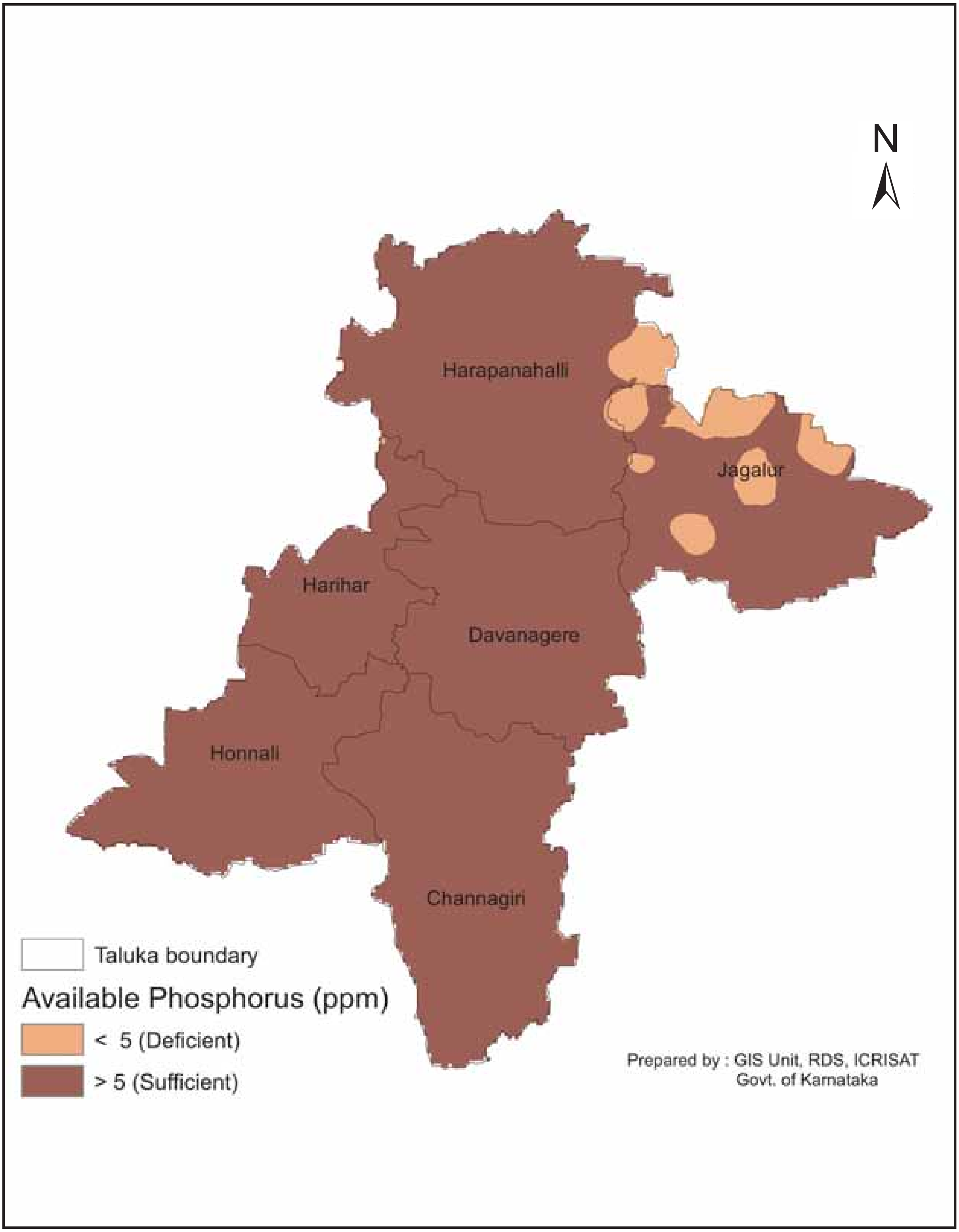


Figure 117. Available phosphorus status in Davangere district

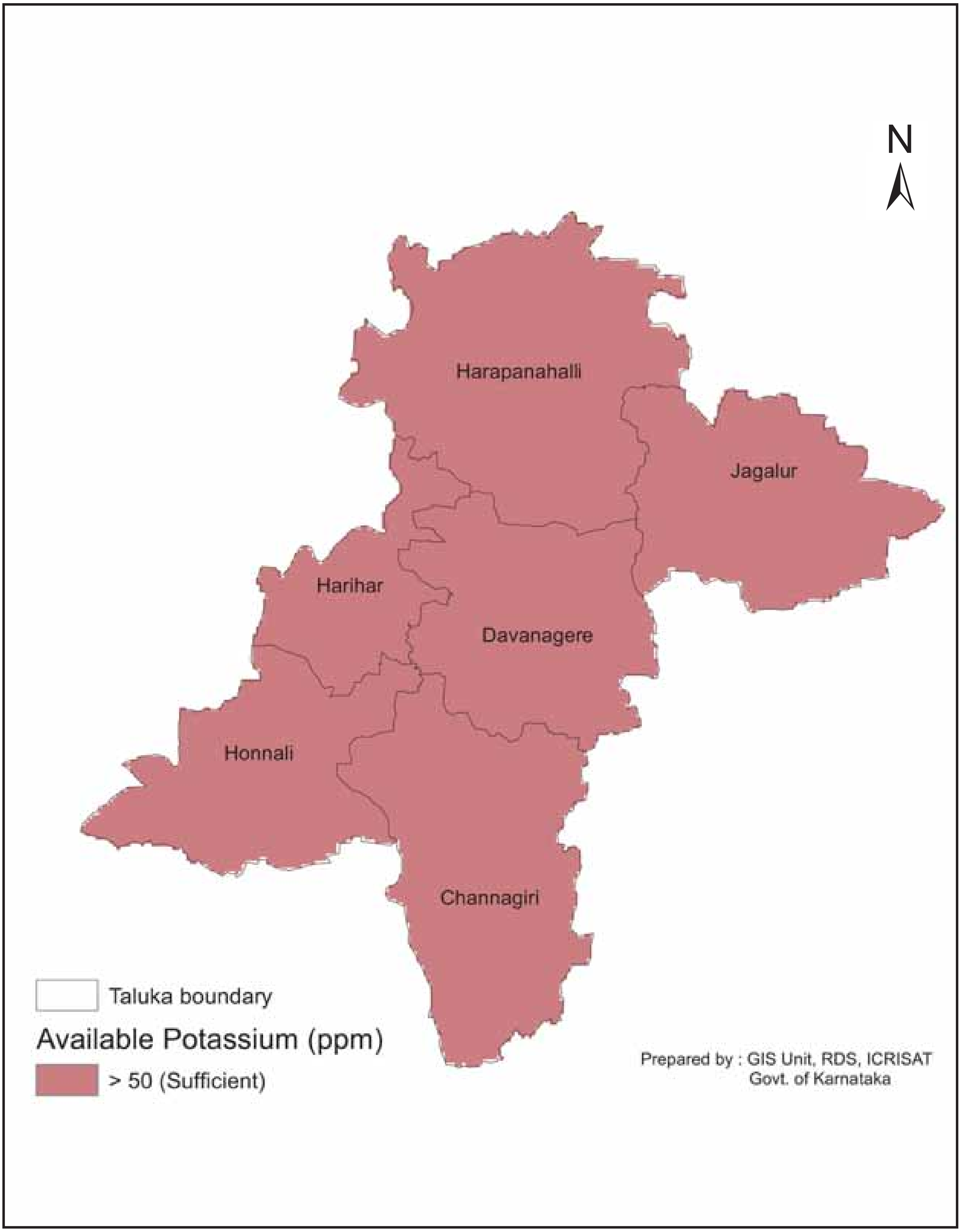


Figure 118. Available potassium status in Davangere district

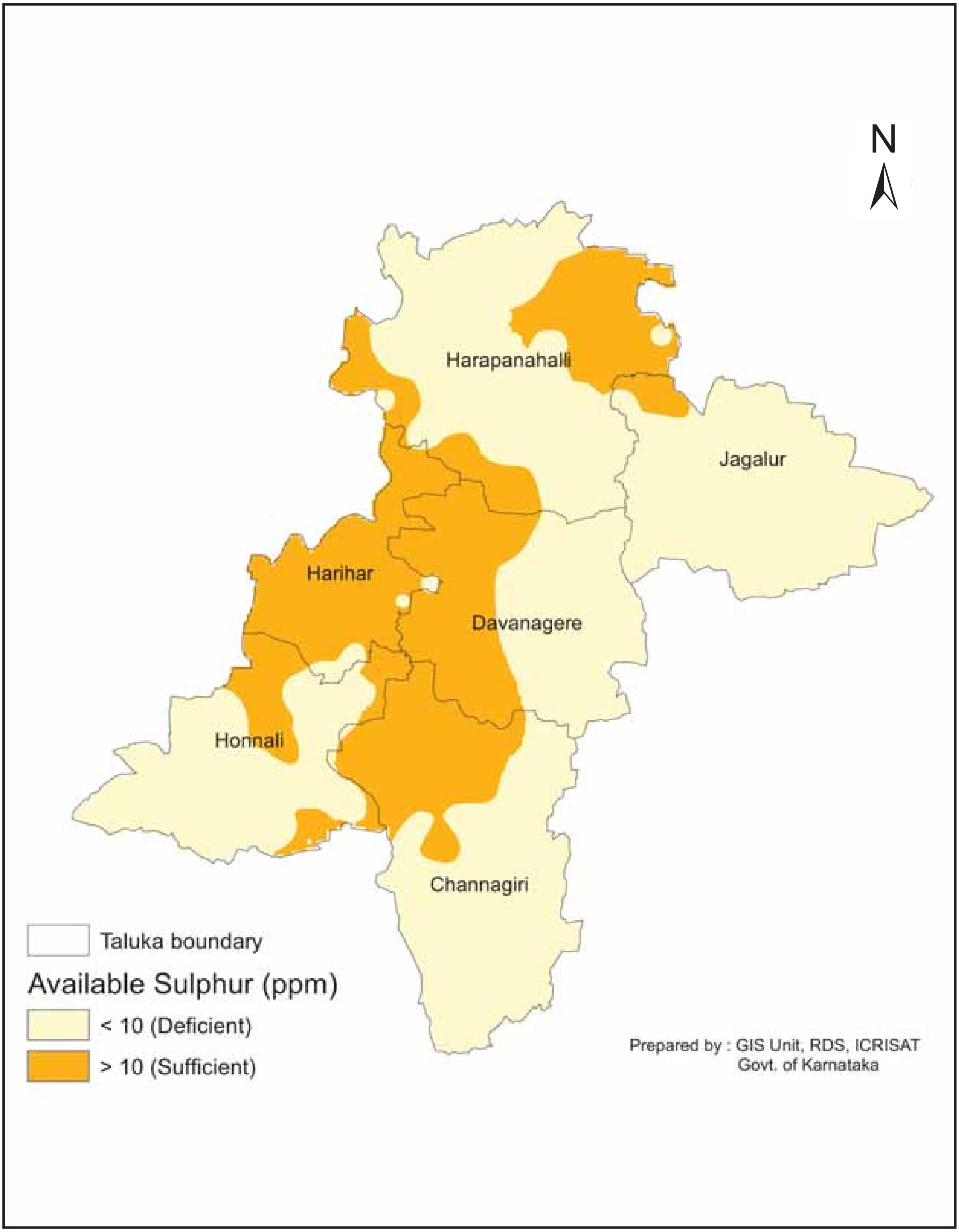


Figure 119. Available sulphur status in Davangere district

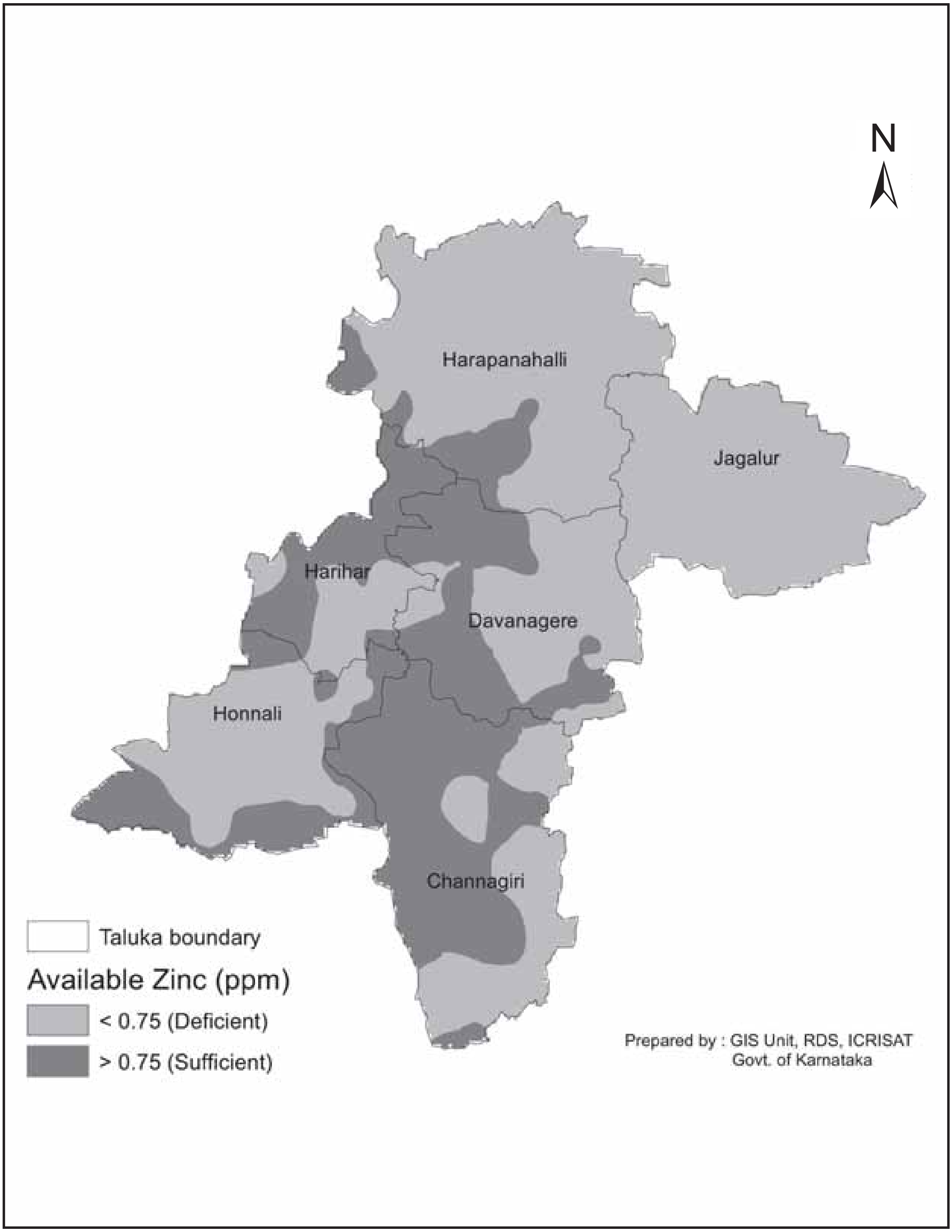


Figure 120. Available zinc status in Davangere district

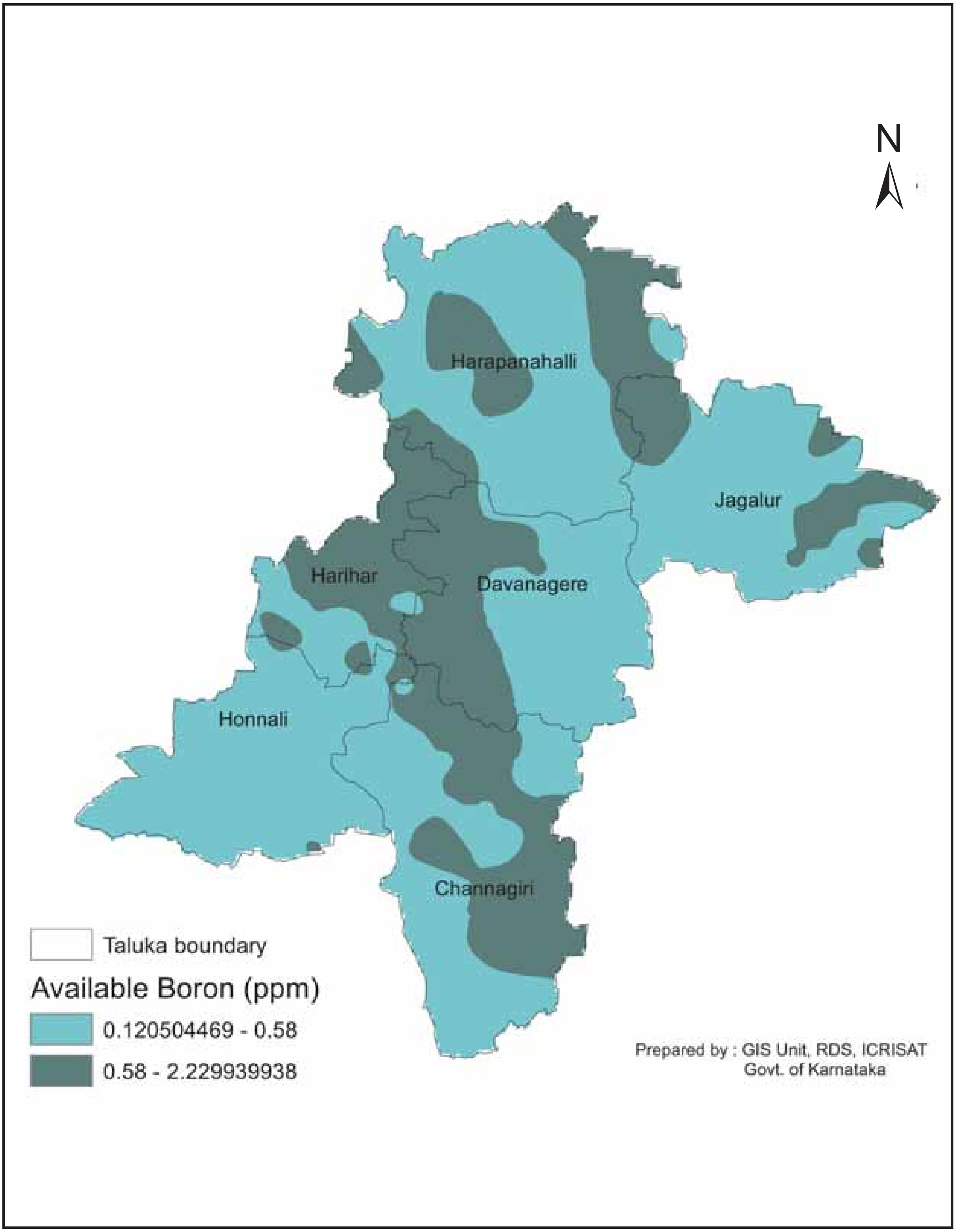


Figure 121. Available boron status in Davangere district

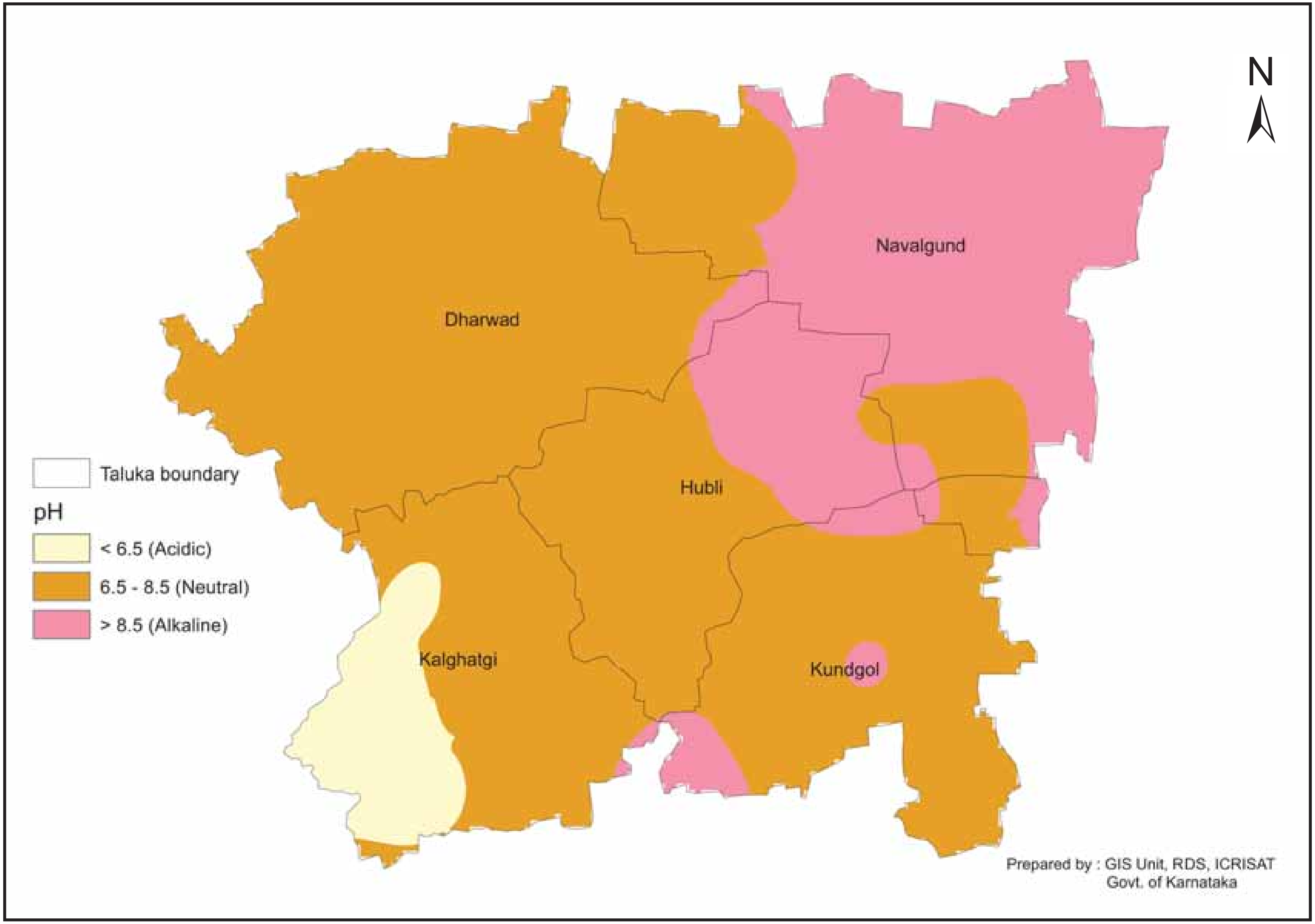


Figure 122. pH status in Dharwad district

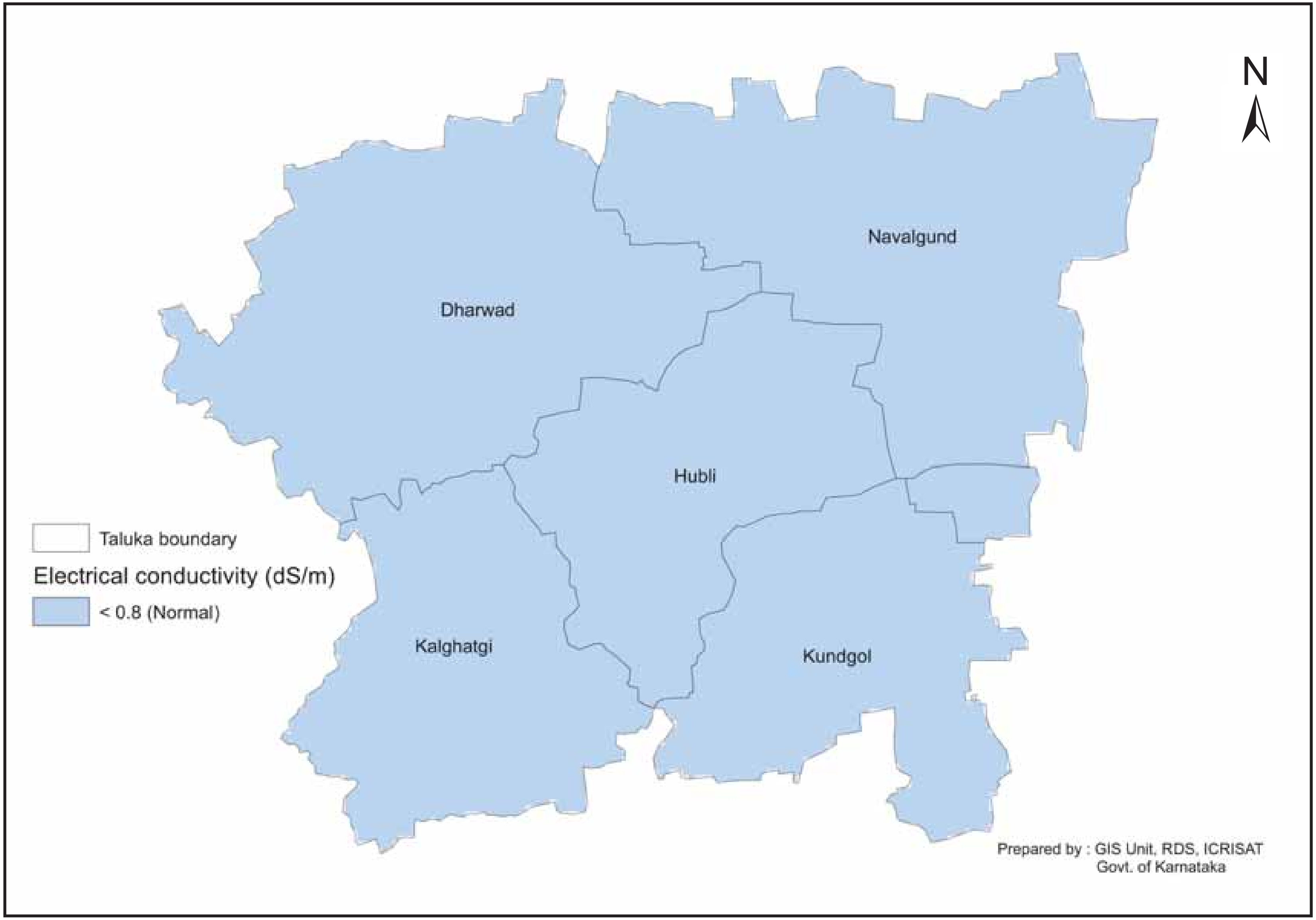


Figure 123. Electrical conductivity status in Dharwad district

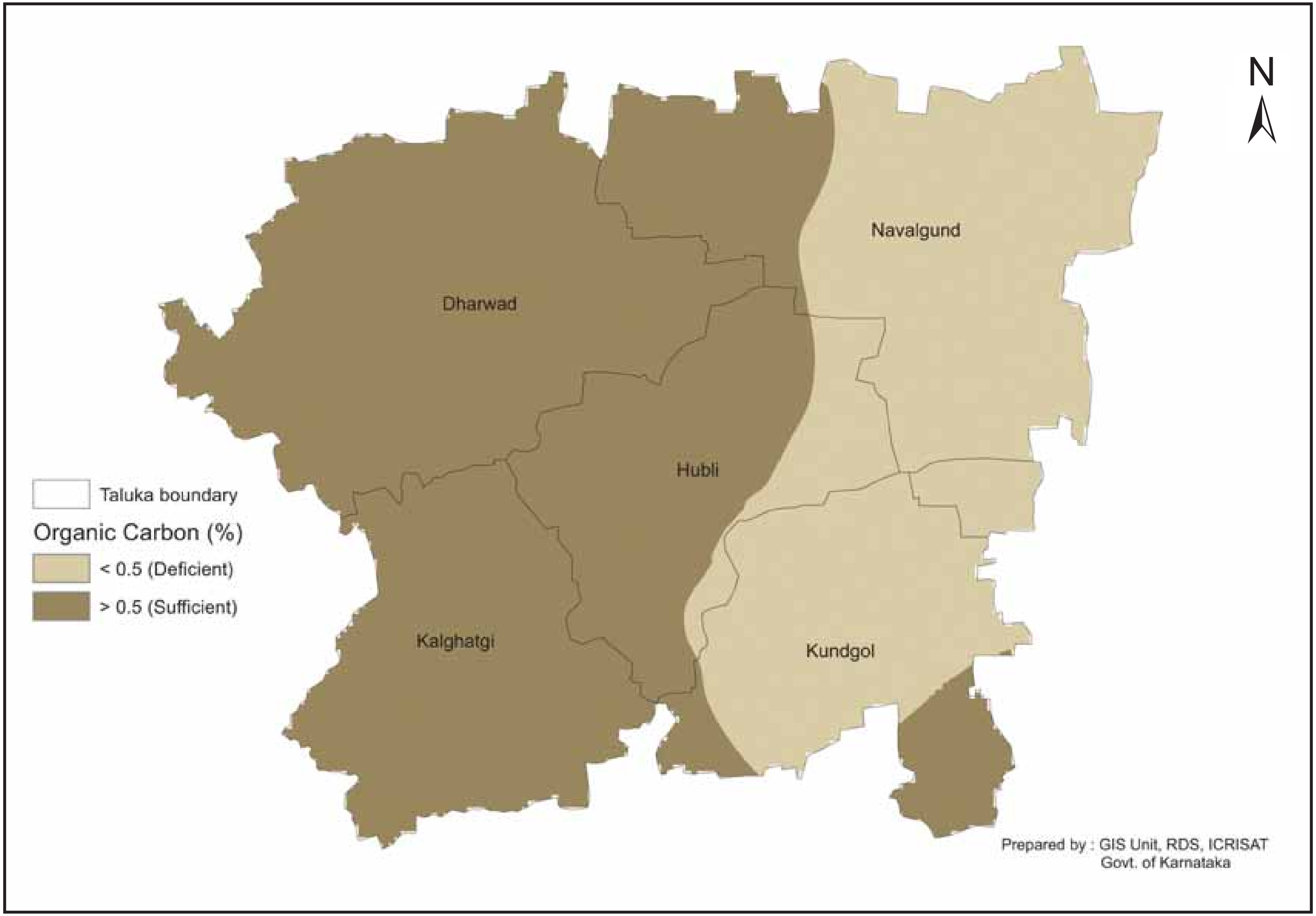


Figure 124. Organic carbon status in Dharwad district

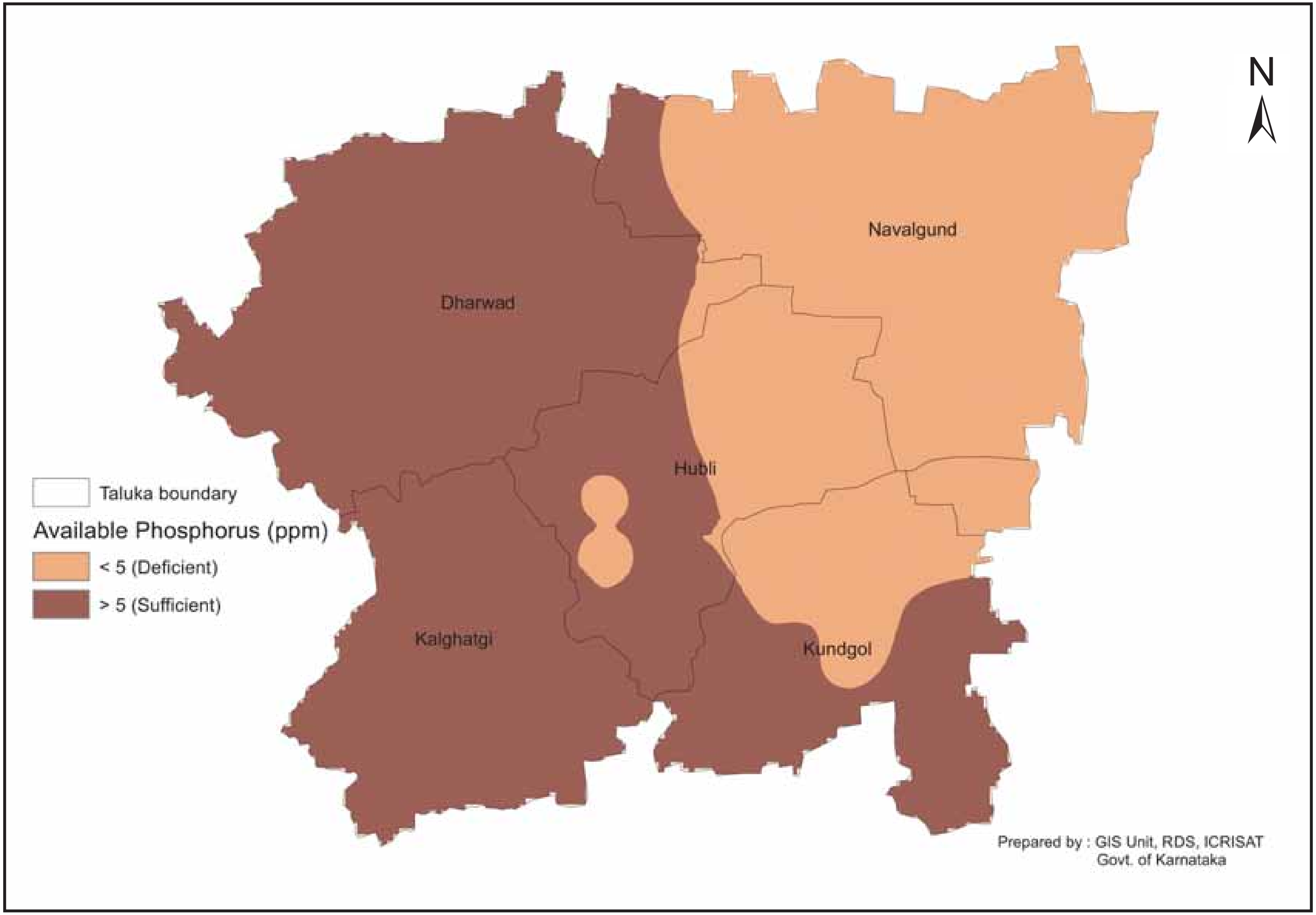


Figure 125. Available phosphorus status in Dharwad district

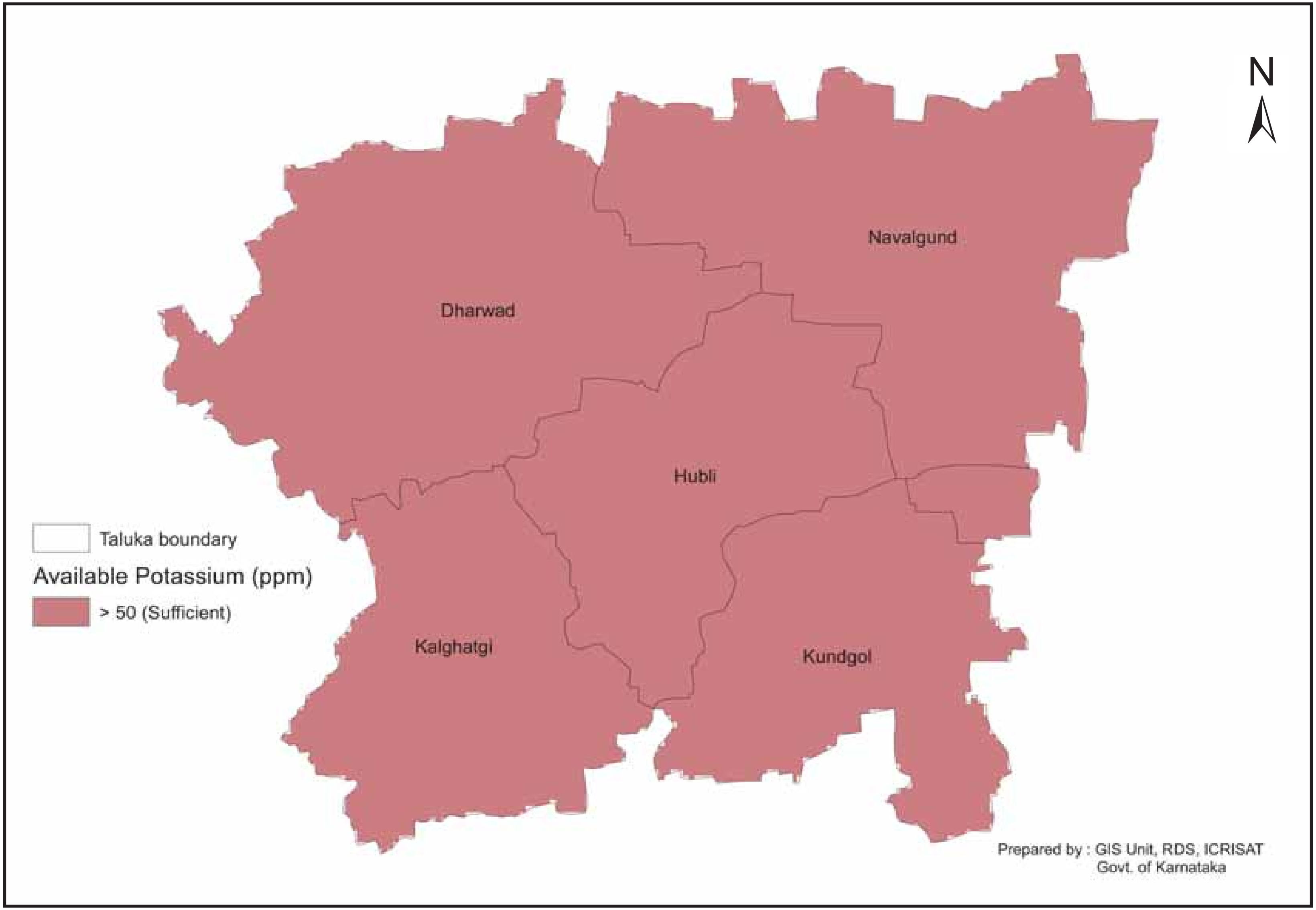


Figure 126. Available potassium status in Dharwad district

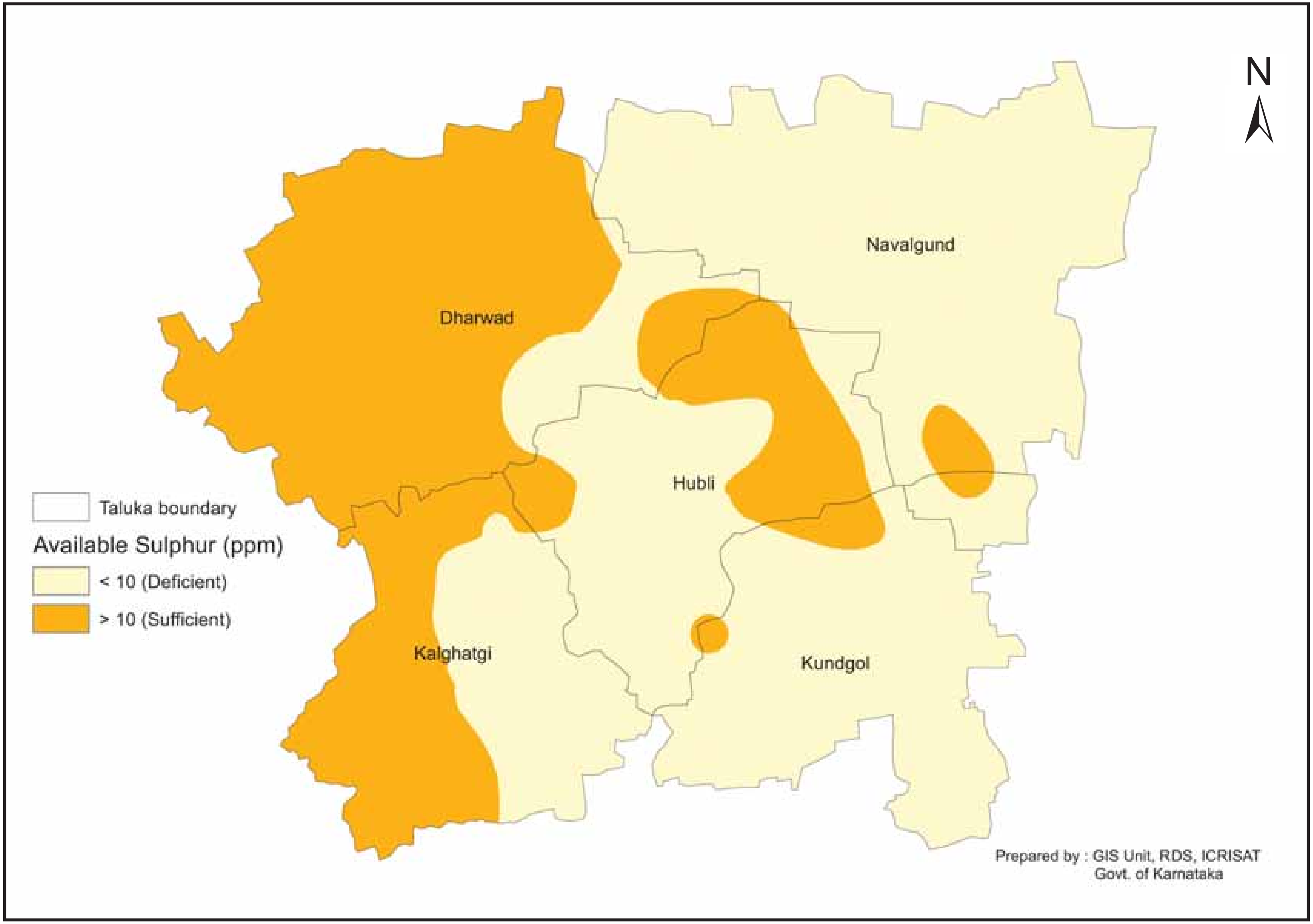


Figure 127. Available sulphur status in Dharwad district

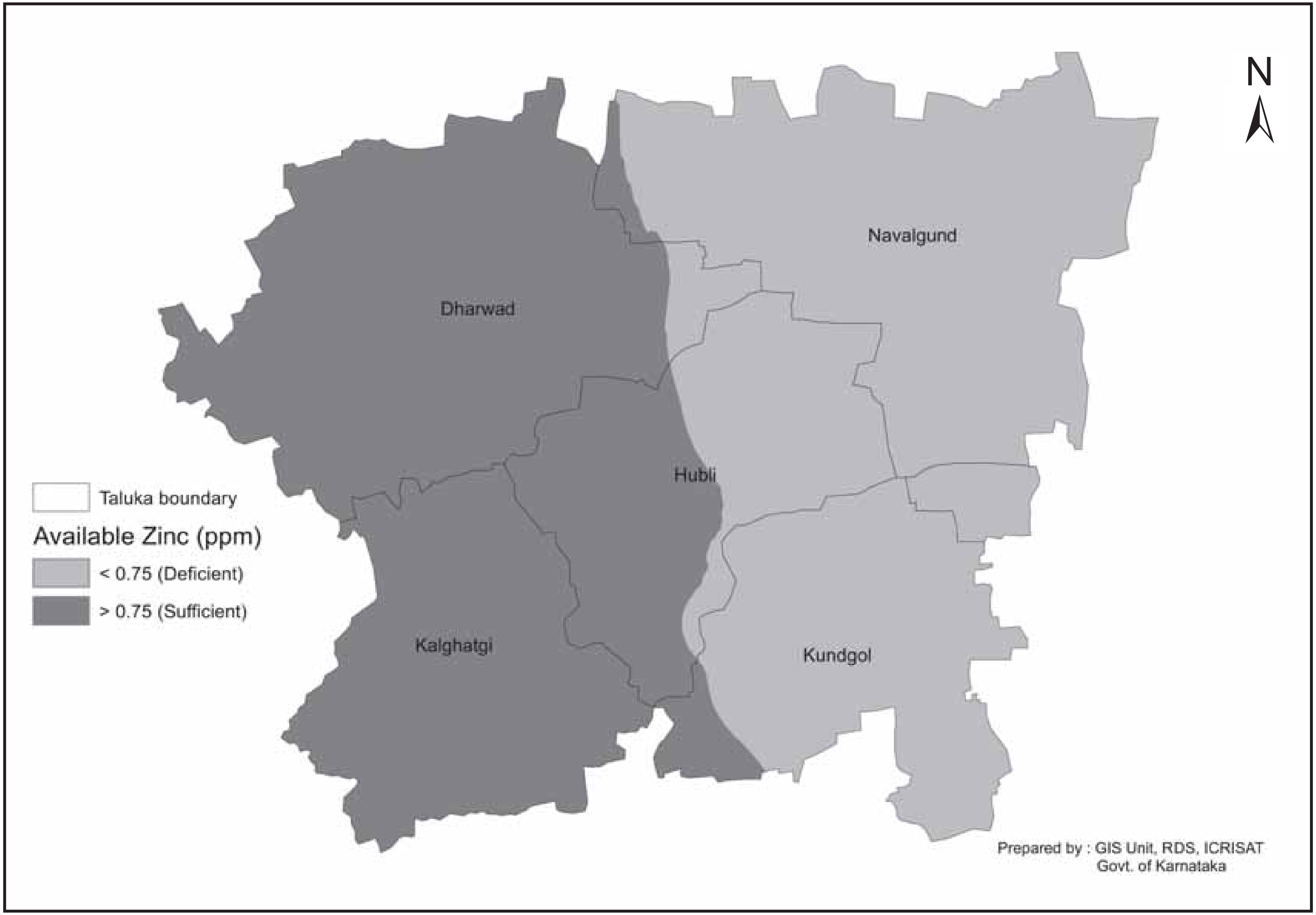


Figure 128. Available zinc status in Dharwad district

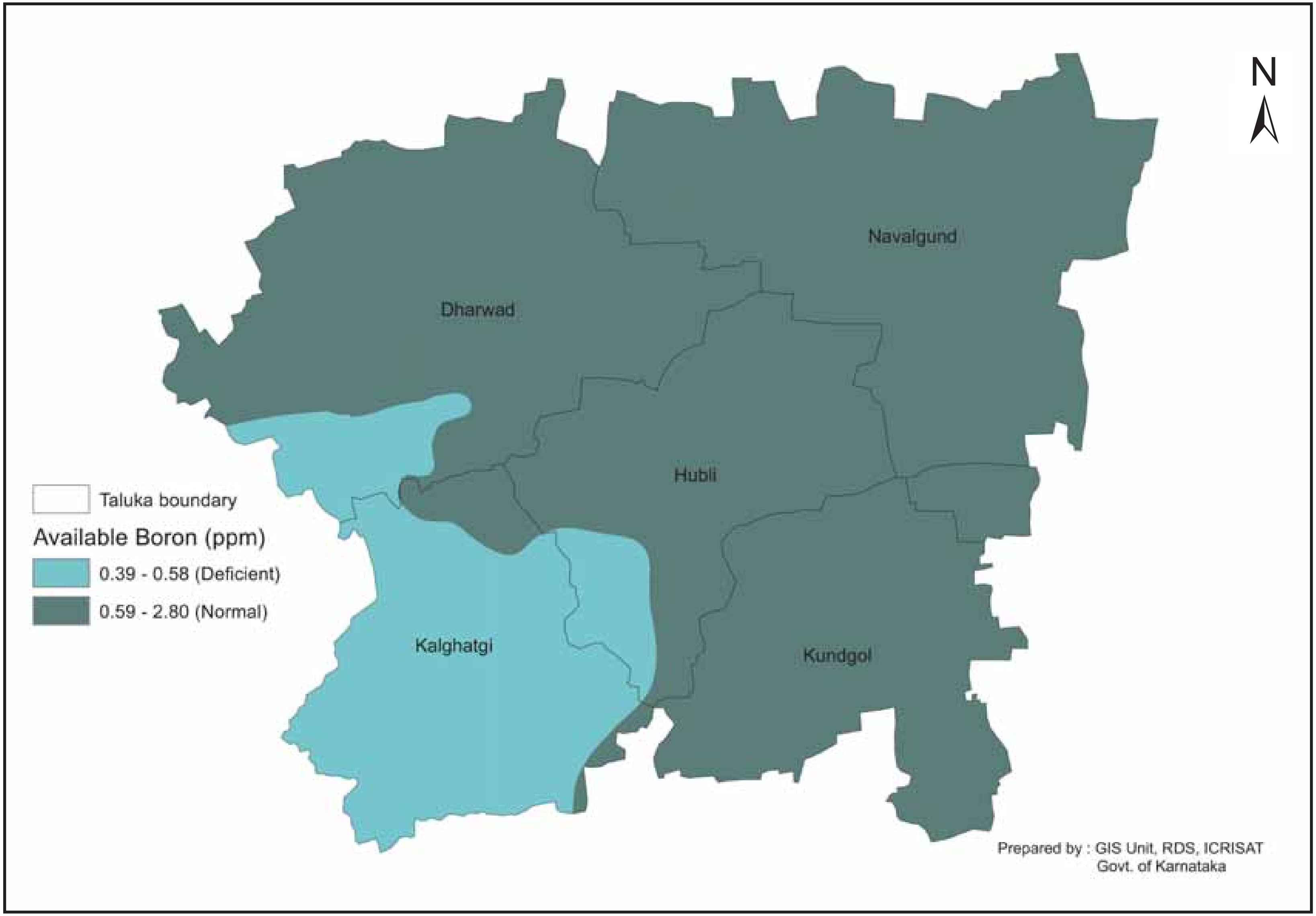


Figure 129. Available boron status in Dharwad district

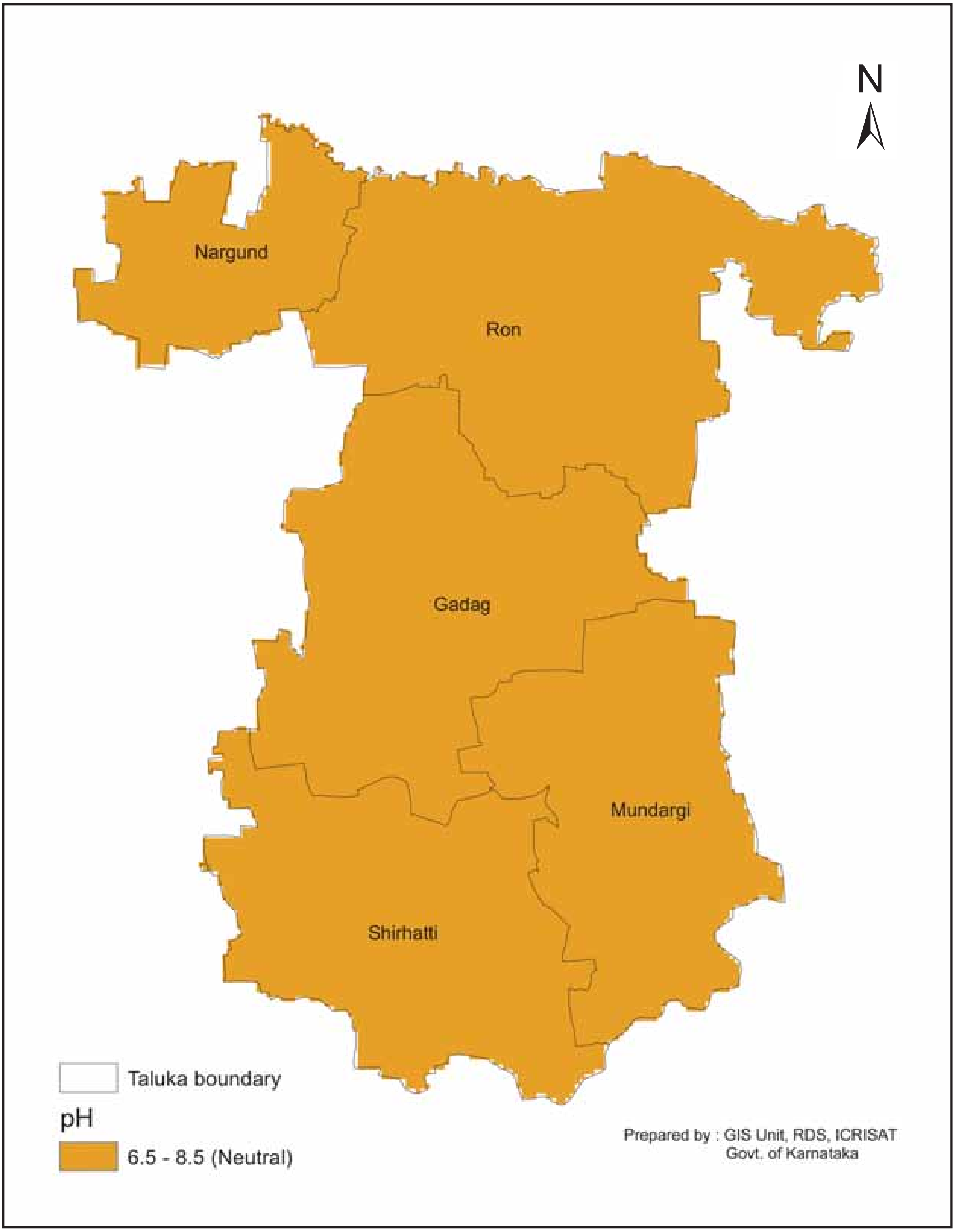


Figure 130. pH status in Gadag district

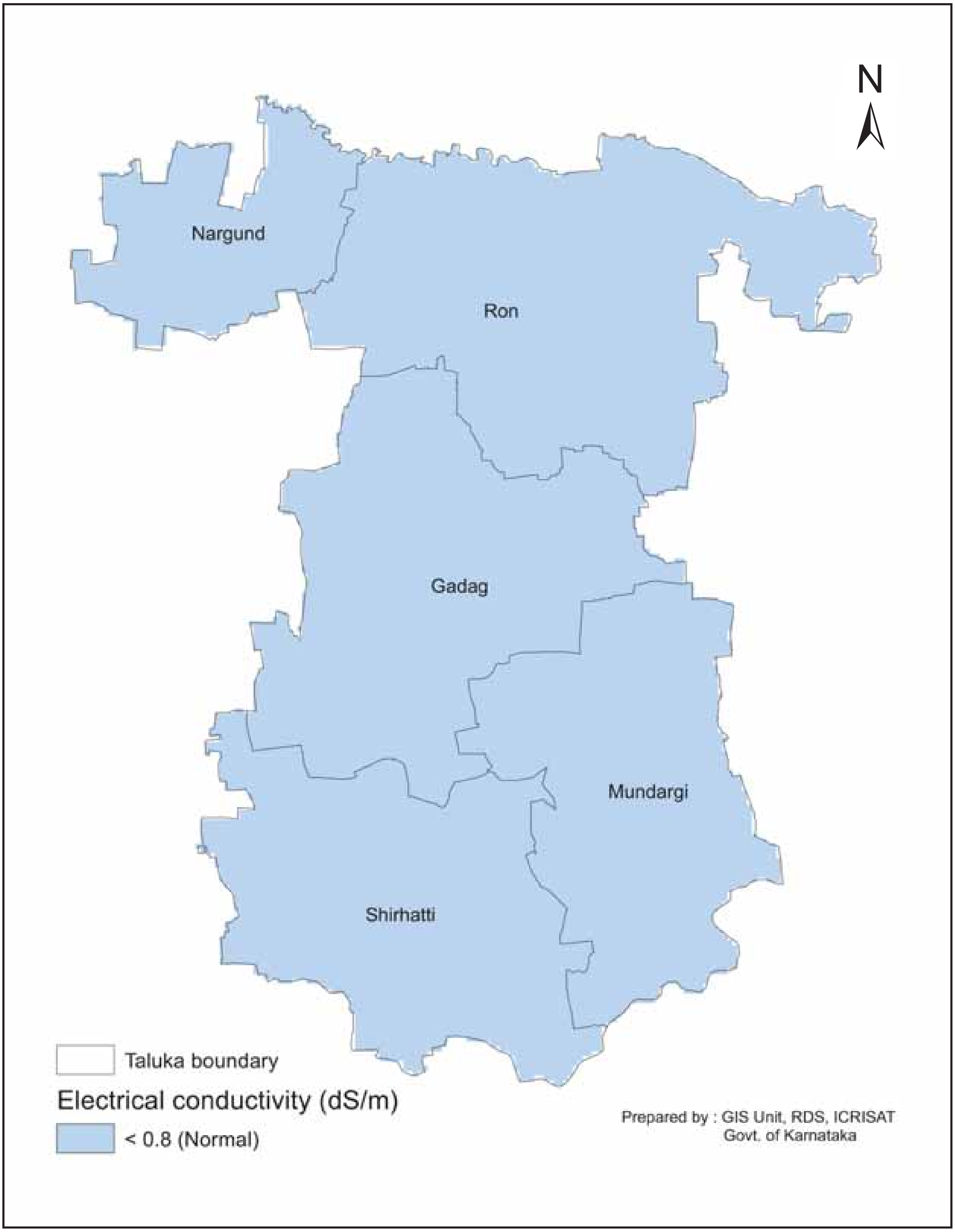


Figure 131. Electrical conductivity status in Gadag district

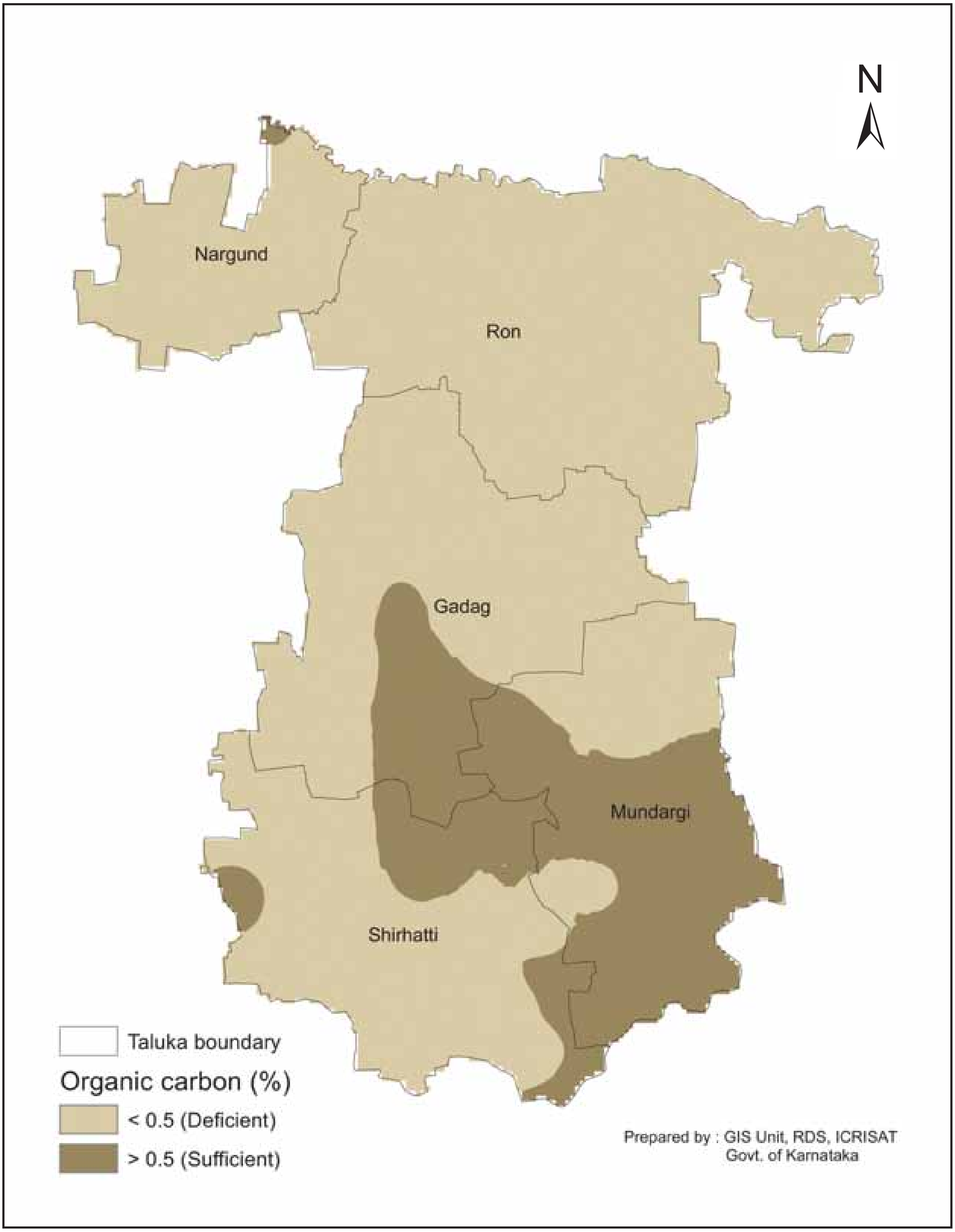


Figure 132. Organic carbon status in Gadag district

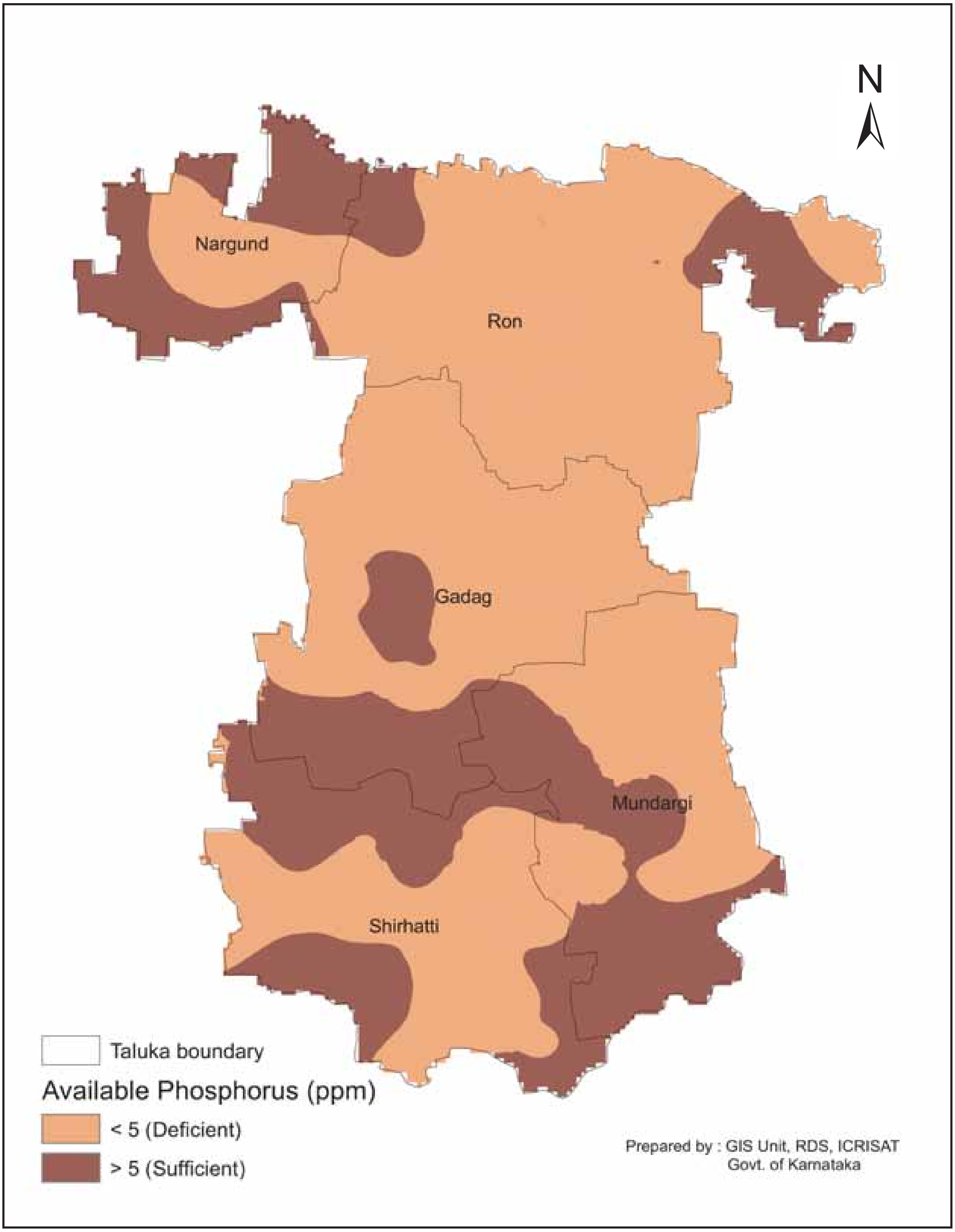


Figure 133. Available phosphorus status in Gadag district

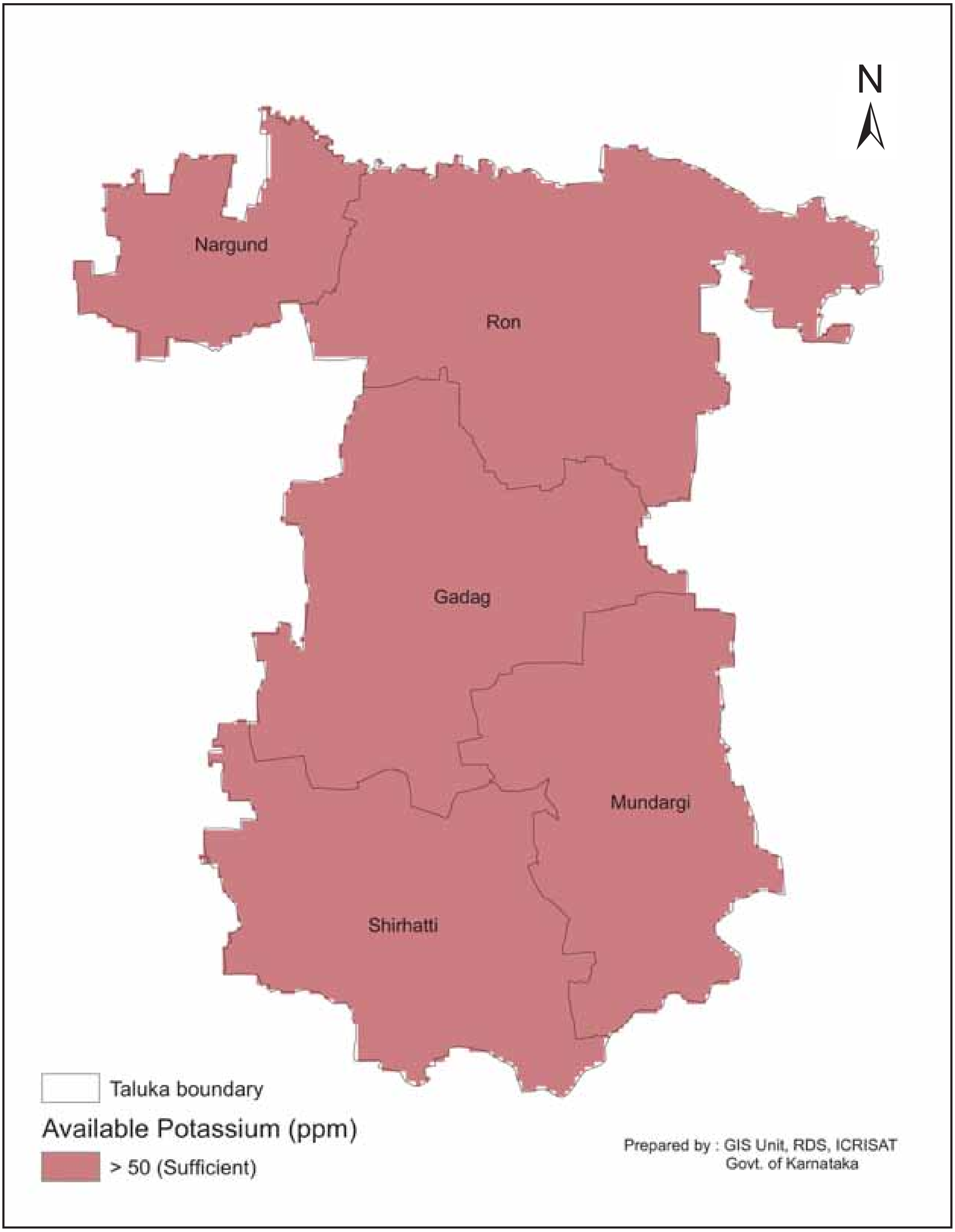


Figure 134. Available potassium status in Gadag district

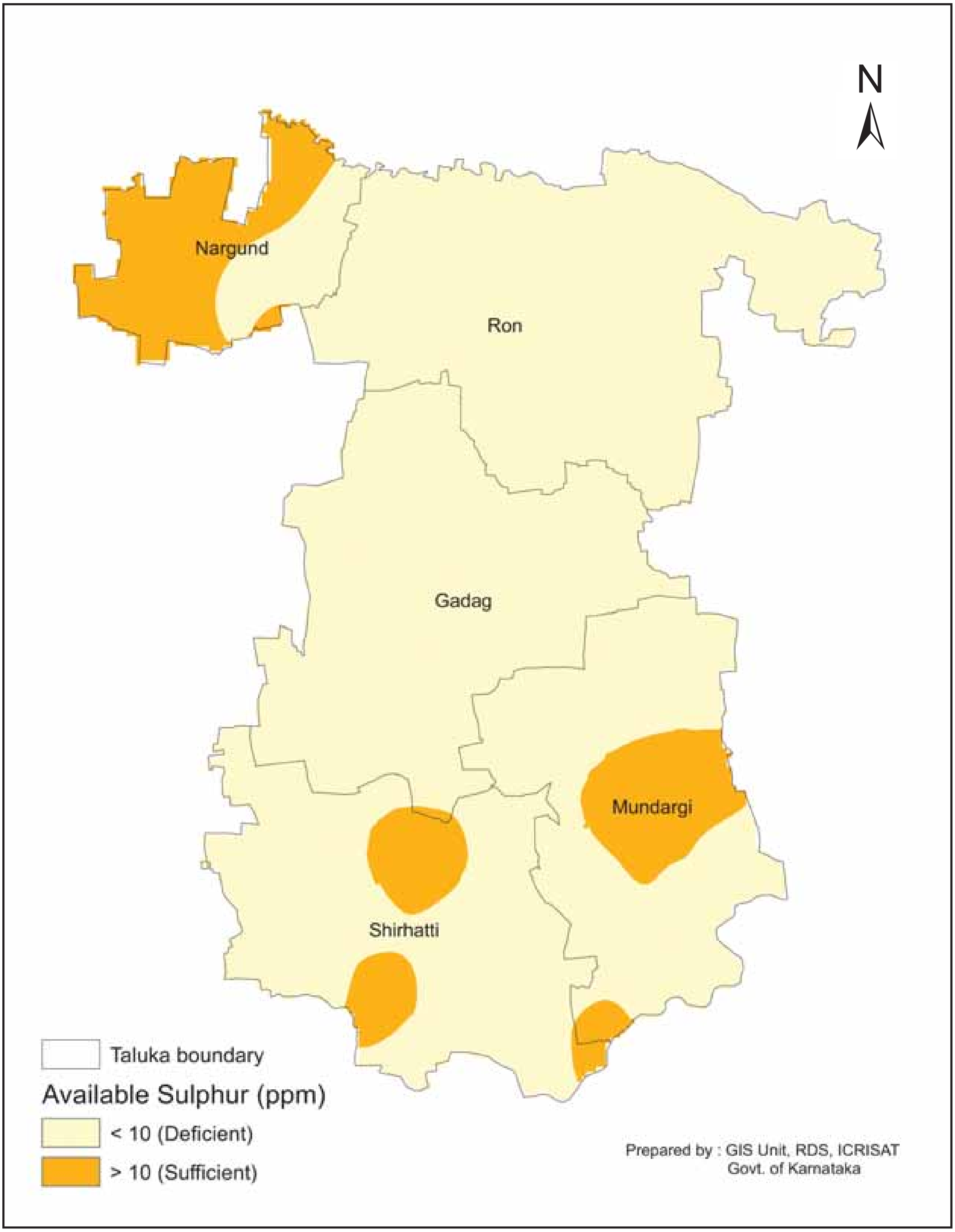


Figure 135. Available sulphur status in Gadag district

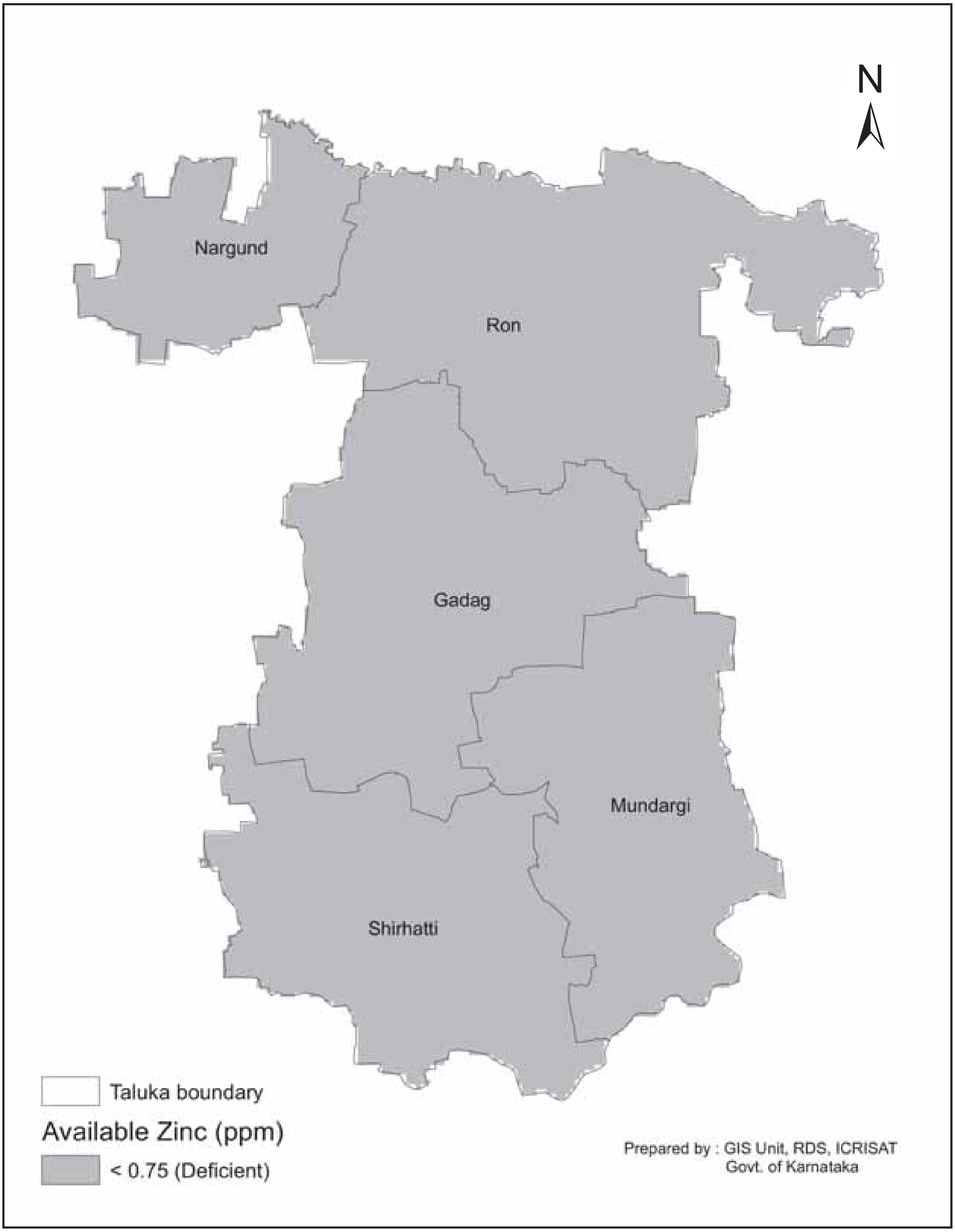


Figure 136. Available zinc status in Gadag district

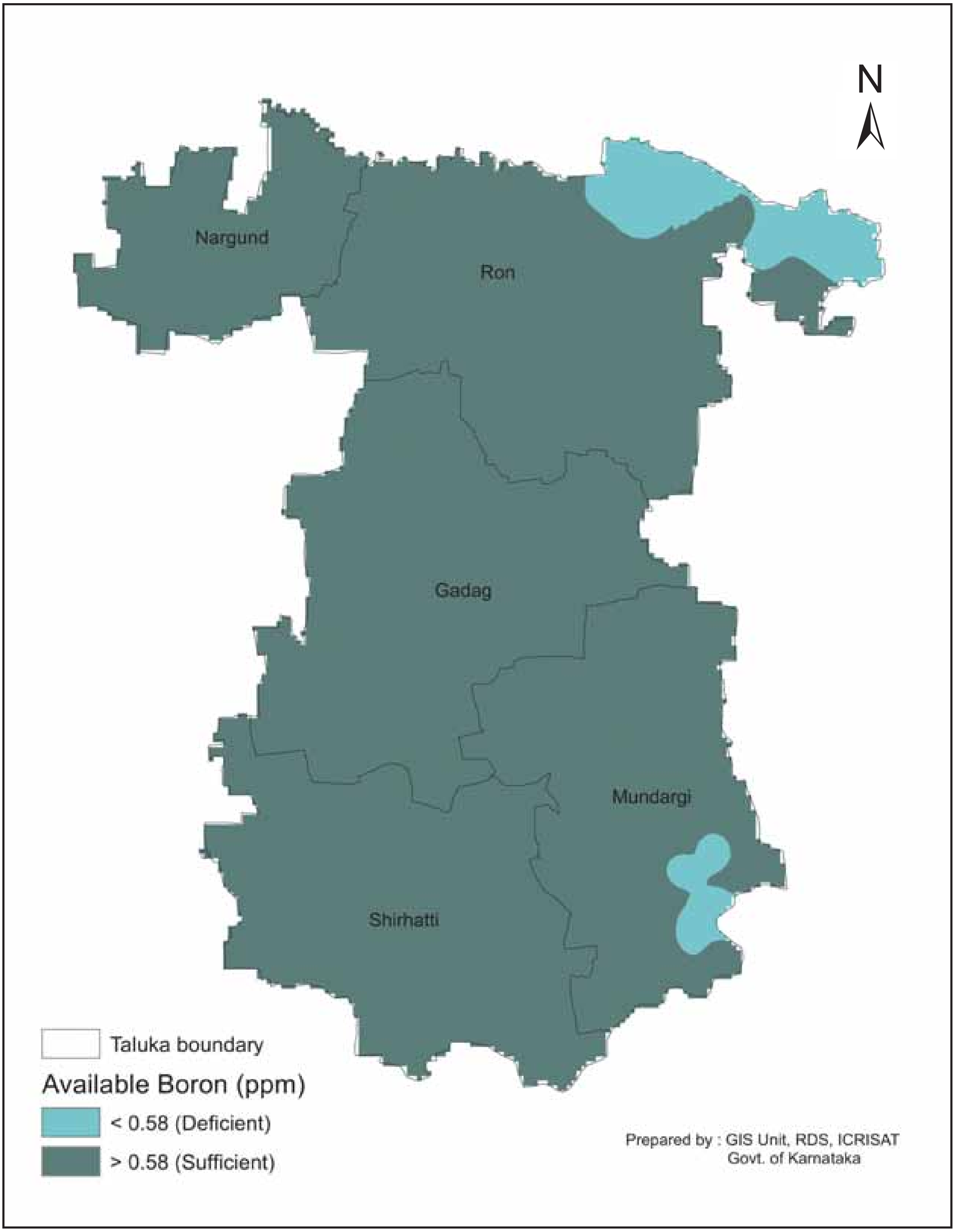


Figure 137. Available boron status in Gadag district

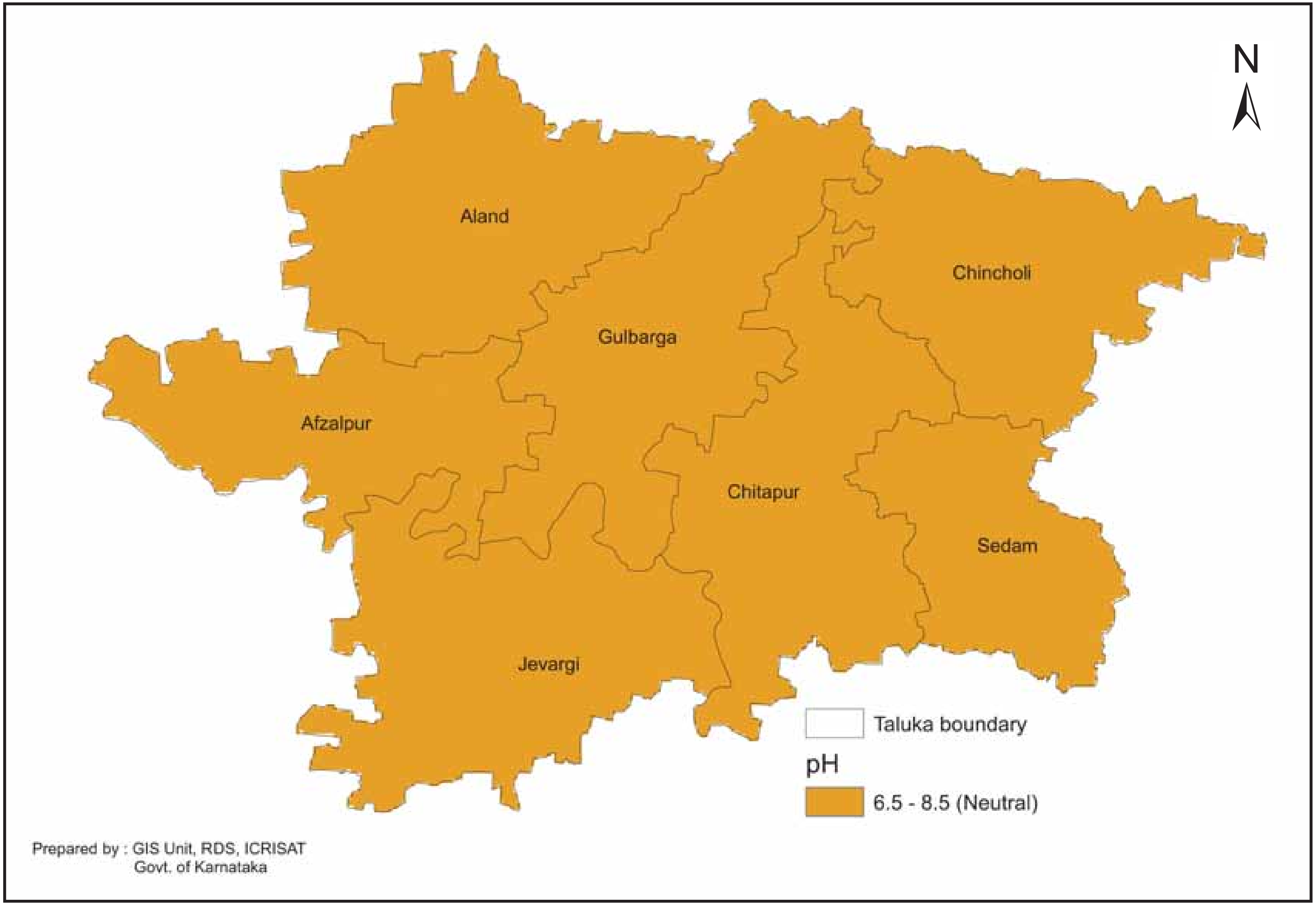


Figure 138. pH status in Gulbarga district

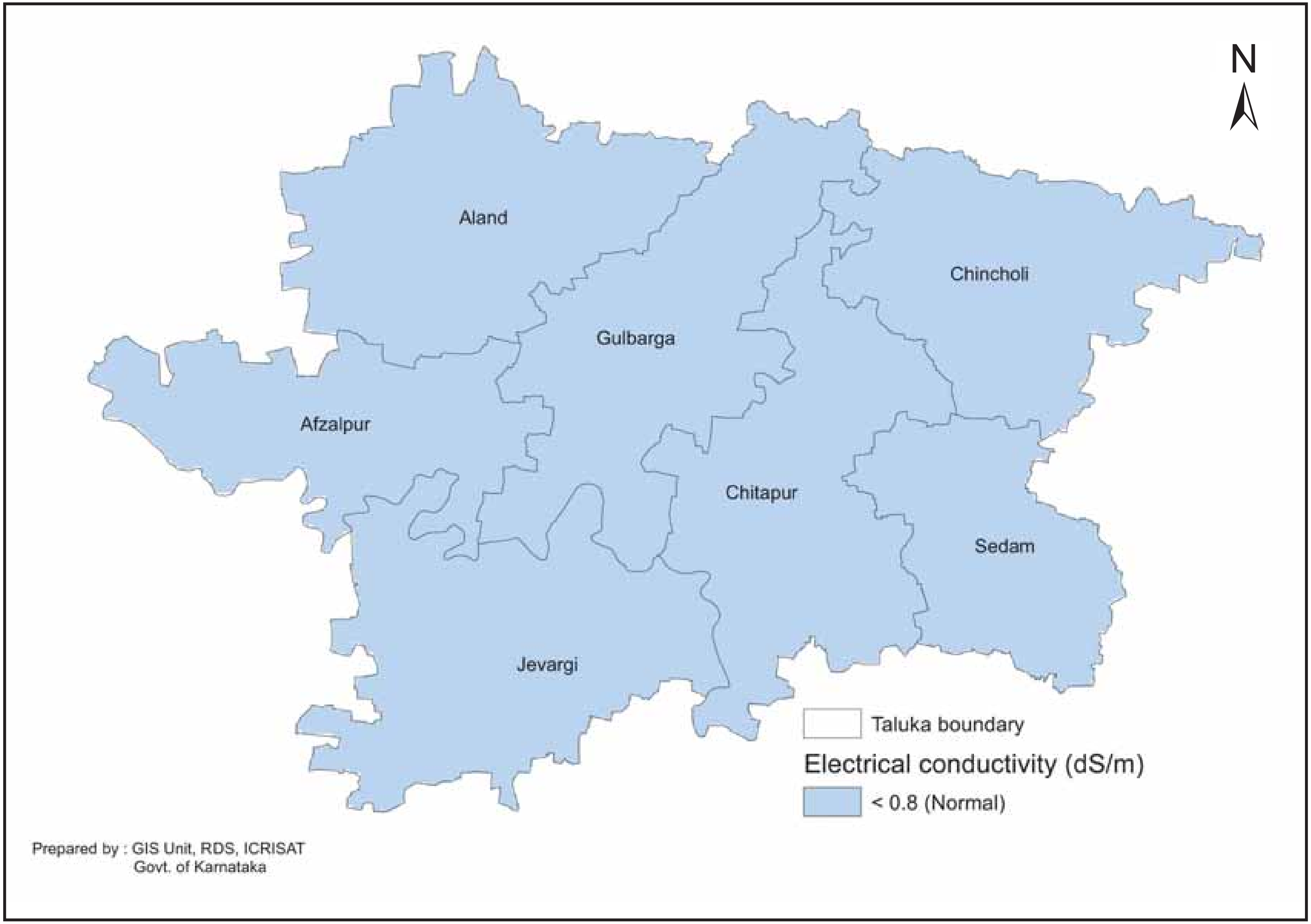


Figure 139. Electrical conductivity status in Gulbarga district

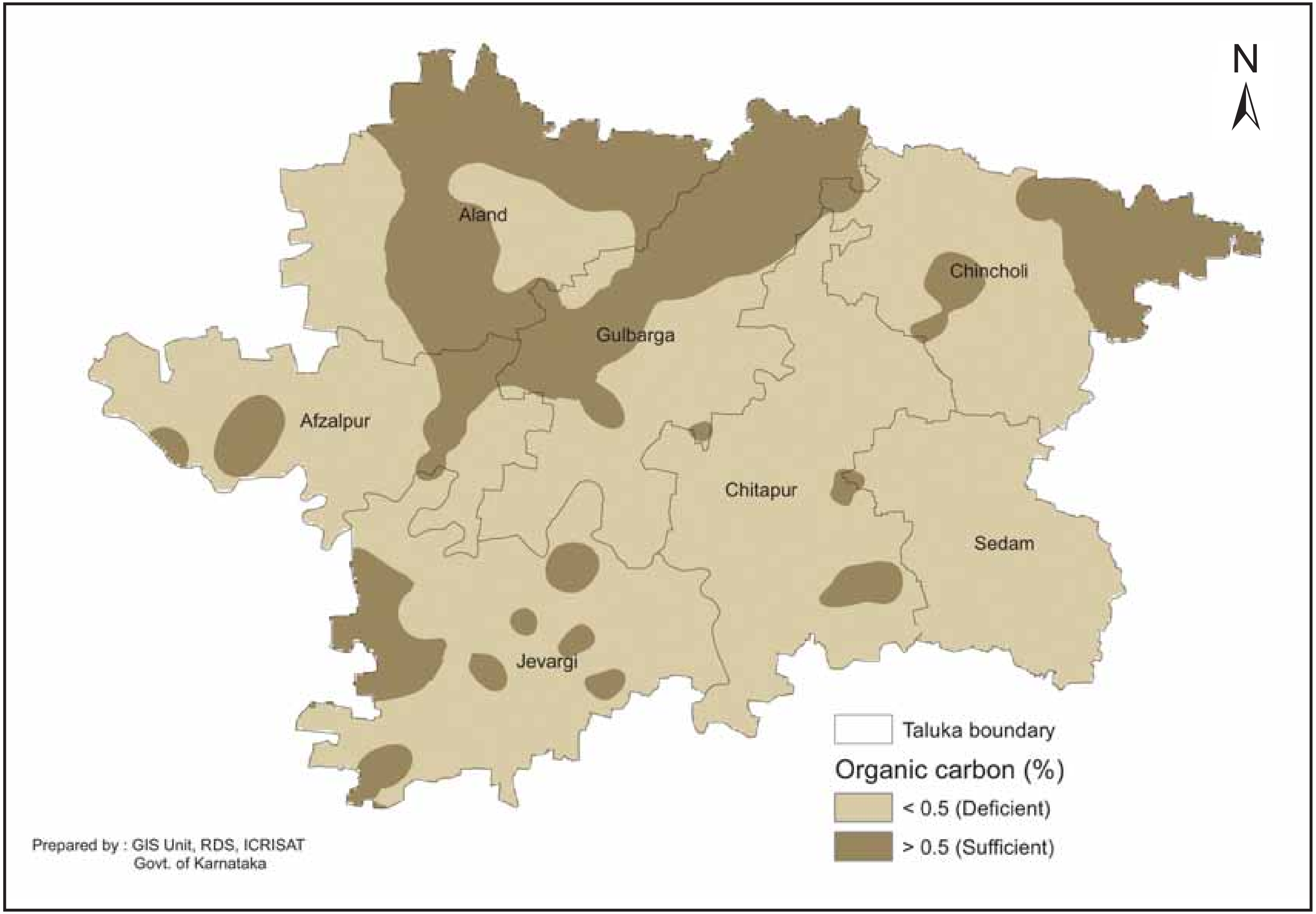


Figure 140. Organic carbon status in Gulbarga district

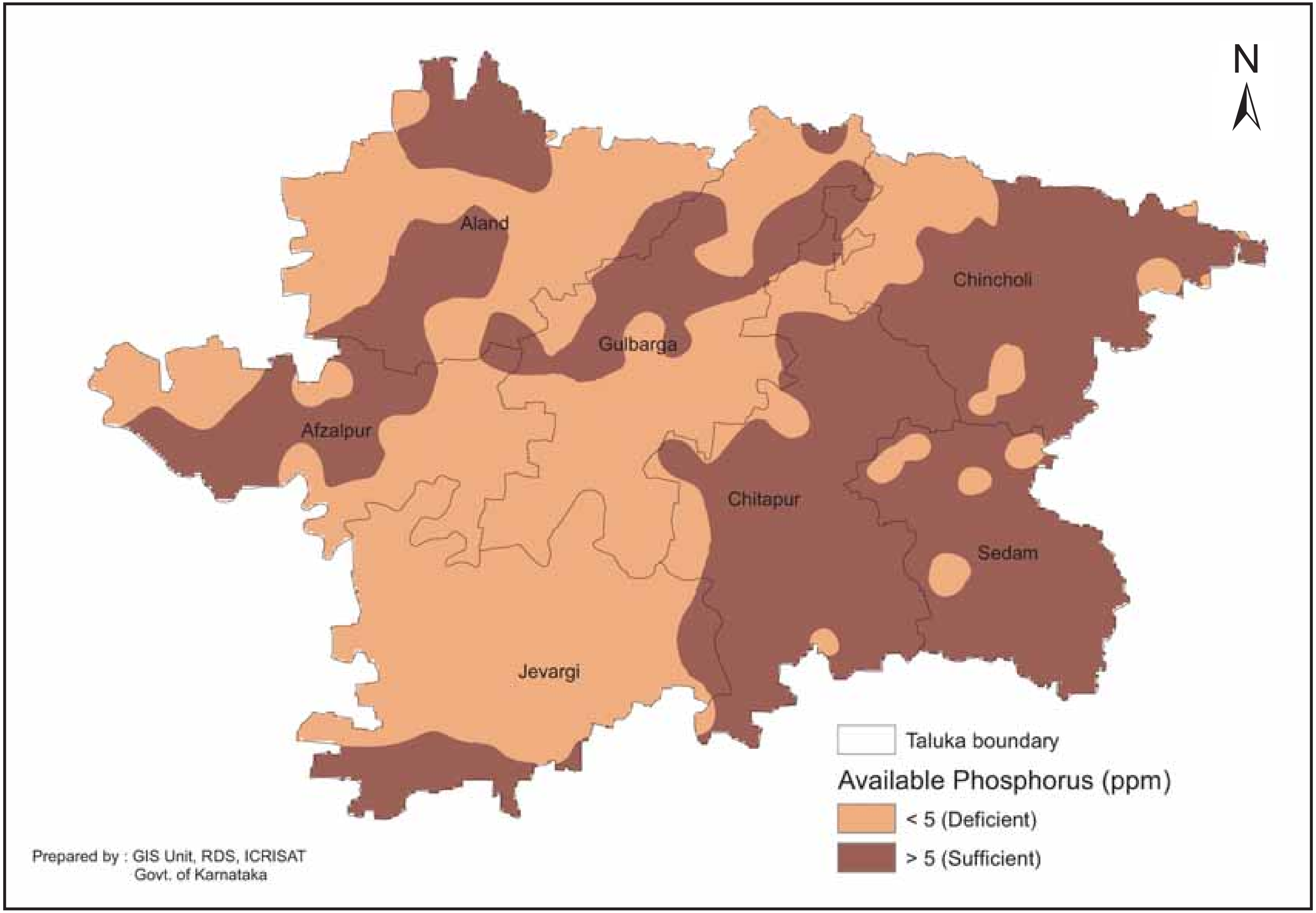


Figure 141. Available phosphorus status in Gulbarga district

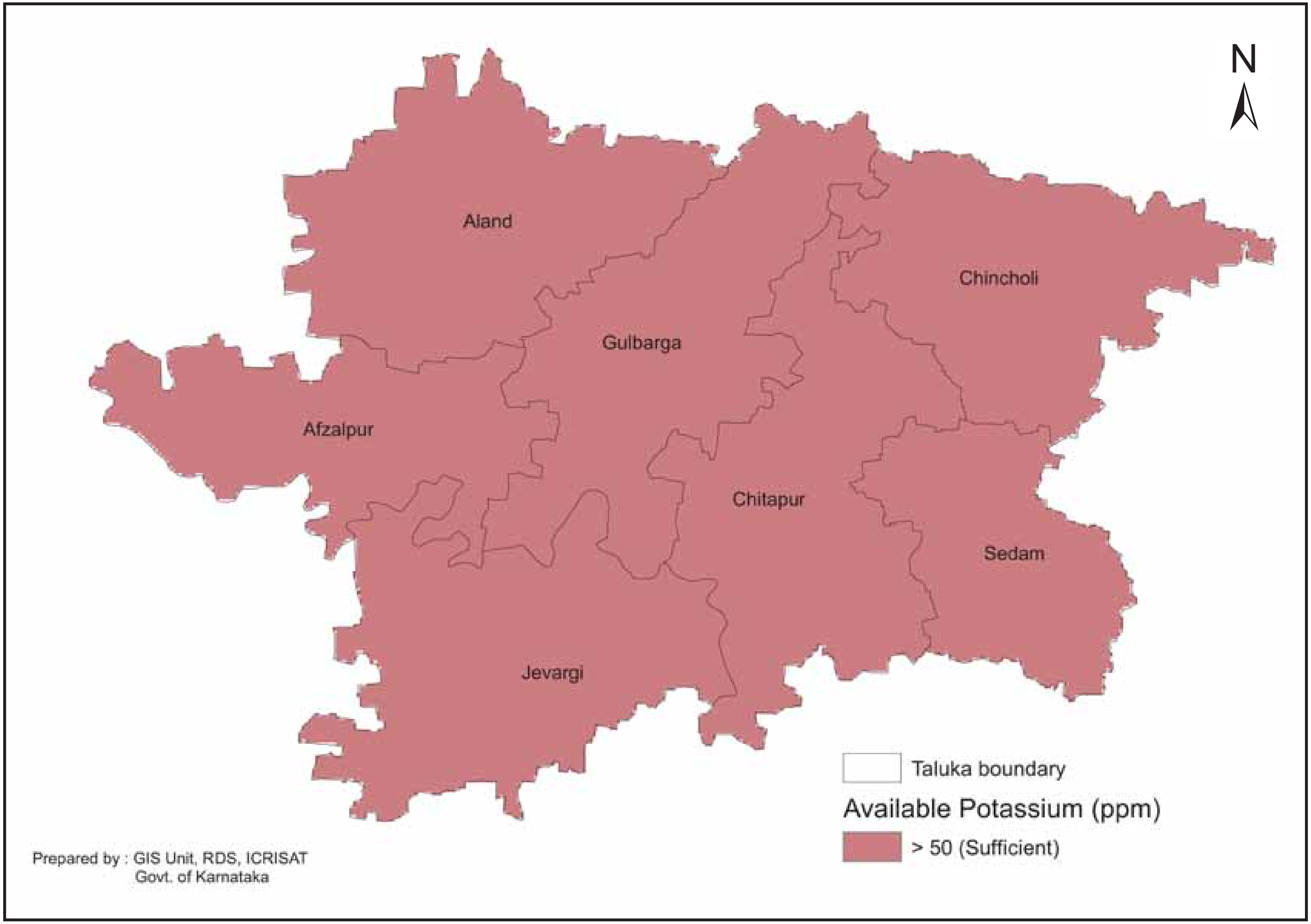


Figure 142. Available potassium status in Gulbarga district

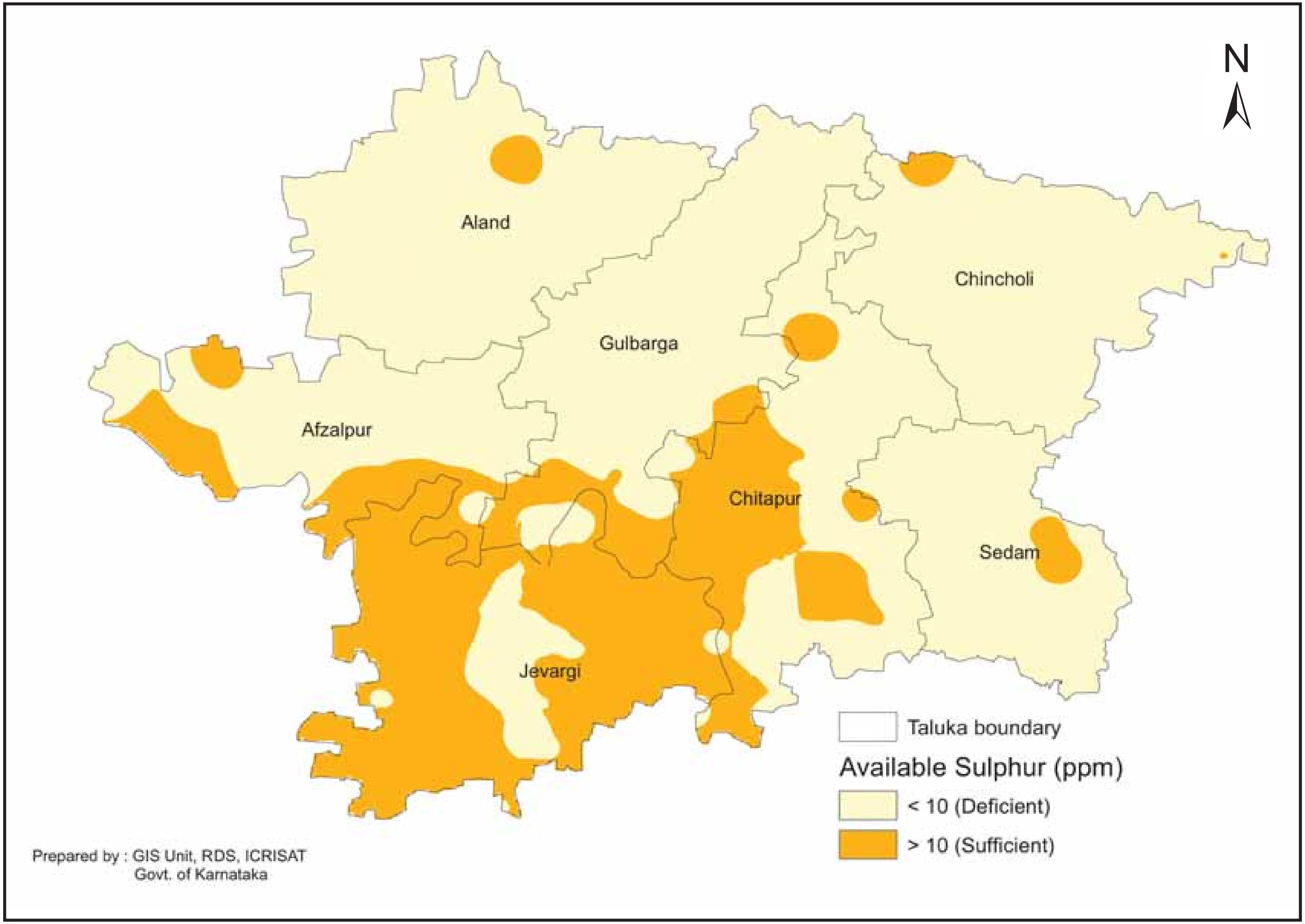


Figure 143. Available sulphur status in Gulbarga district

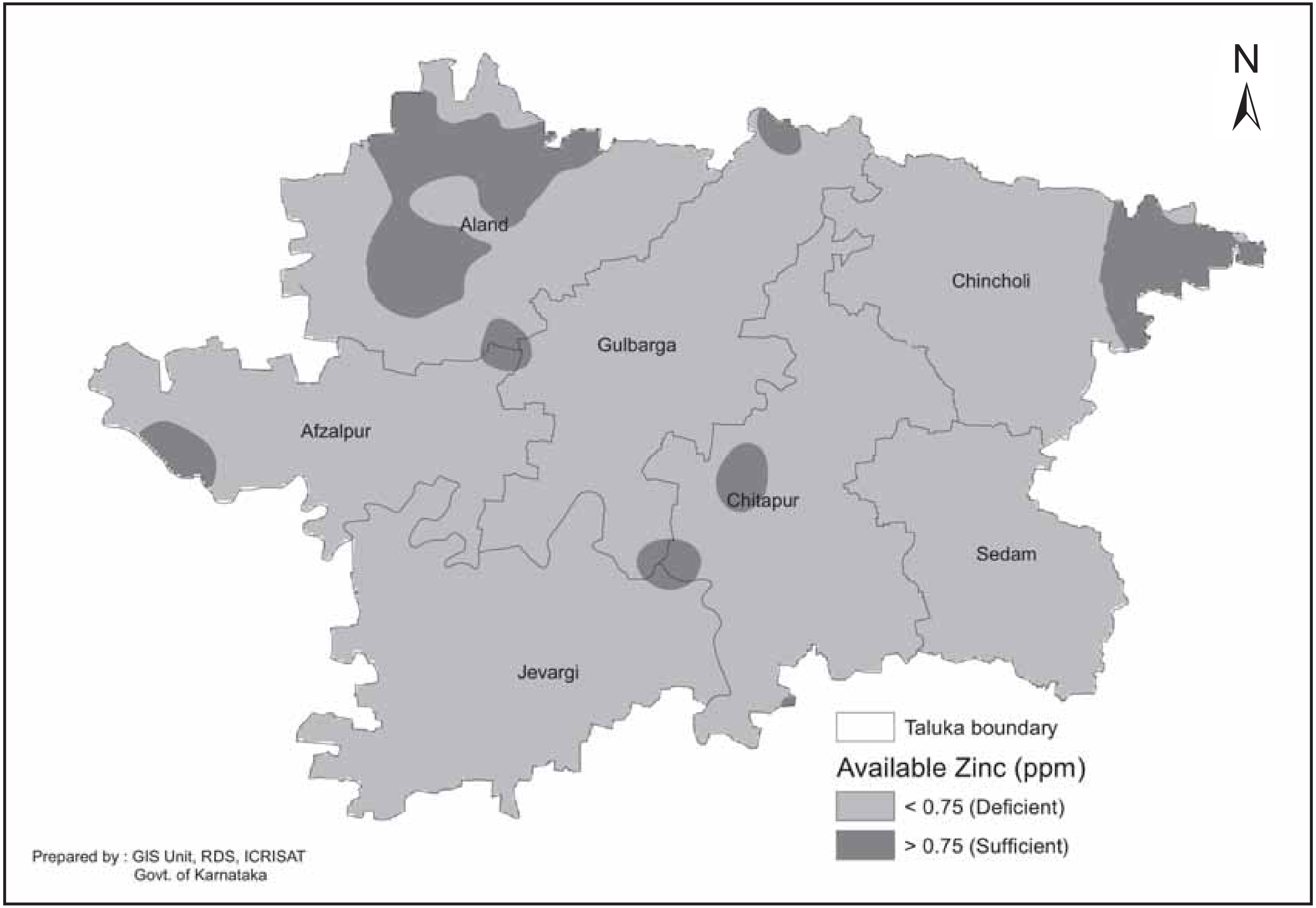


Figure 144. Available zinc status in Gulbarga district

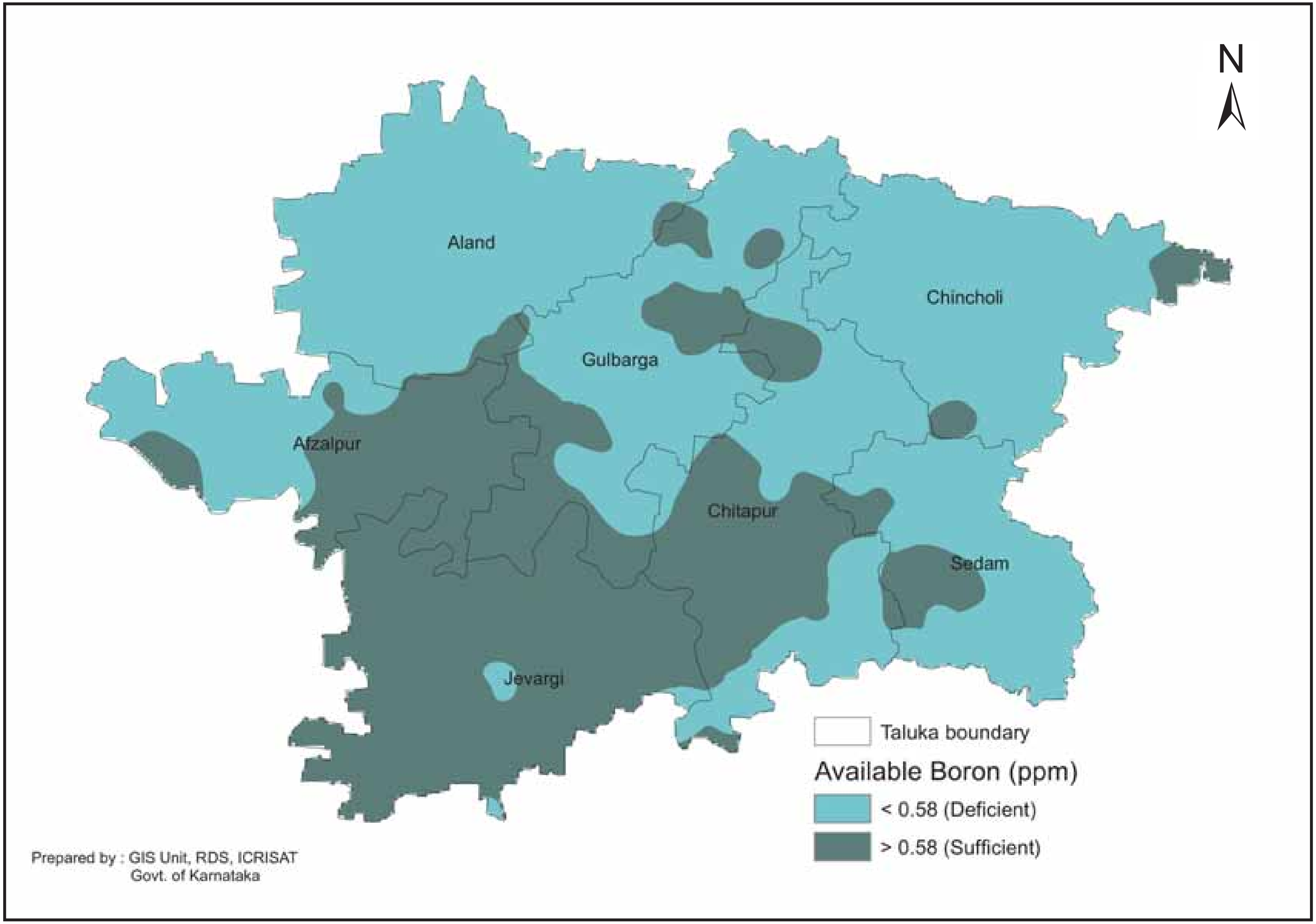


Figure 145. Available boron status in Gulbarga district

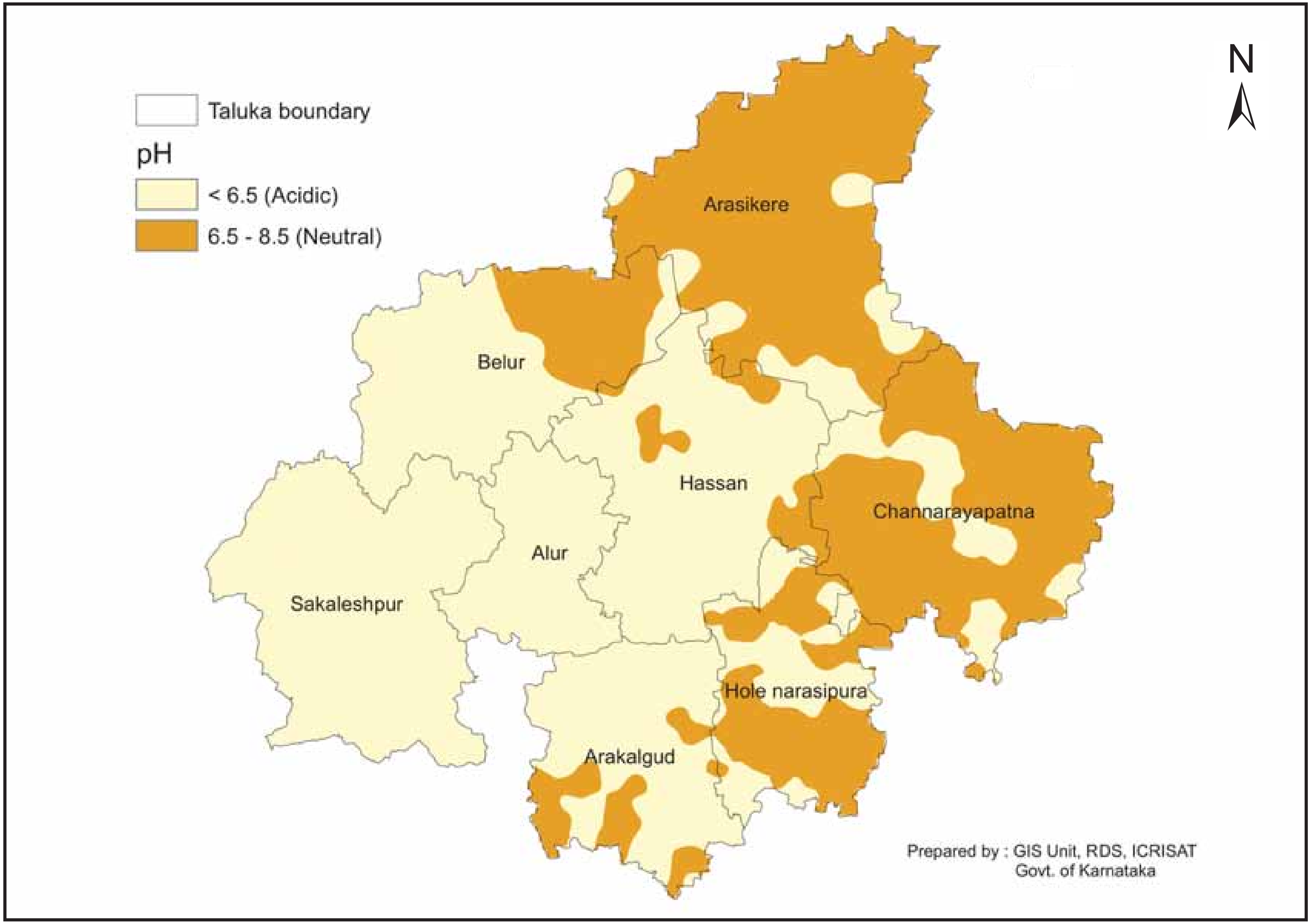


Figure 146. pH status in Hassan district

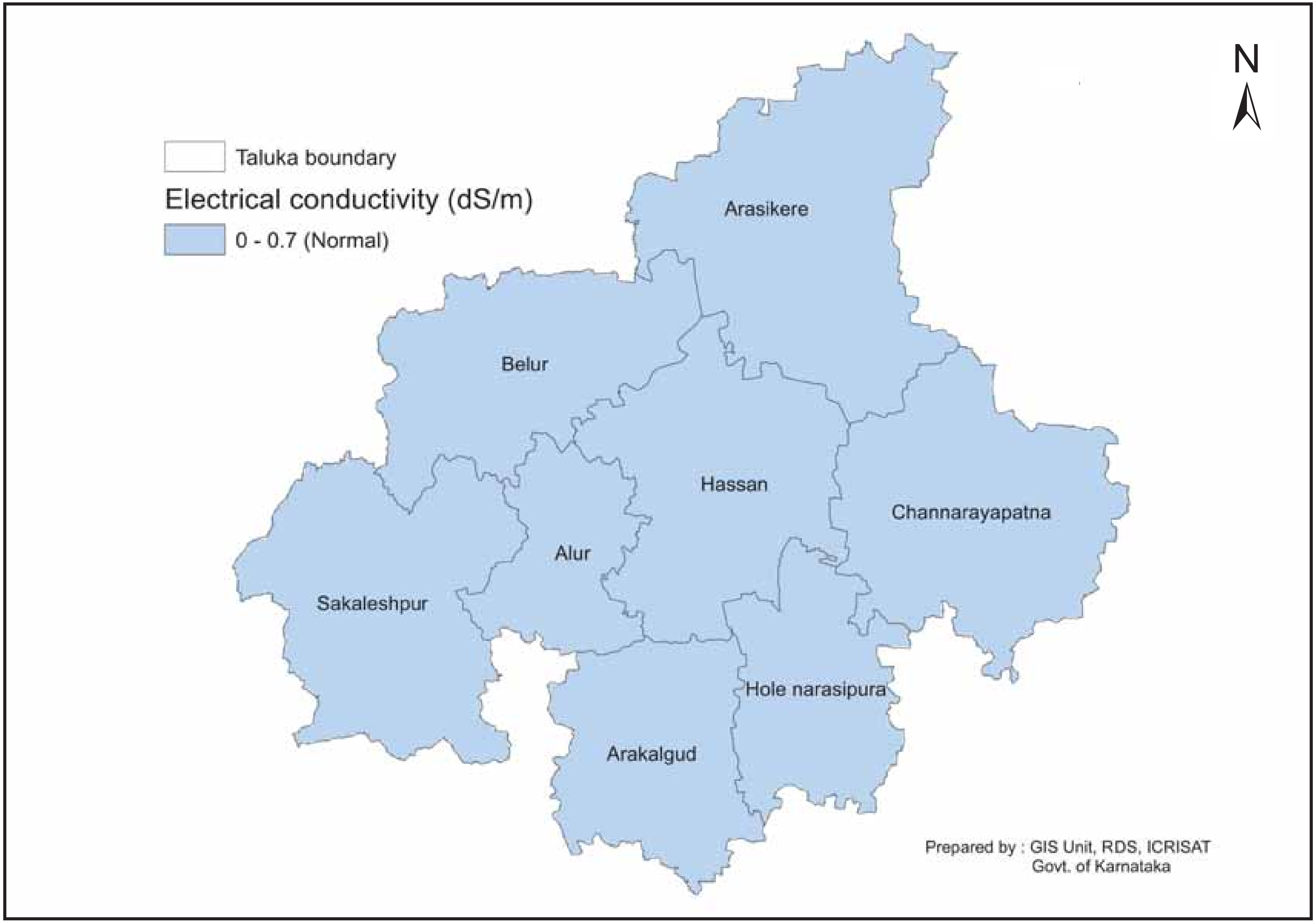


Figure 147. Electrical conductivity status in Hassan district

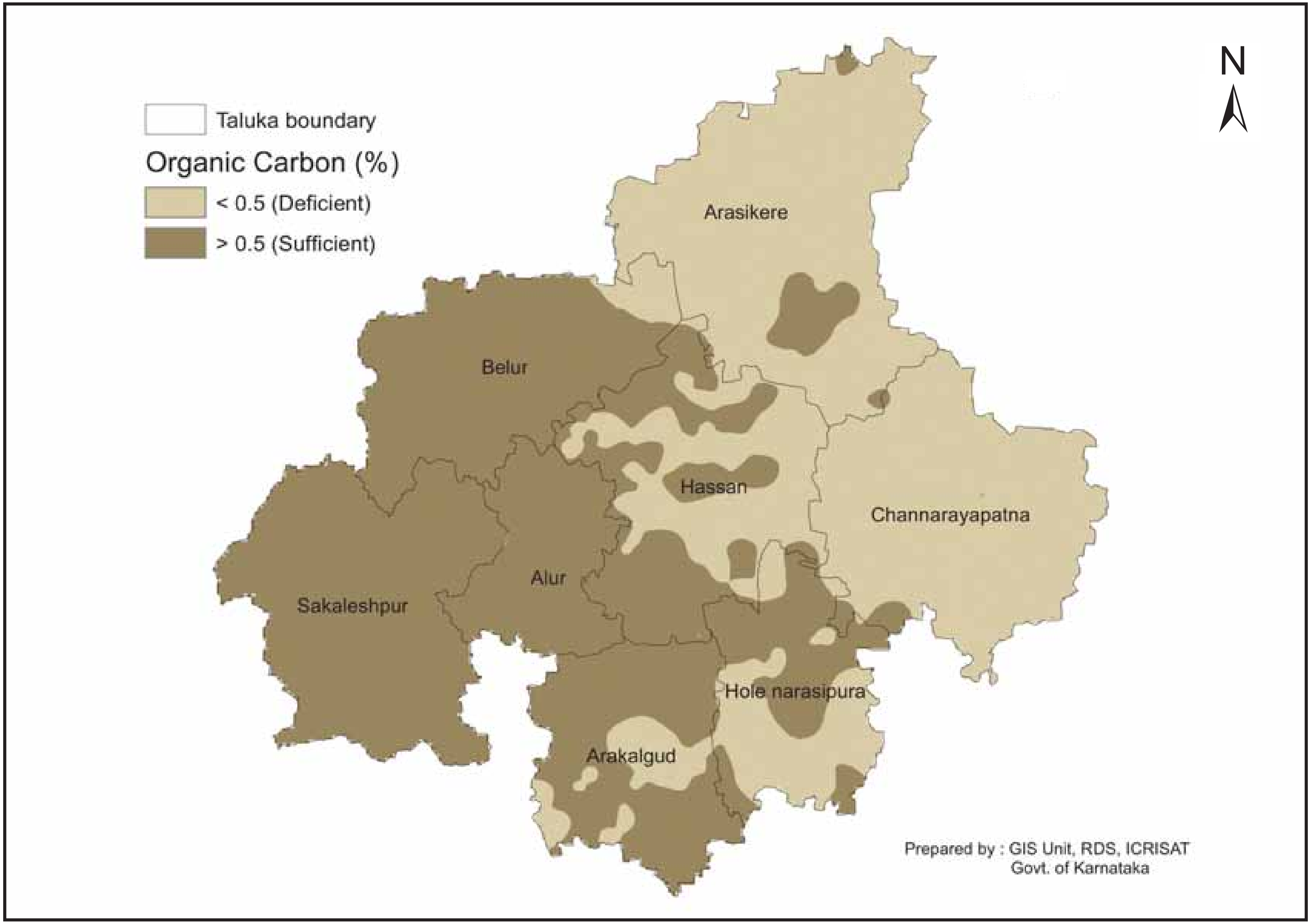


Figure 148. Organic carbon status in Hassan district

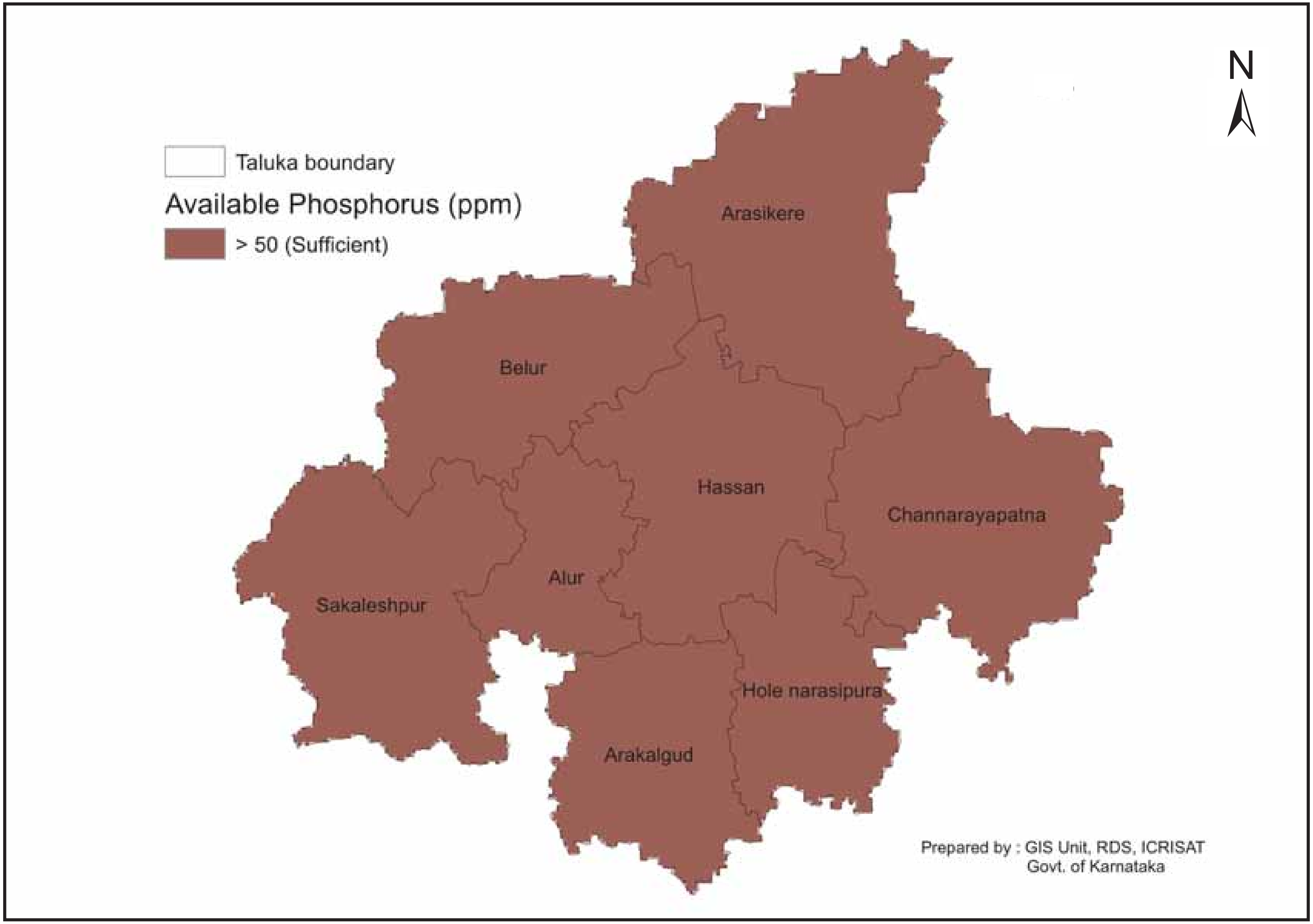


Figure 149. Available phosphorus status in Hassan district

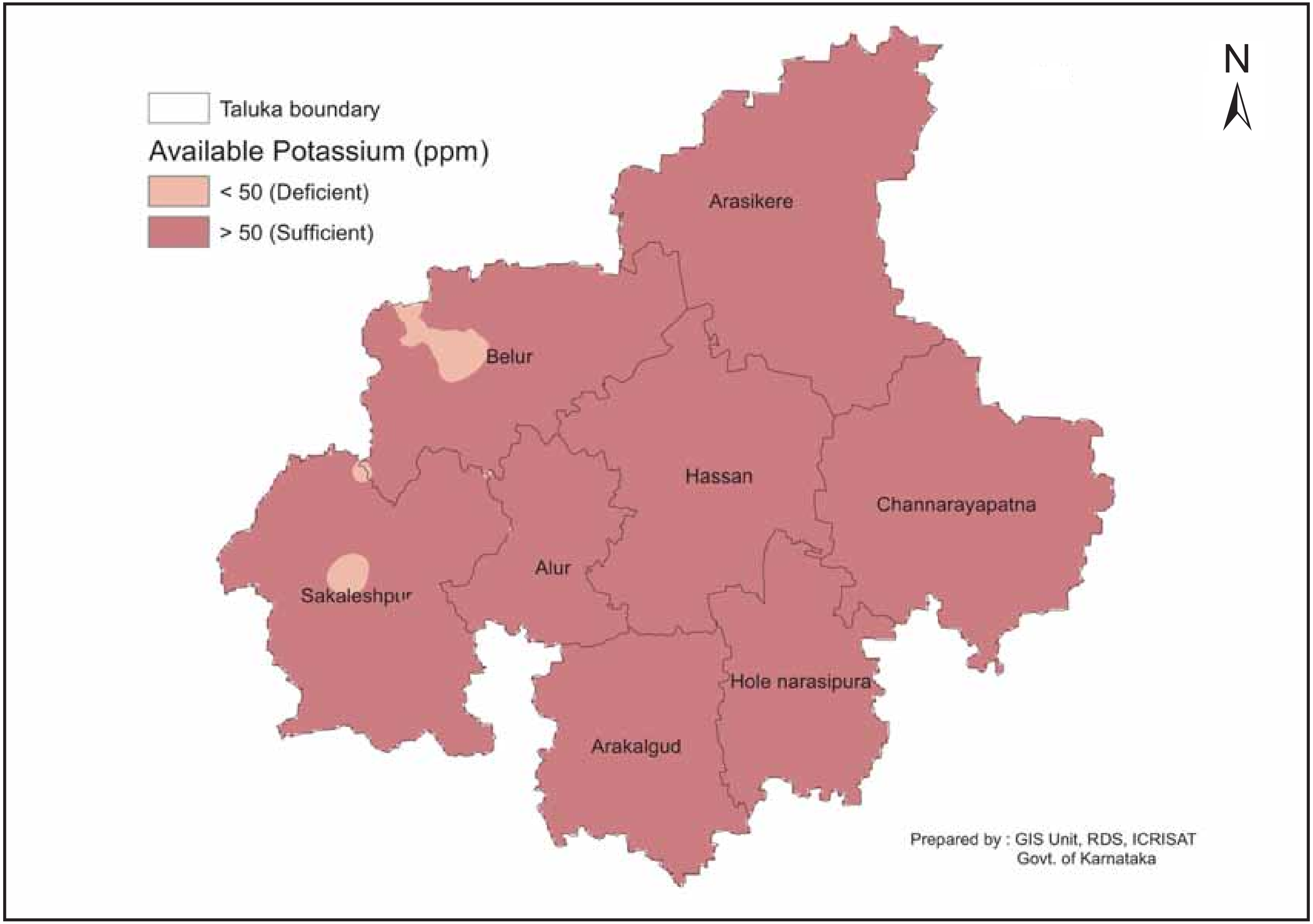


Figure 150. Available potassium status in Hassan district

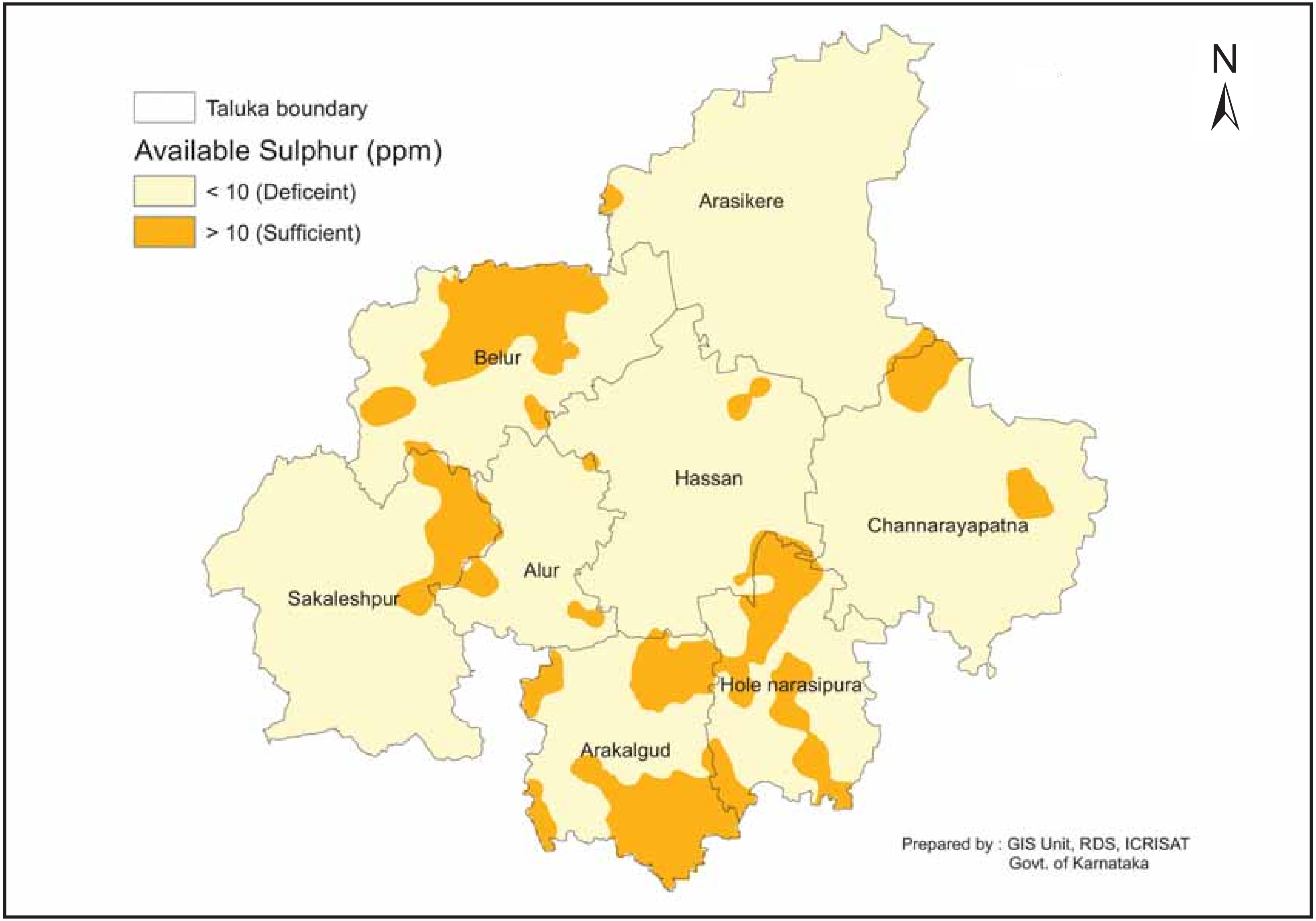


Figure 151. Available sulphur status in Hassan district

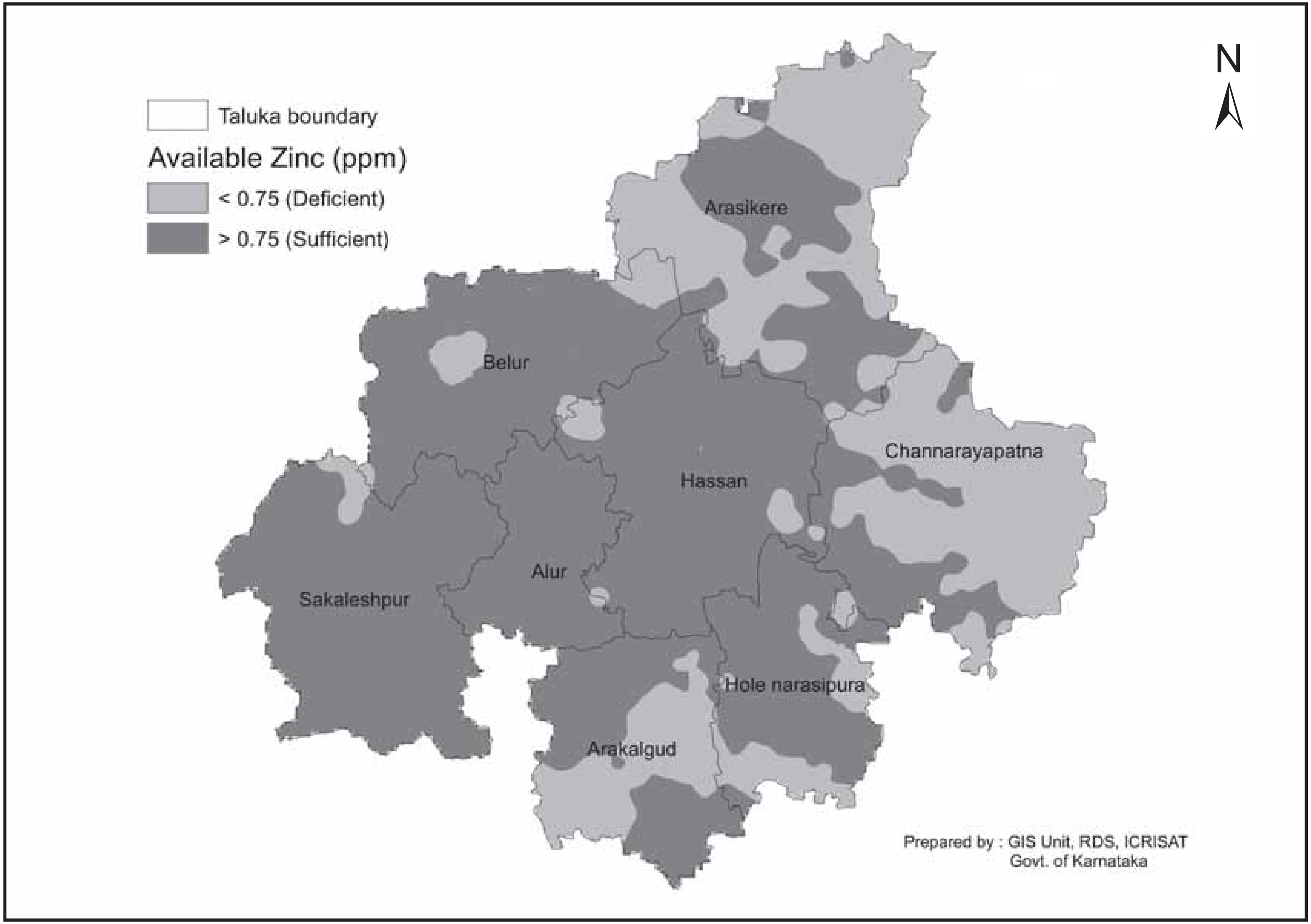


Figure 152. Available zinc status in Hassan district

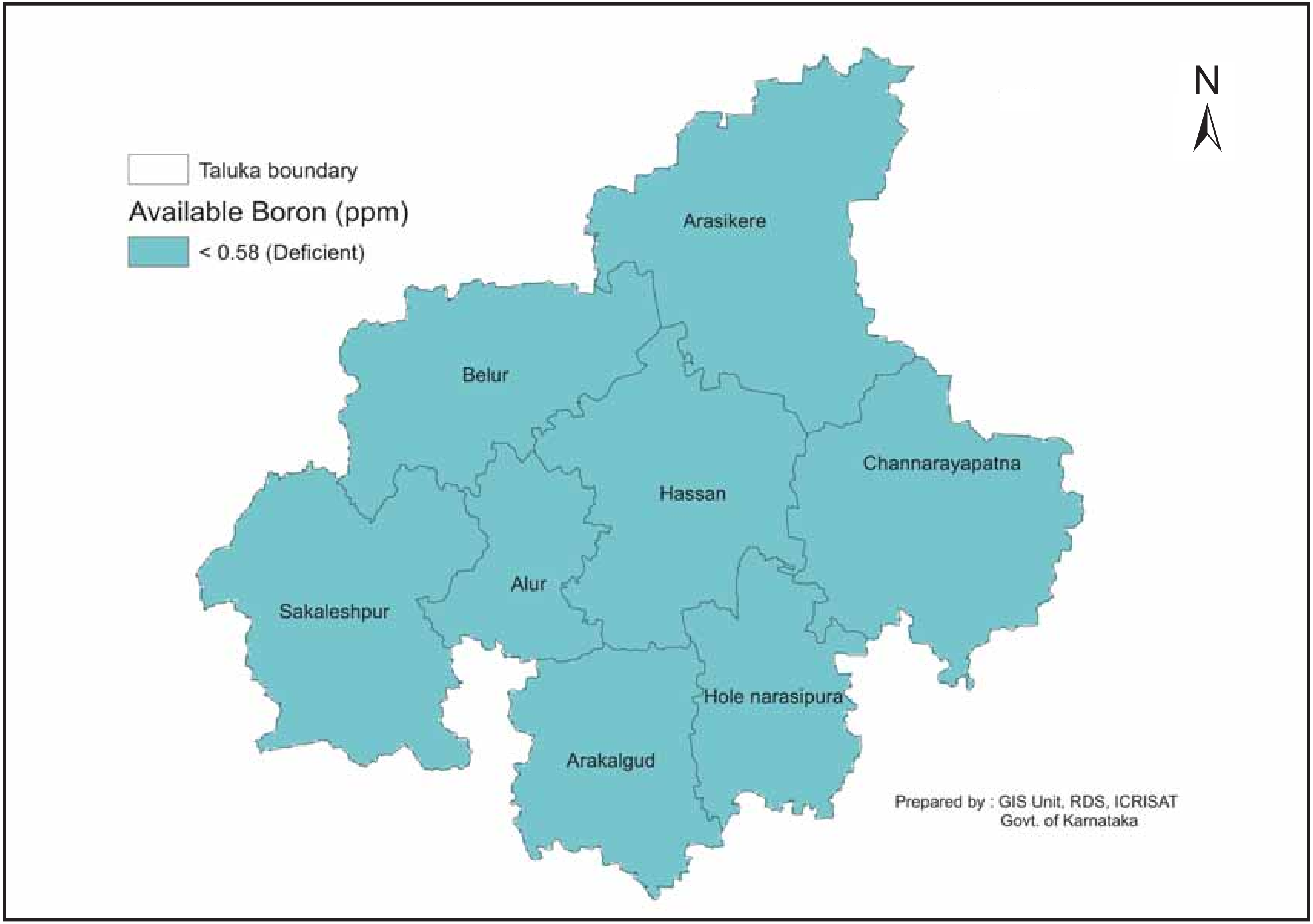


Figure 153. Available boron status in Hassan district

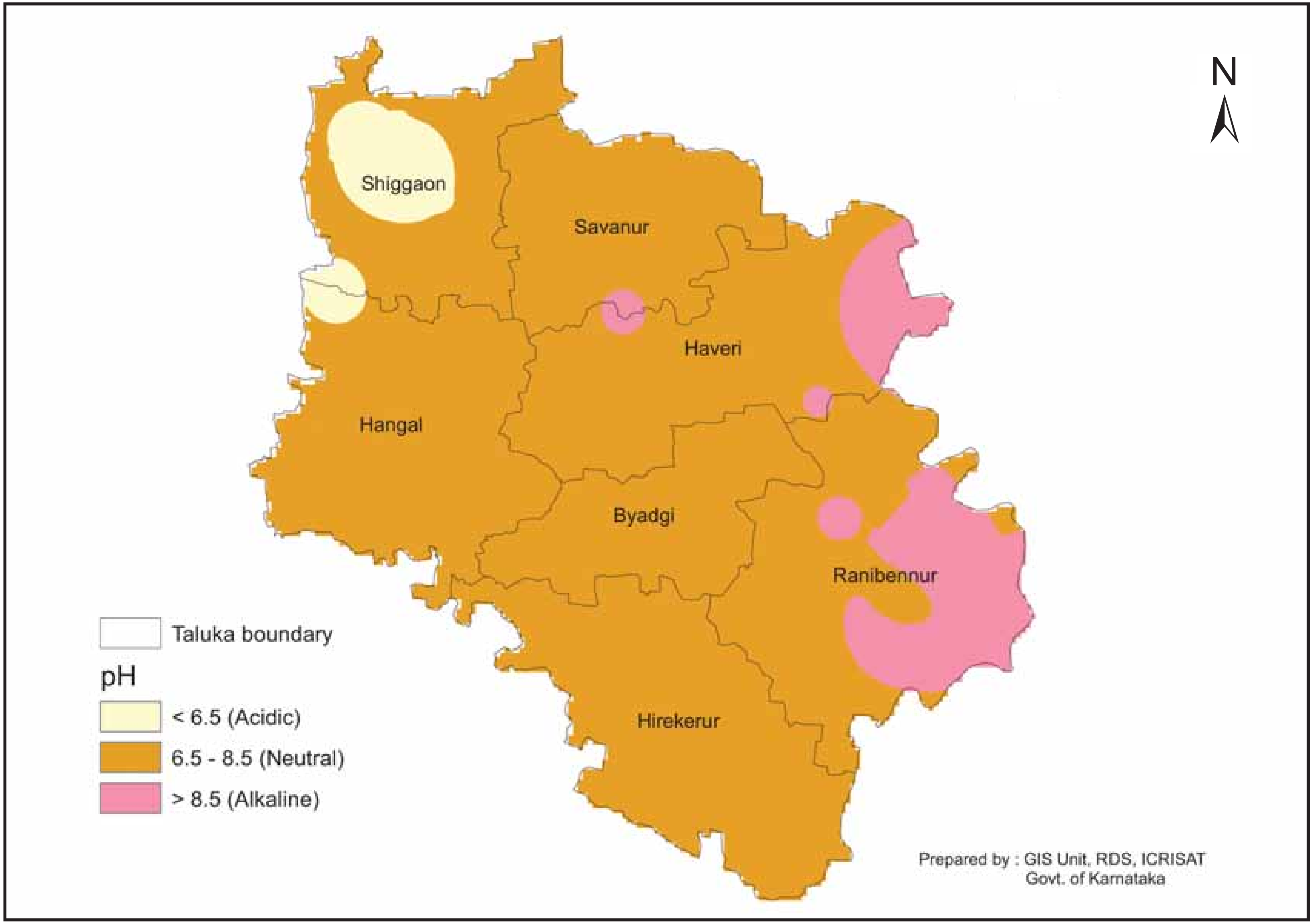


Figure 154. pH status in Haveri district

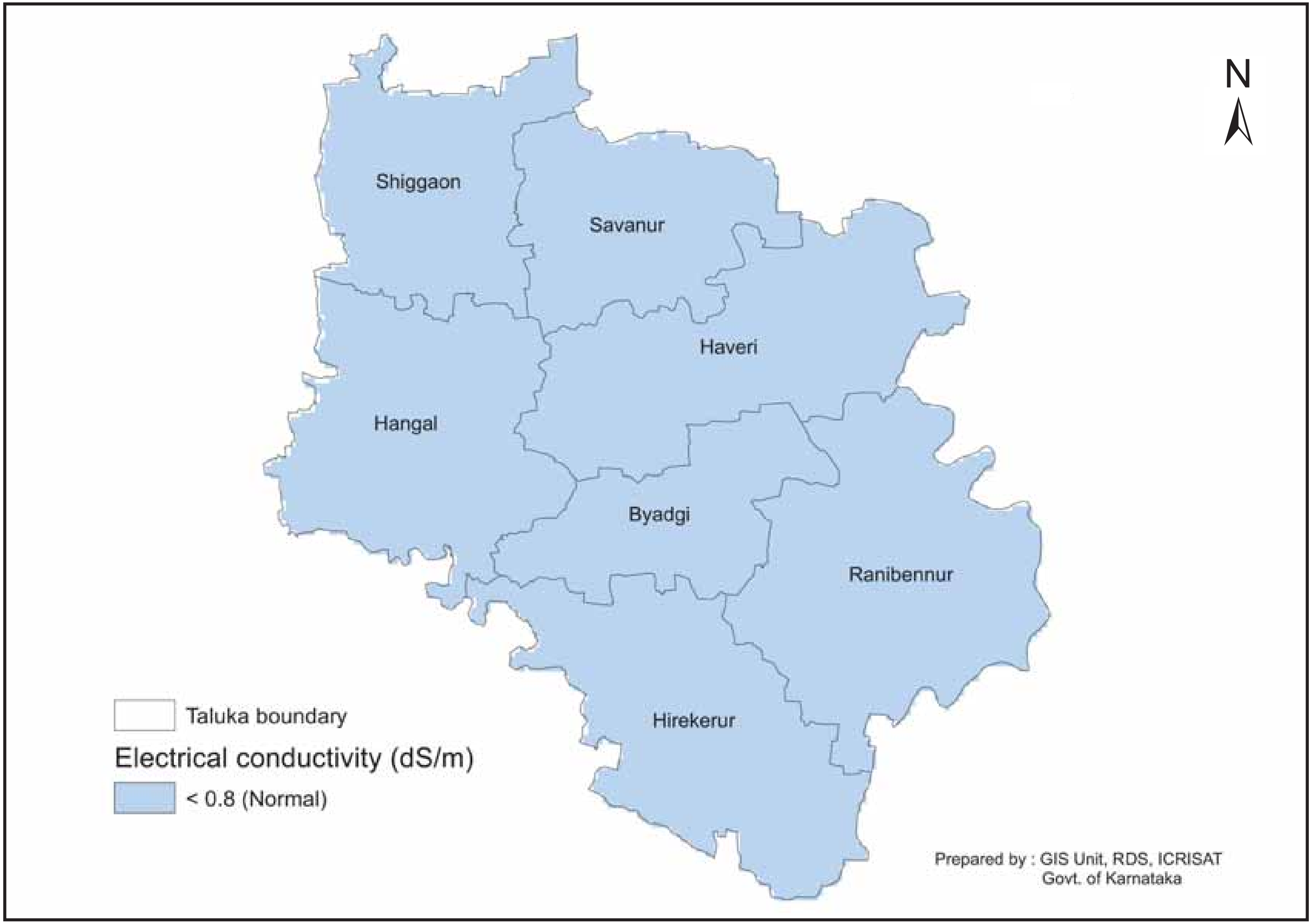


Figure 155. Electrical conductivity status in Haveri district

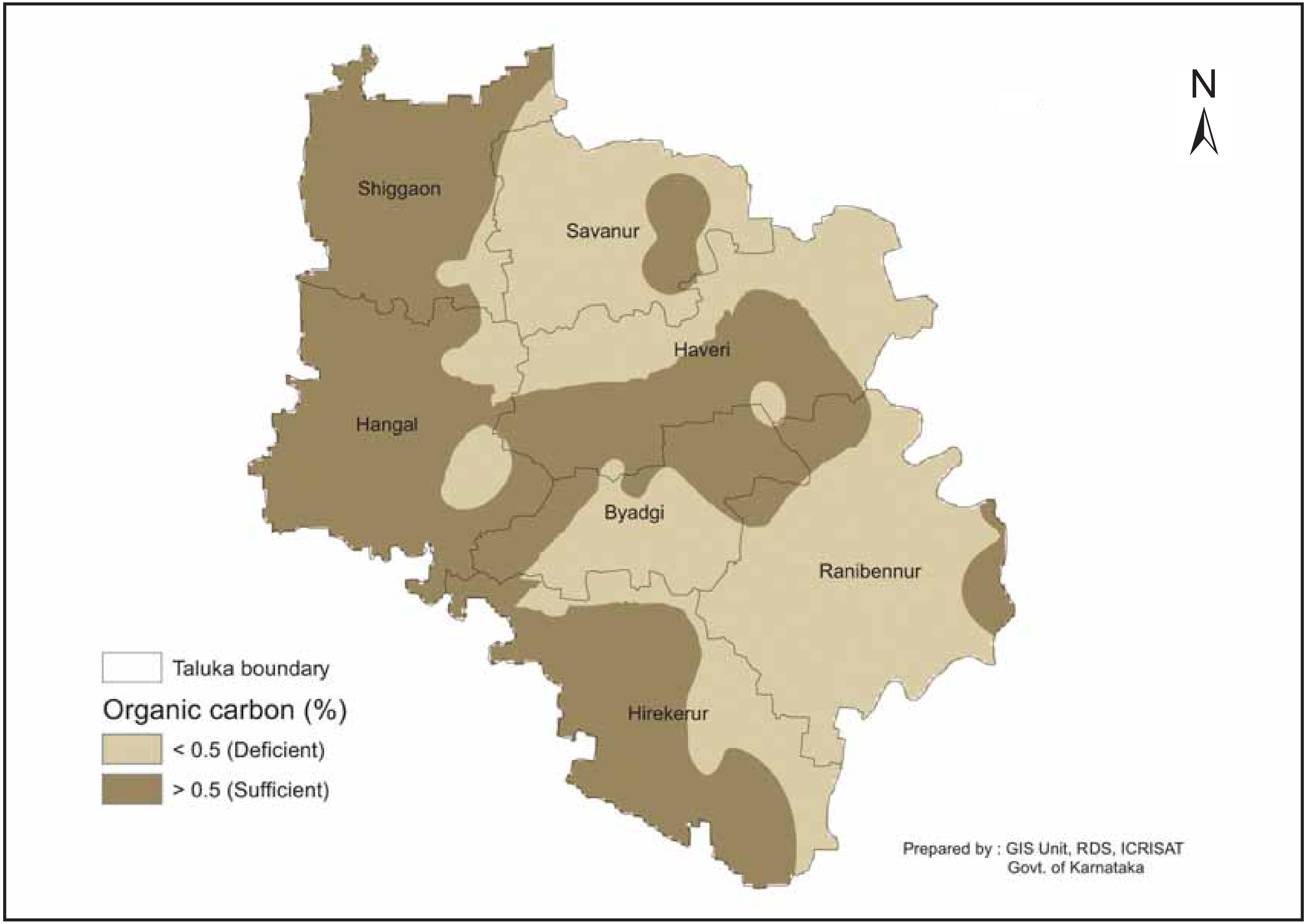


Figure 156. Organic carbon status in Haveri district

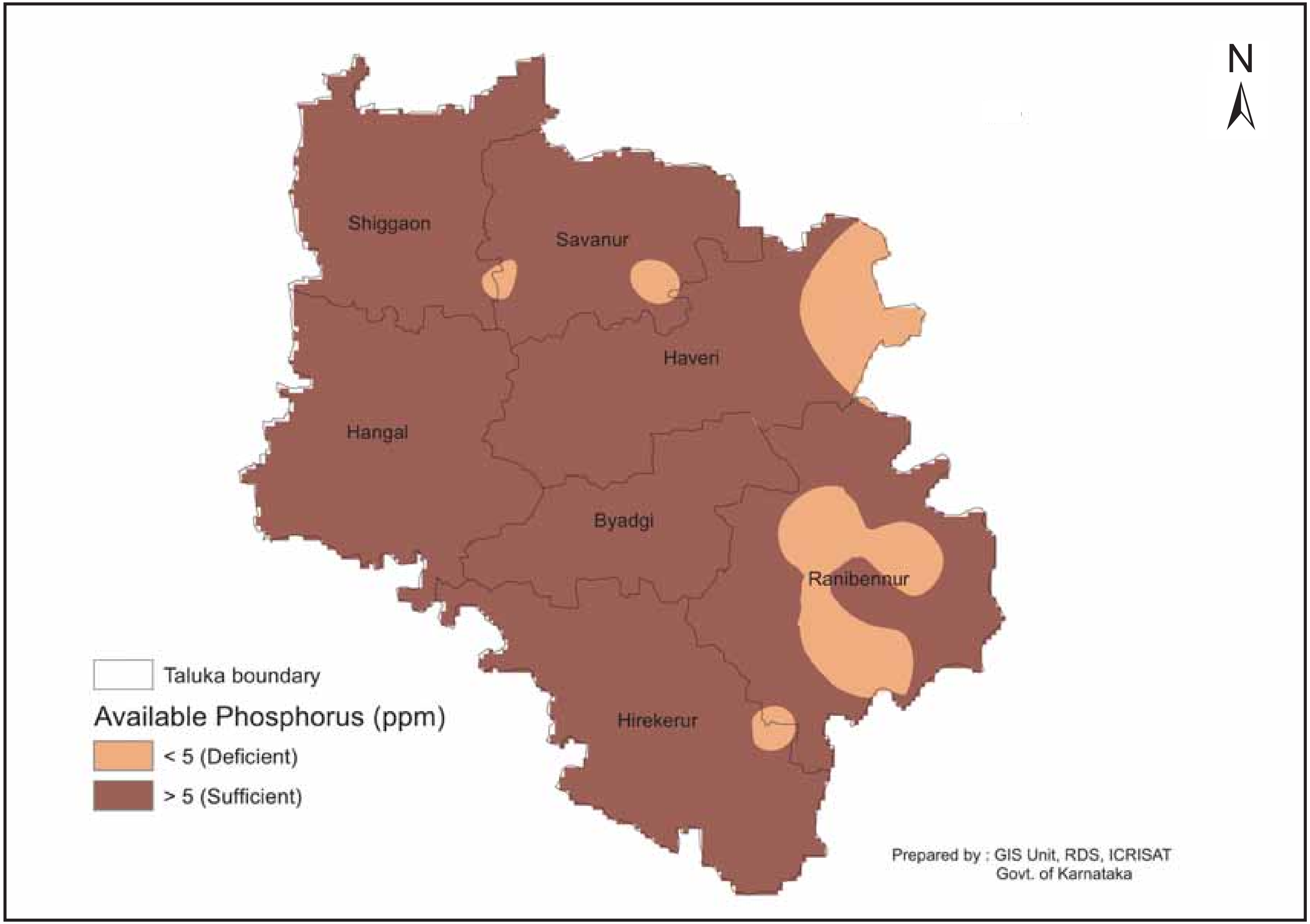


Figure 157. Available phosphorus status in Haveri district

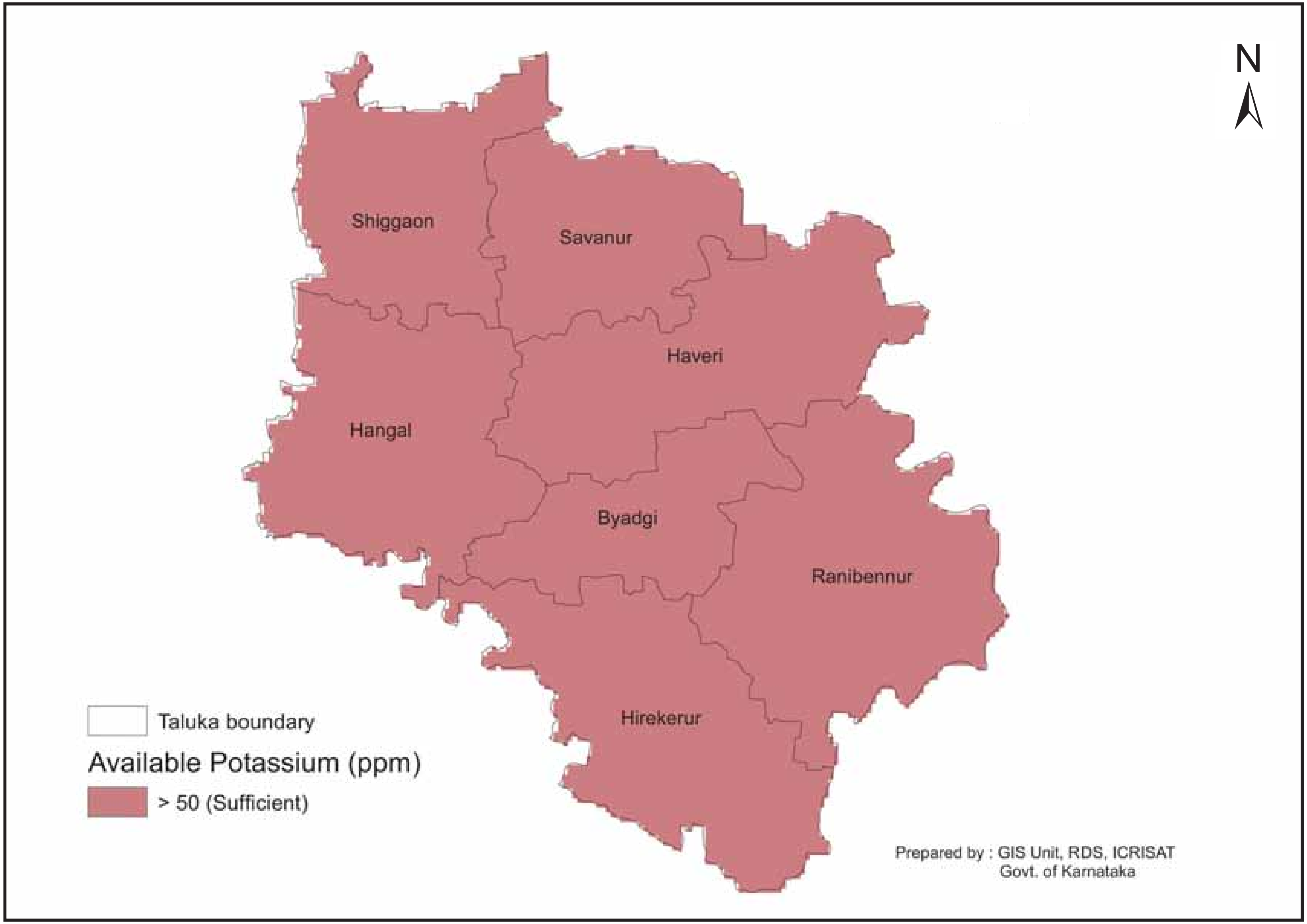


Figure 158. Available potassium status in Haveri district

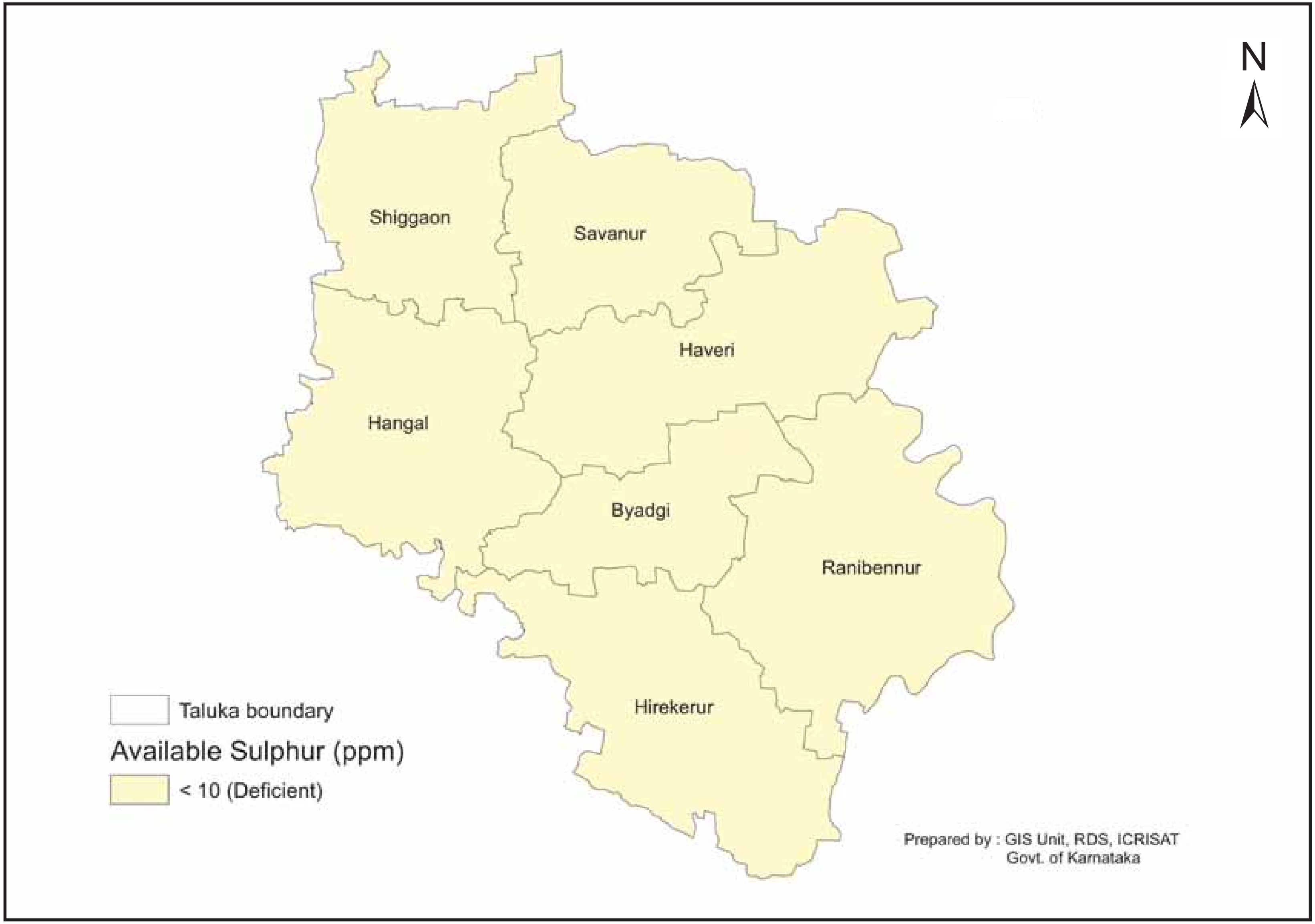


Figure 159. Available sulphur status in Haveri district

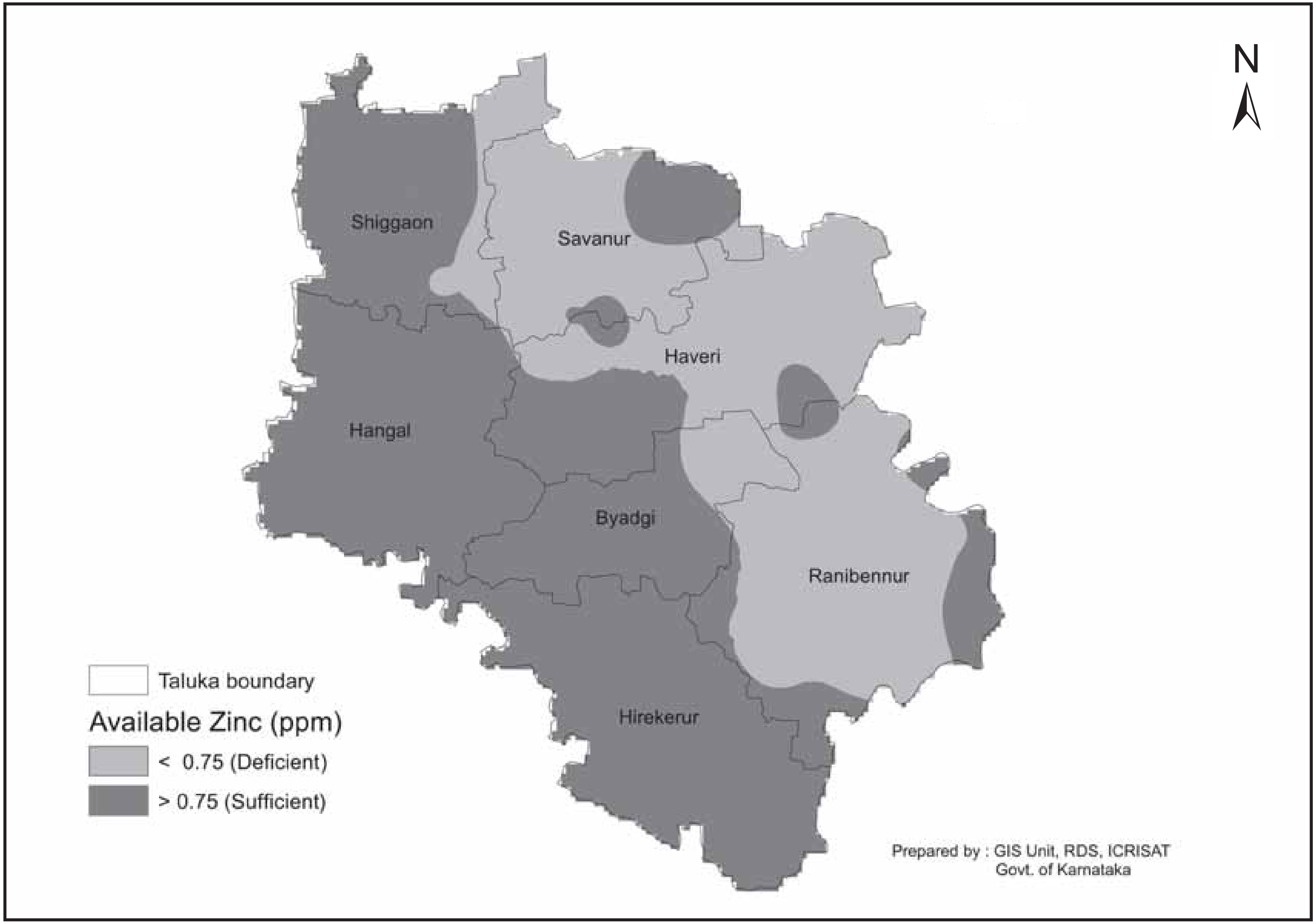


Figure 160. Available zinc status in Haveri district

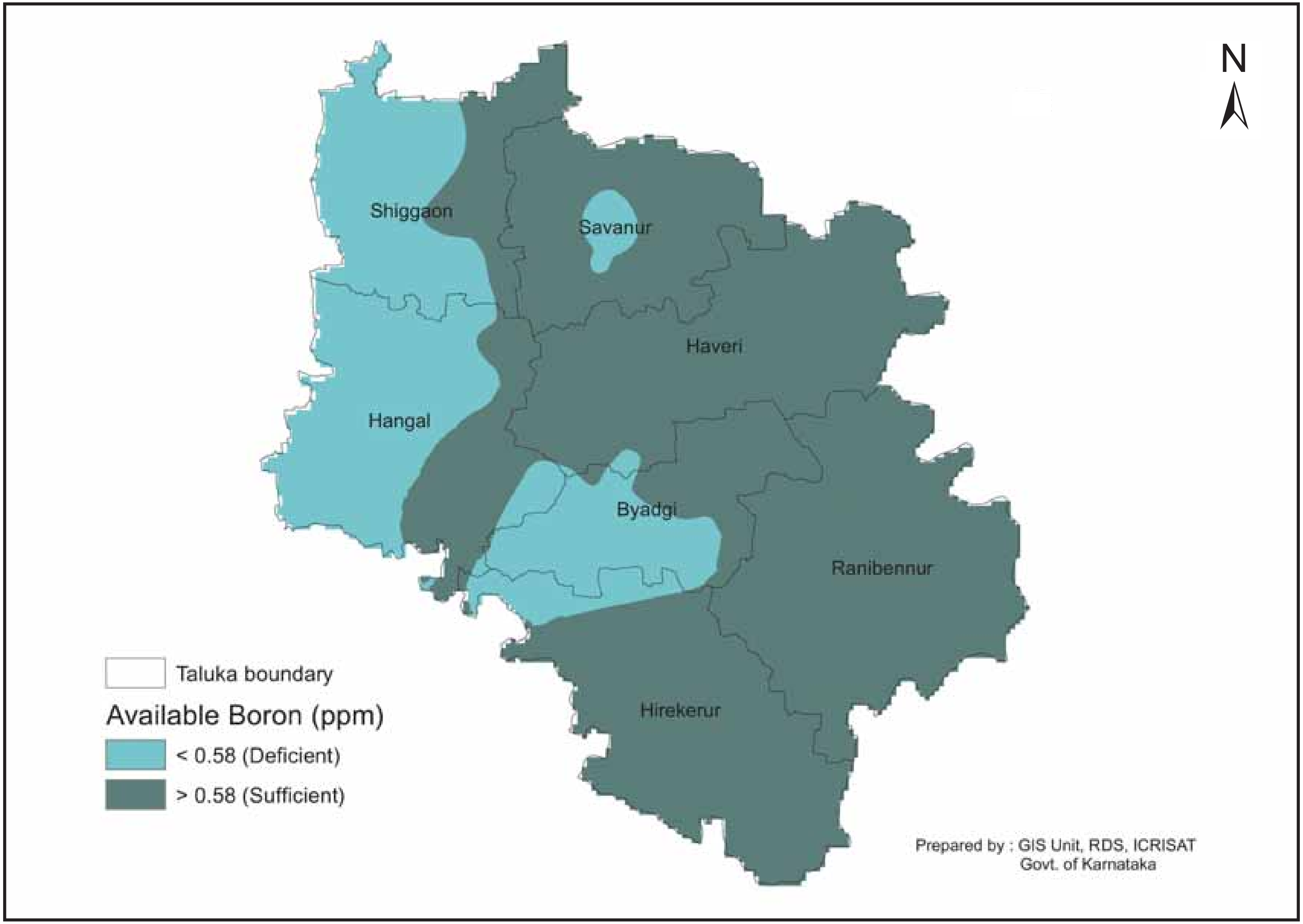


Figure 161. Available boron status in Haveri district

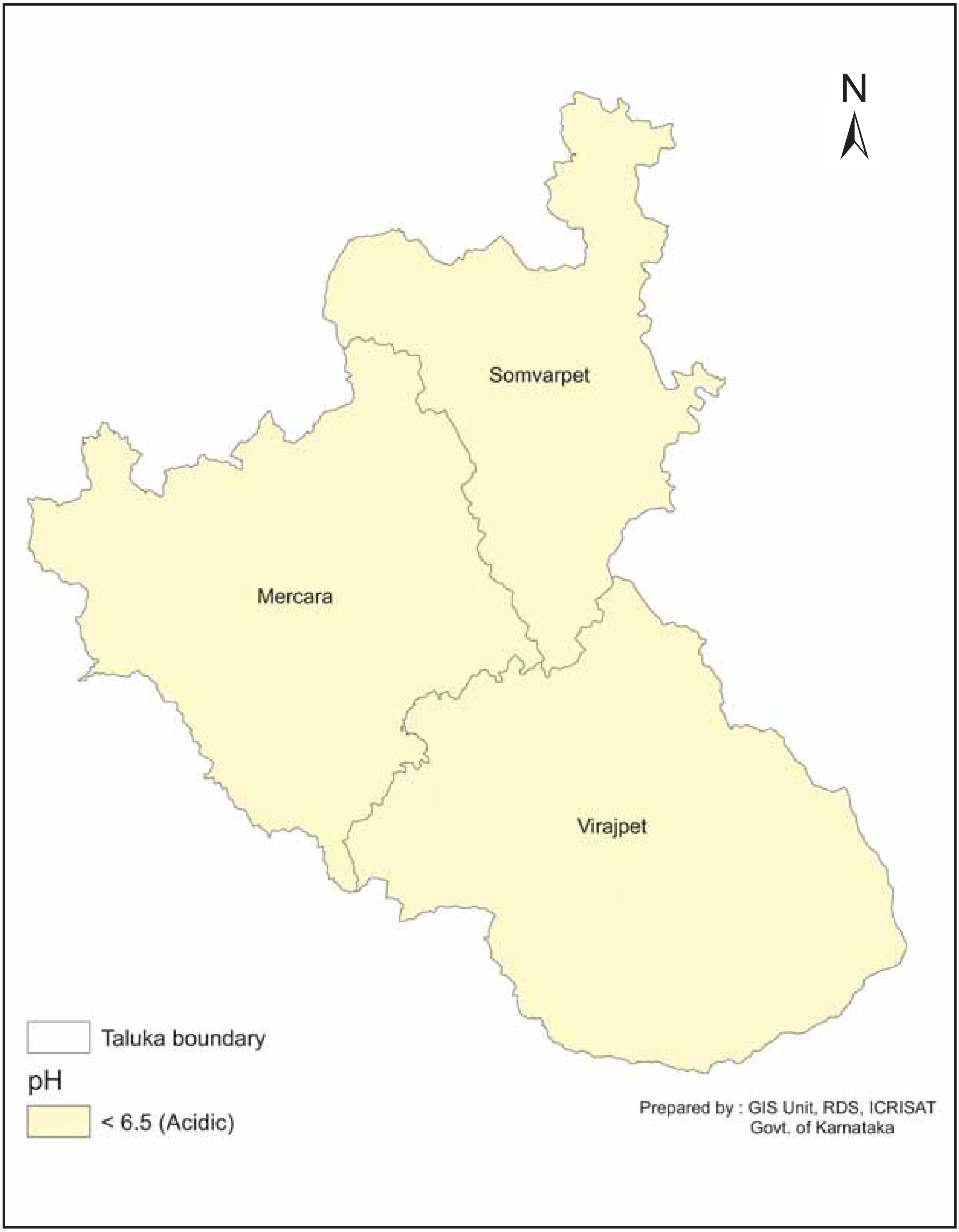


Figure 162. pH status in Kodagu district

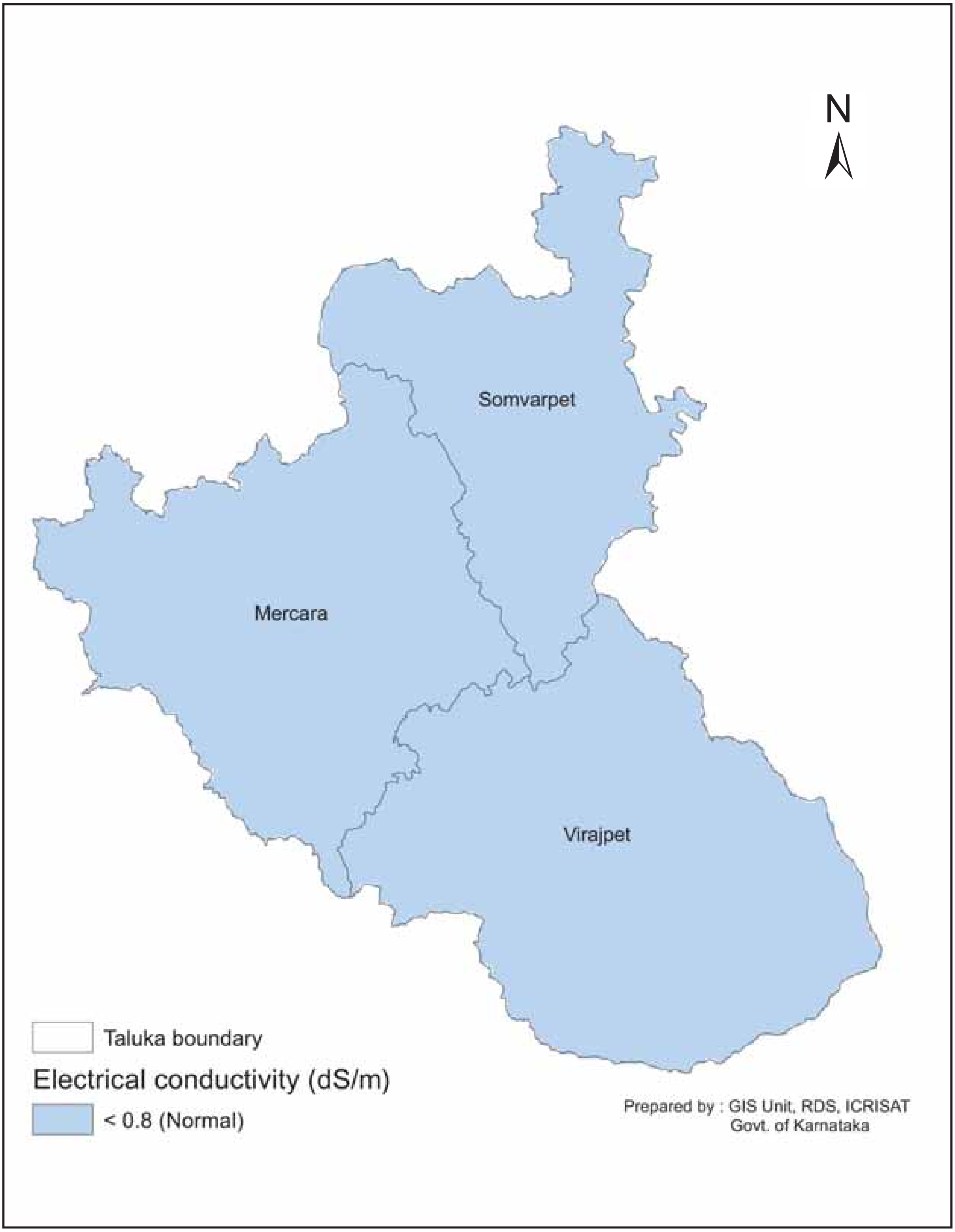


Figure 163. Electrical conductivity status in Kodagu district

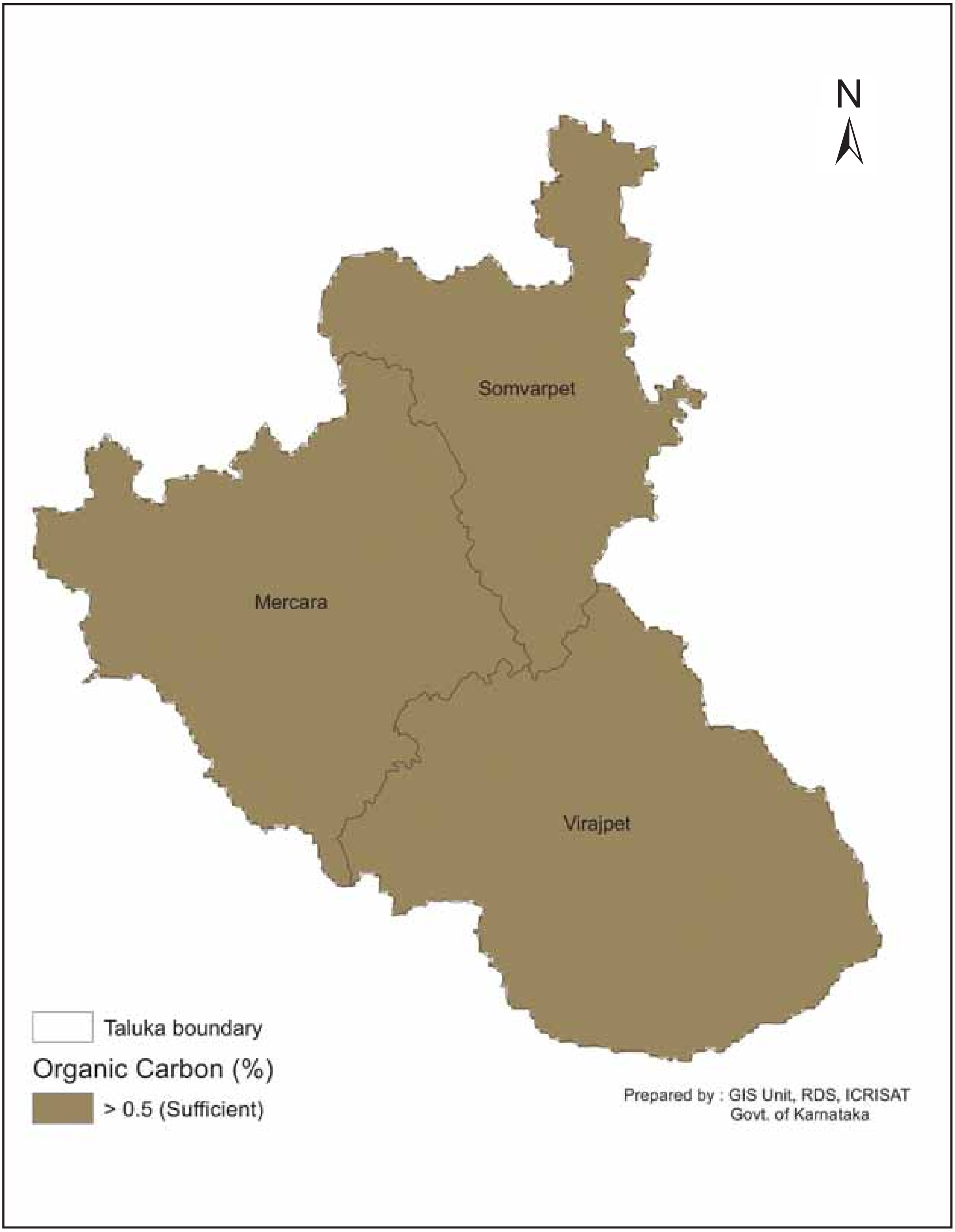


Figure 164. Organic carbon status in Kodagu district

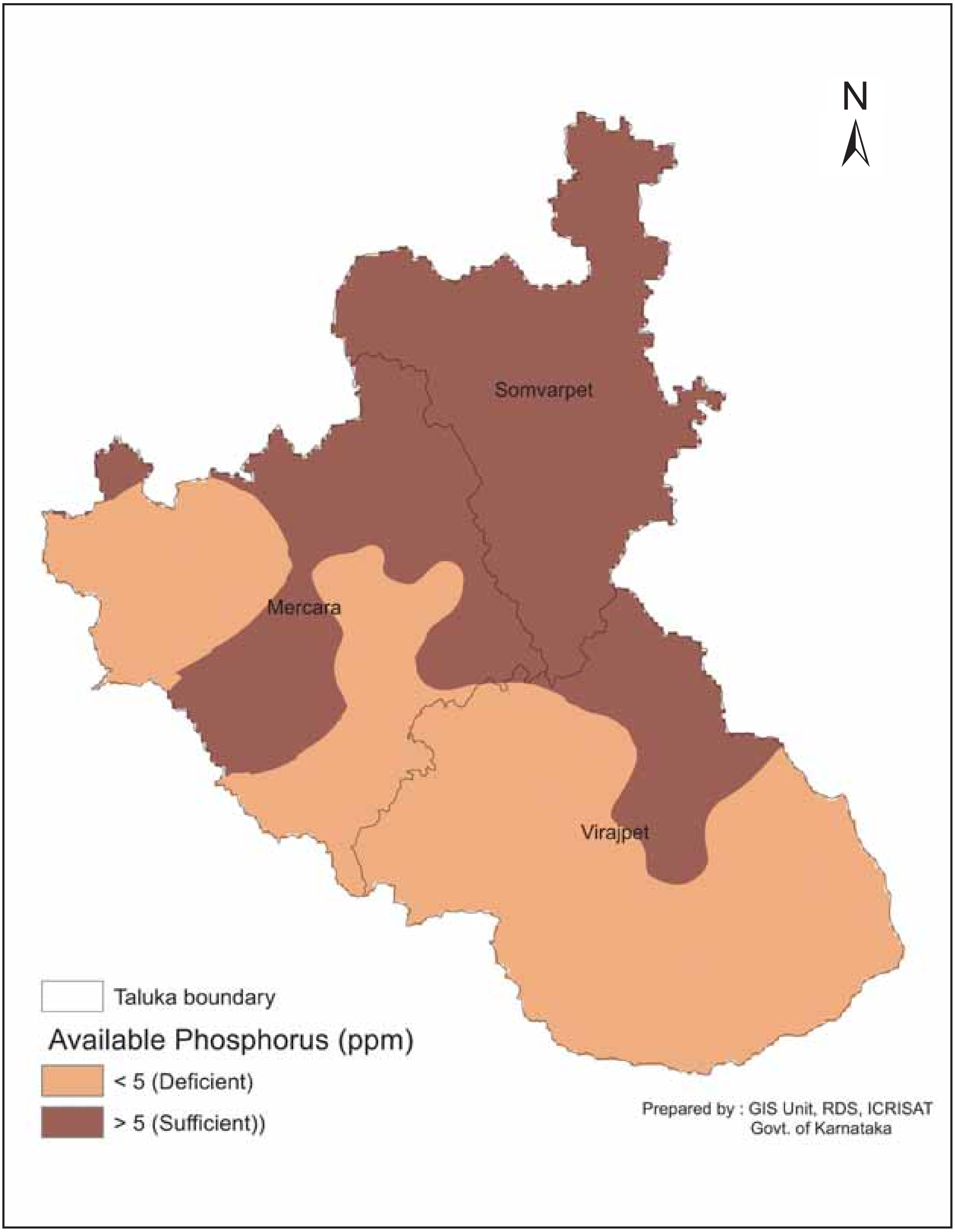


Figure 165. Available phosphorus status in Kodagu district

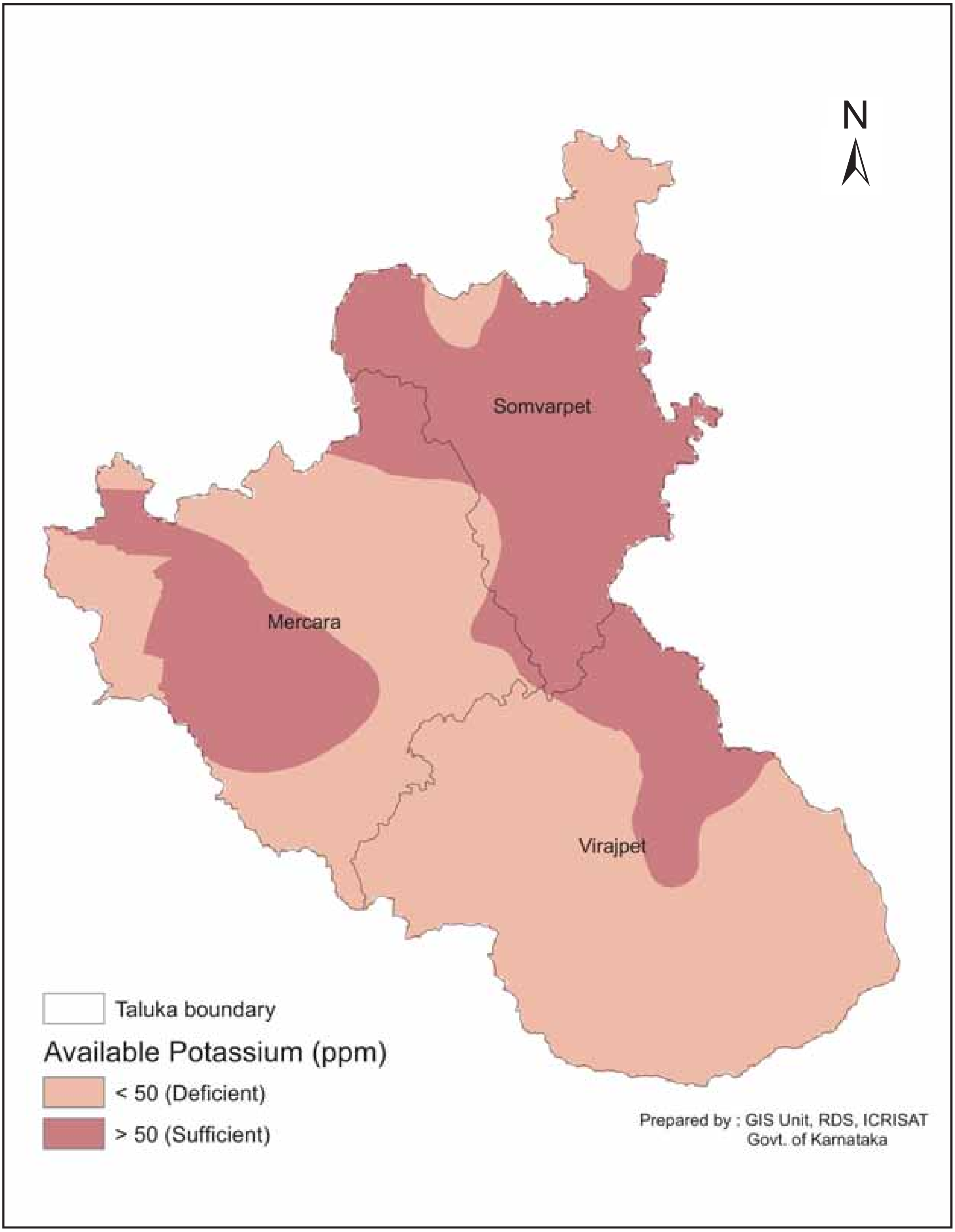


Figure 166. Available potassium status in Kodagu district

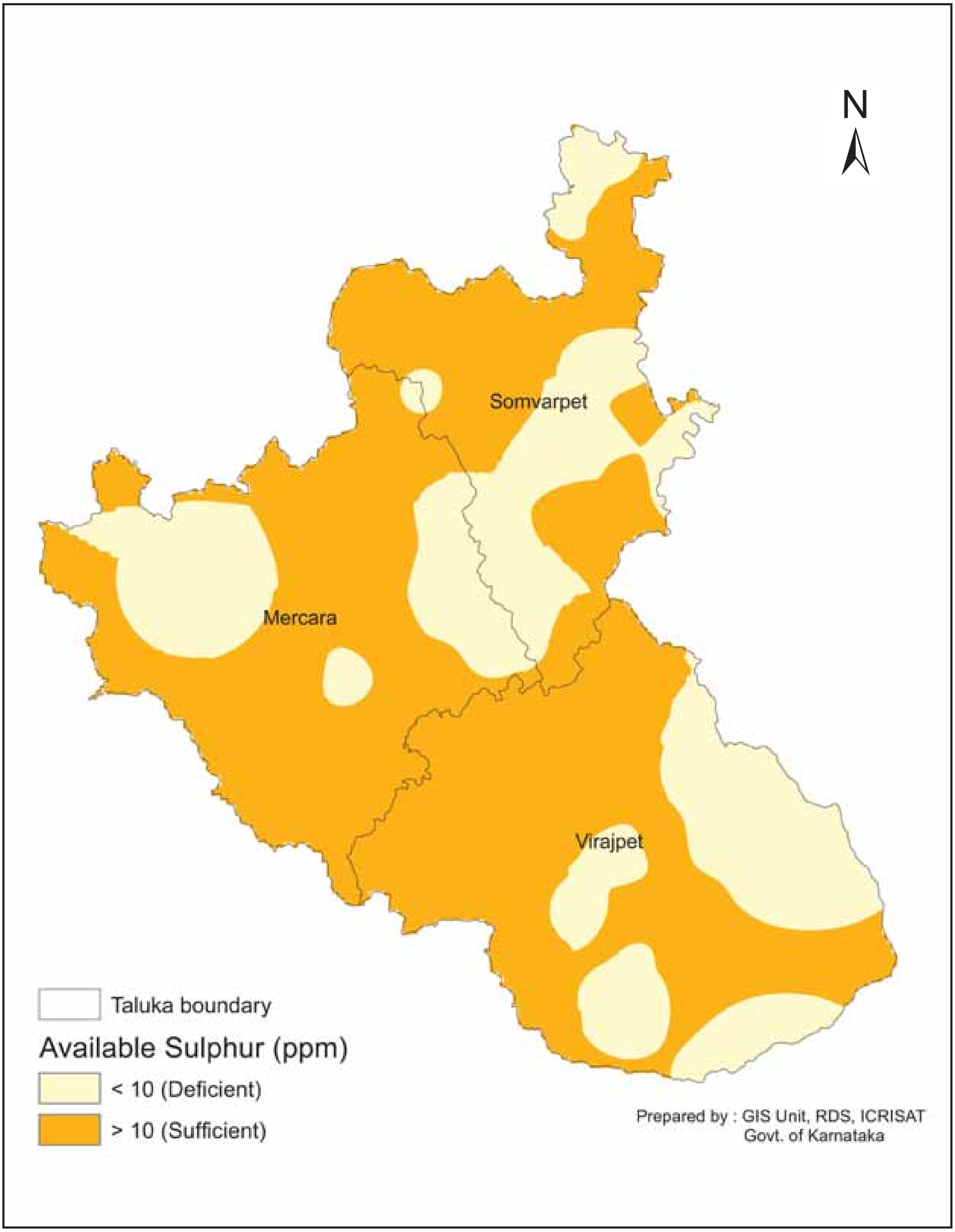


Figure 167. Available sulphur status in Kodagu district

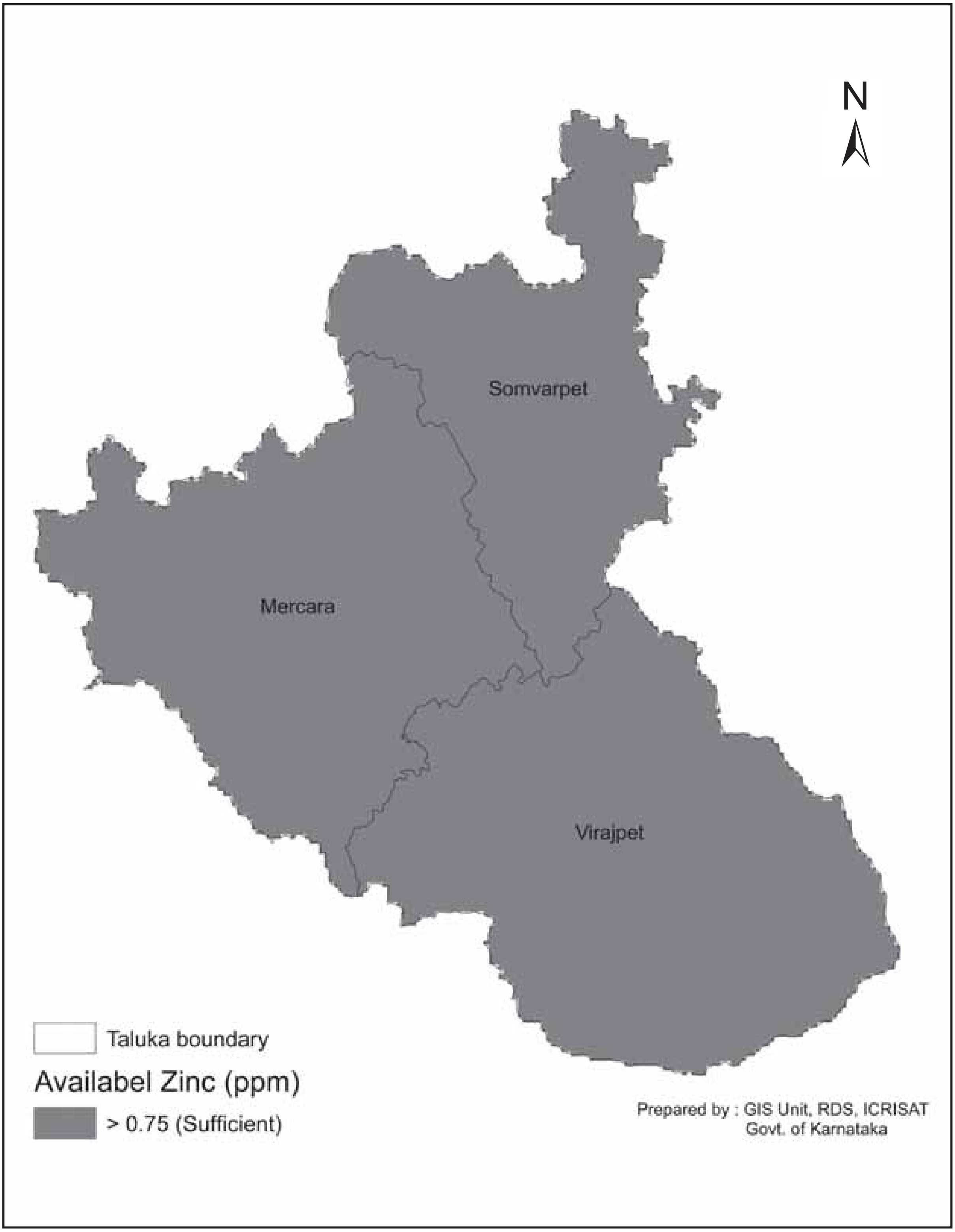


Figure 168. Available zinc status in Kodagu district

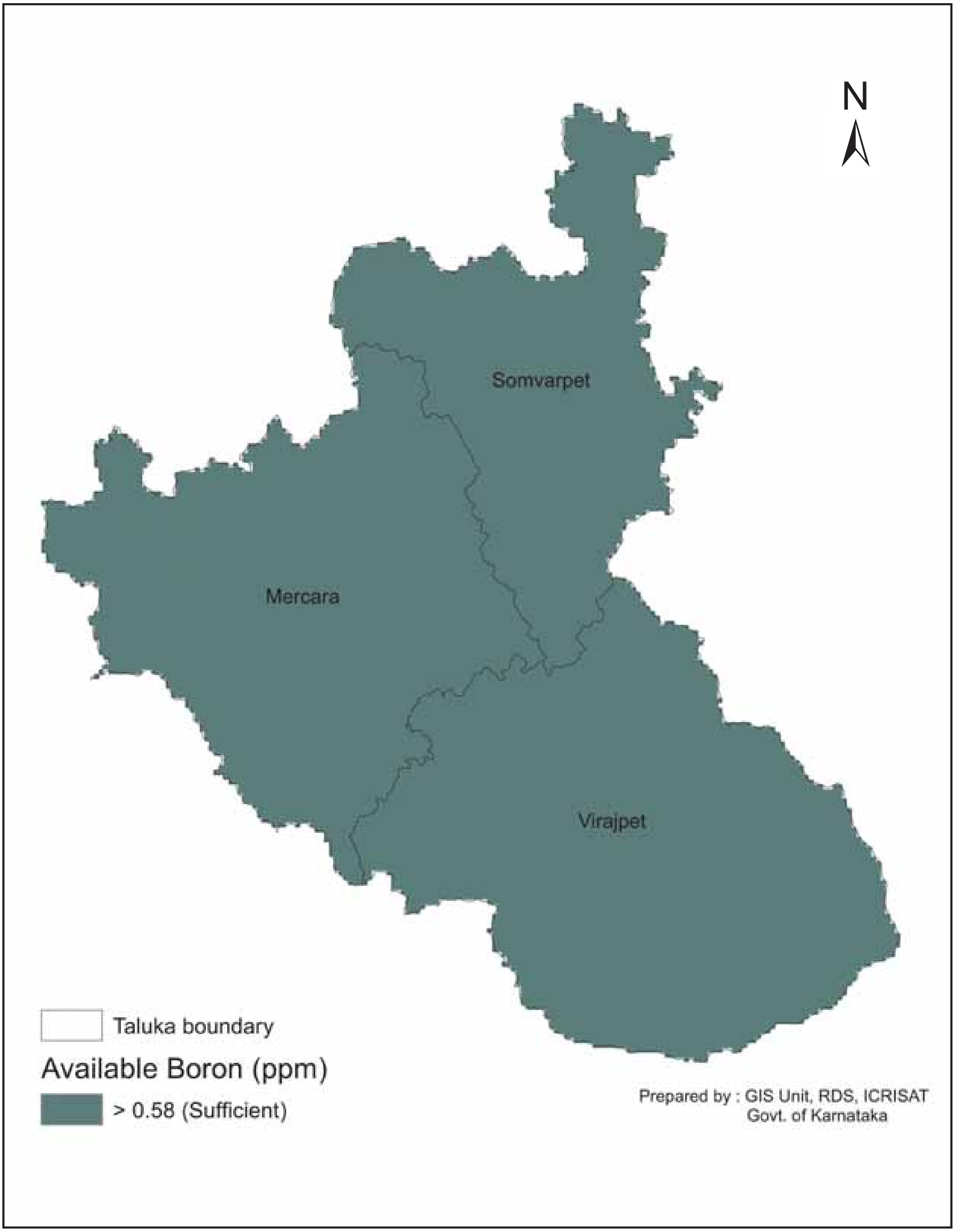


Figure 169. Available boron status in Kodagu district

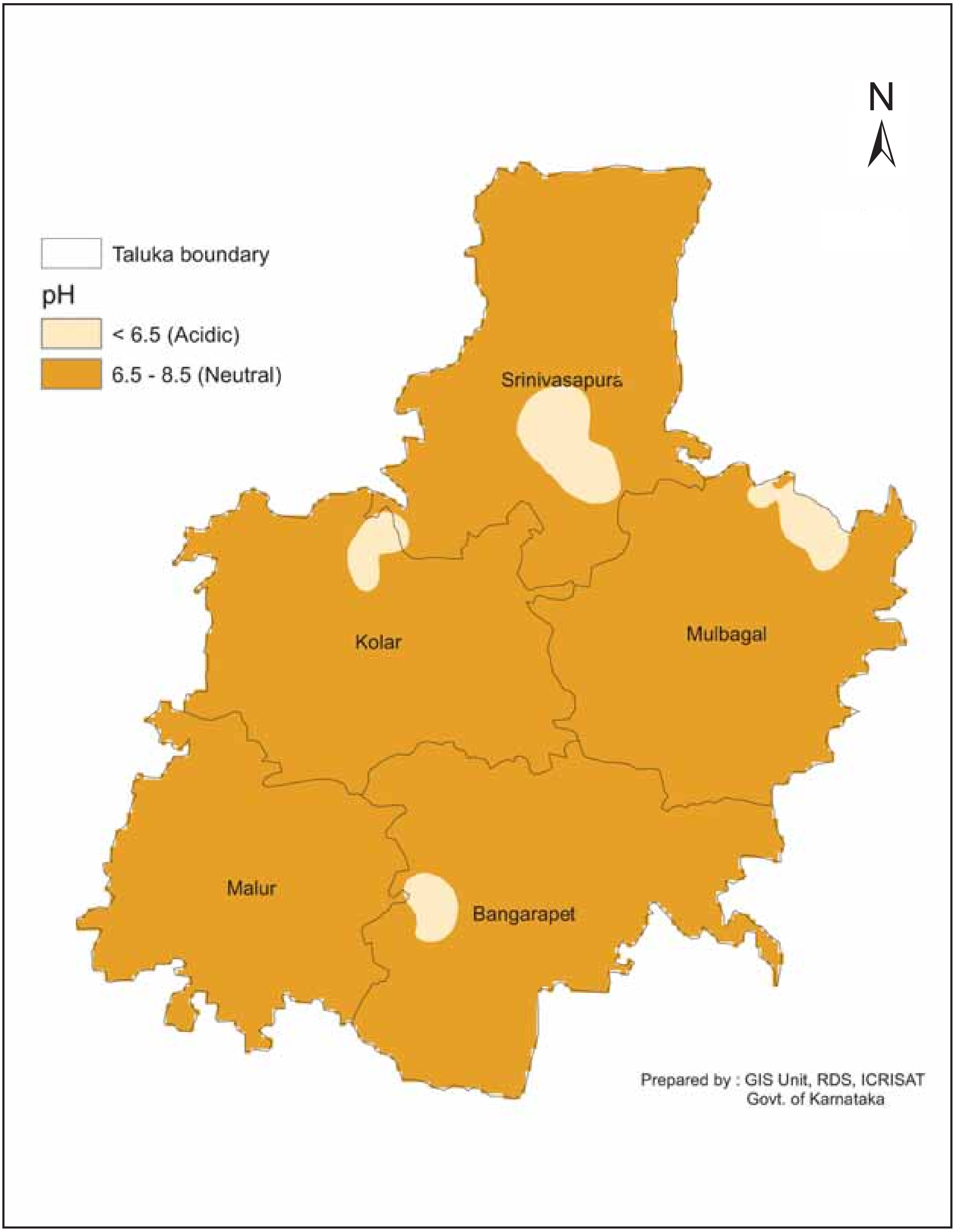


Figure 170. pH status in Kolar district

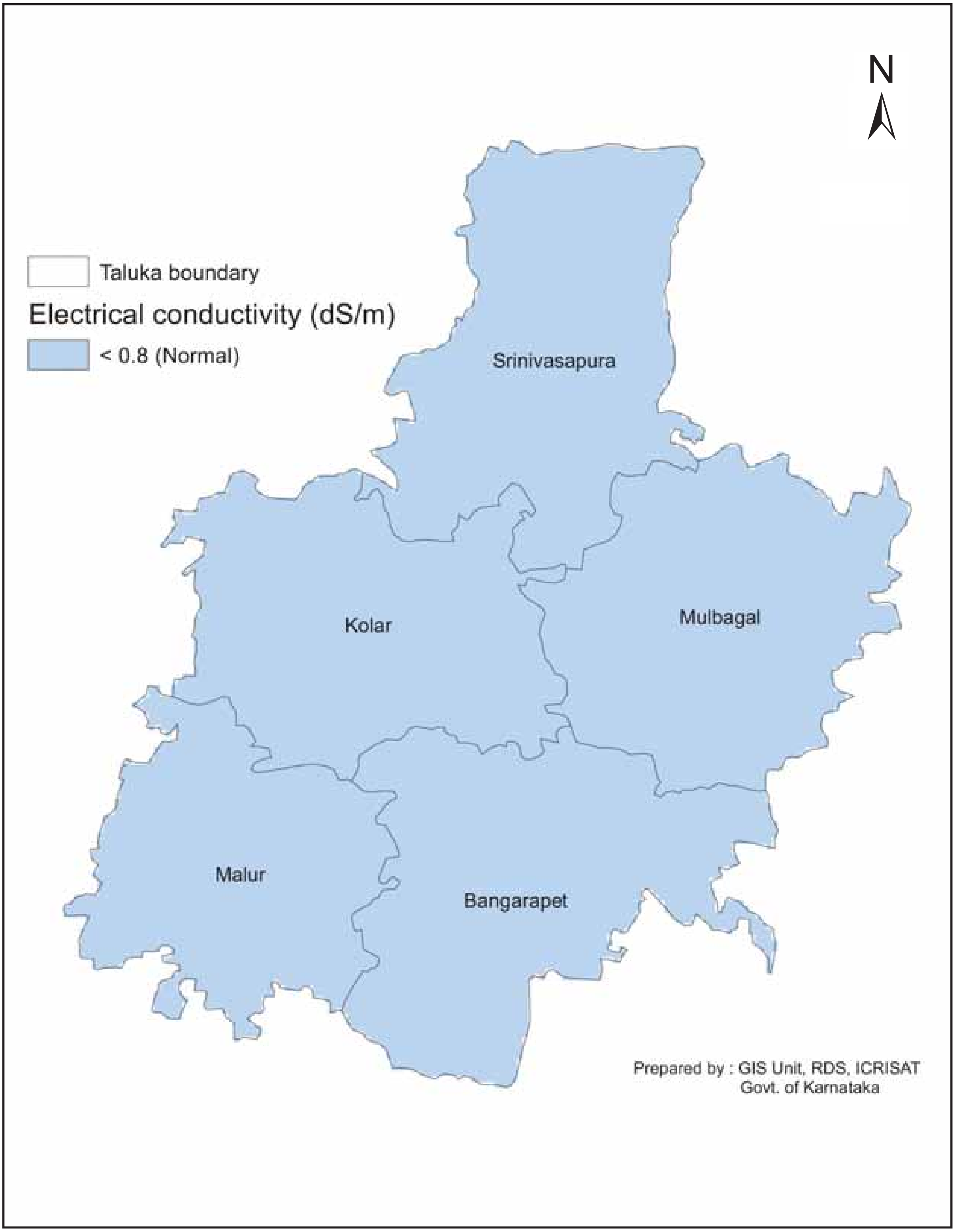


Figure 171. Electrical conductivity status in Kolar district

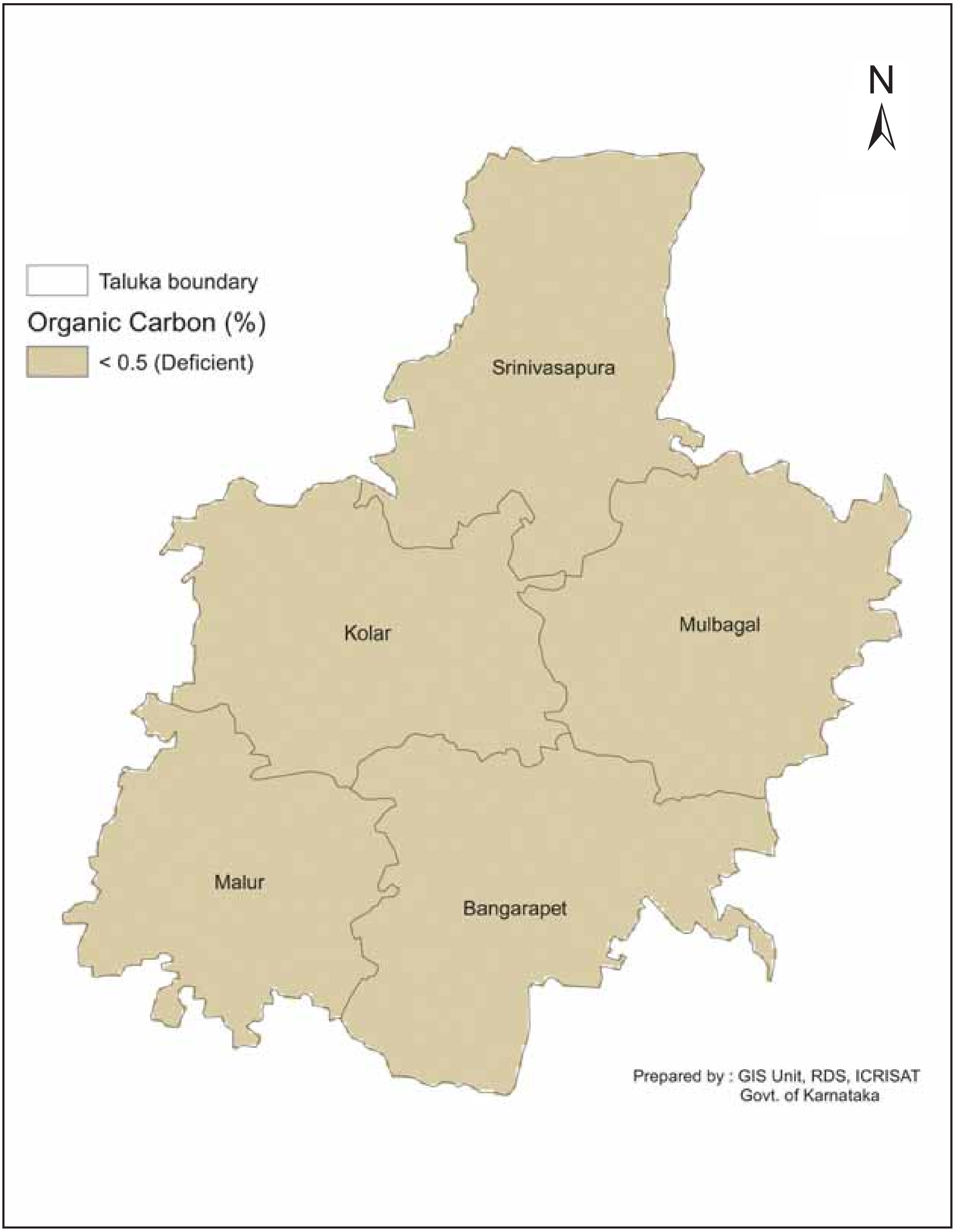


Figure 172. Organic carbon status in Kolar district

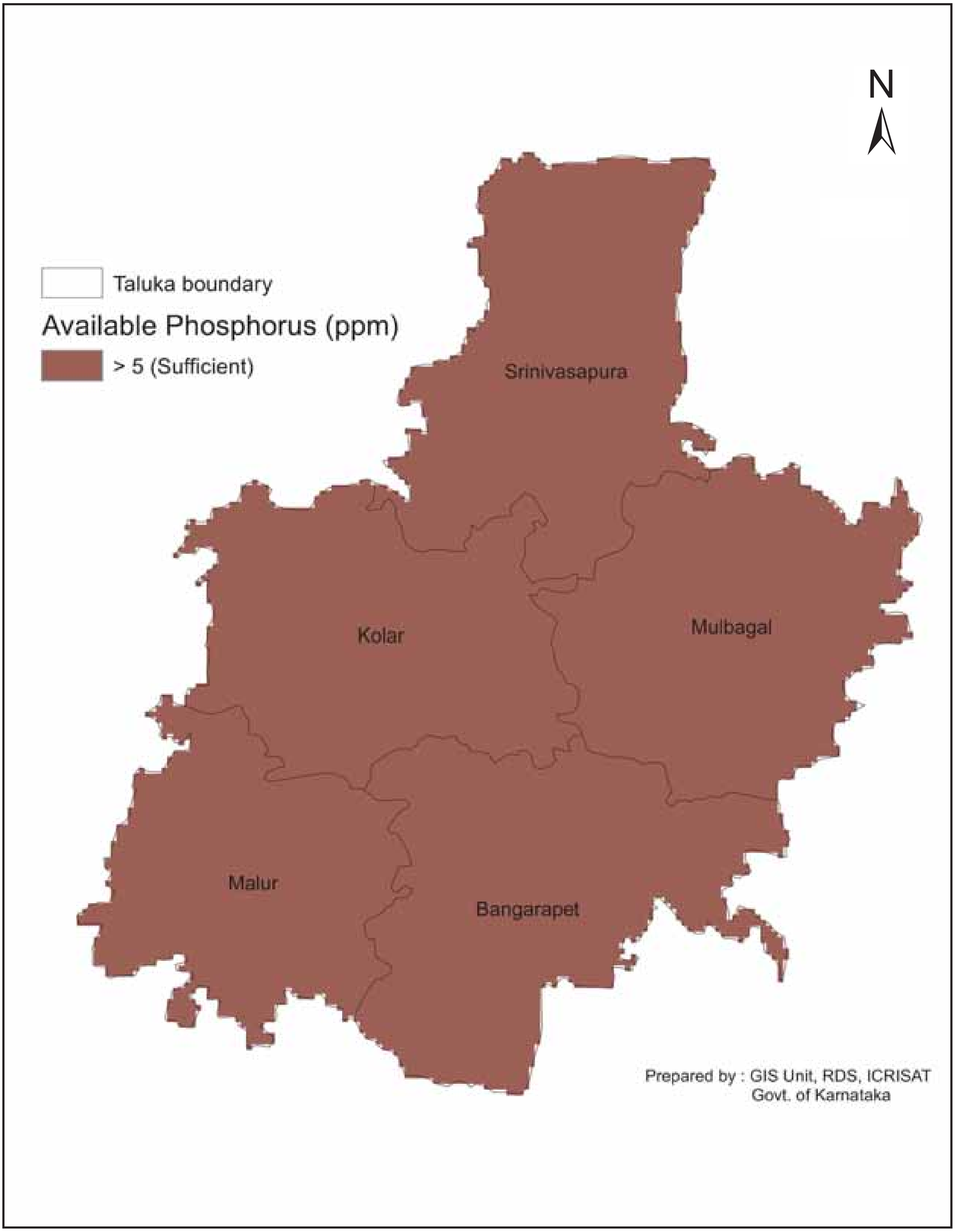


Figure 173. Available phosphorus status in Kolar district

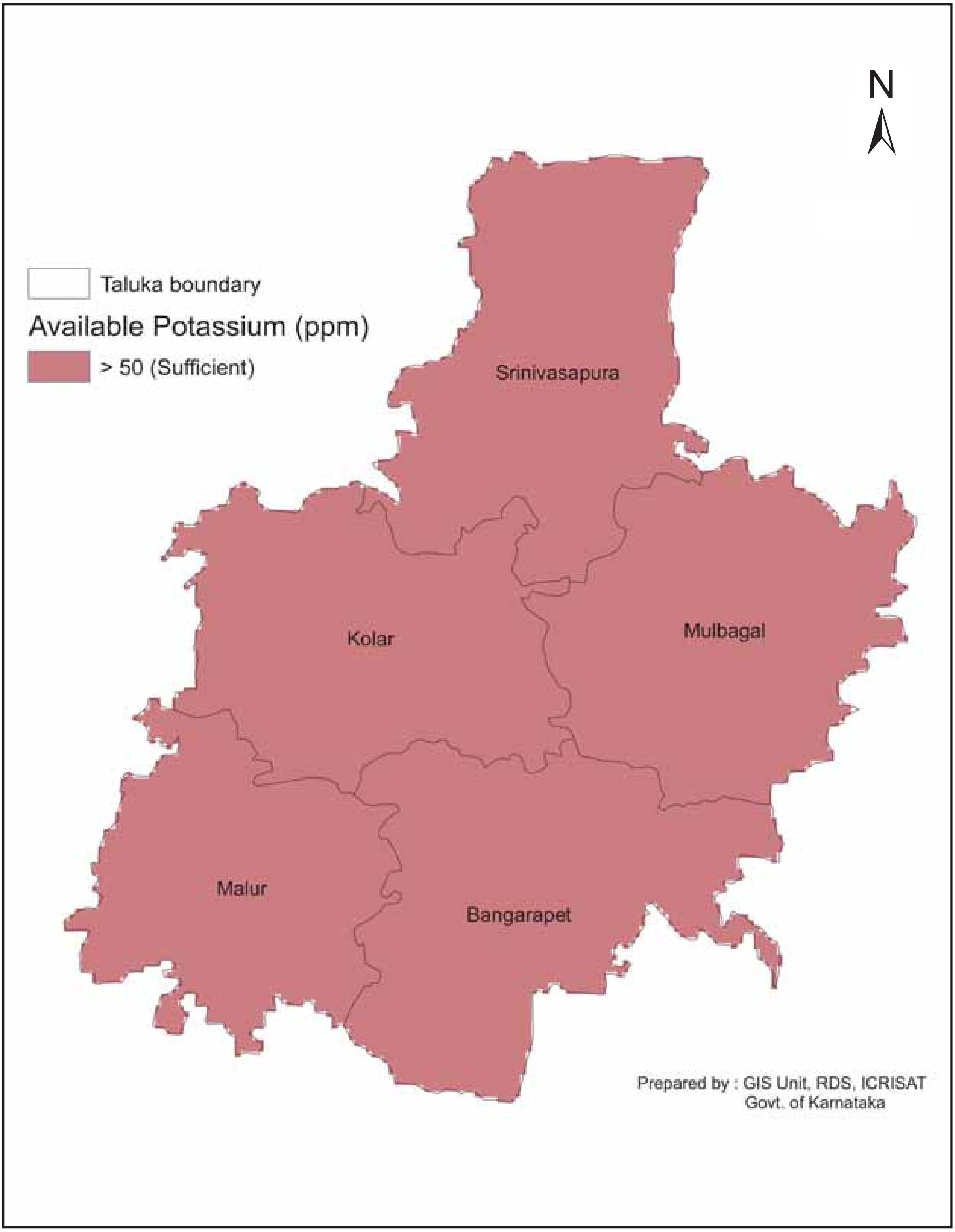


Figure 174. Available potassium status in Kolar district

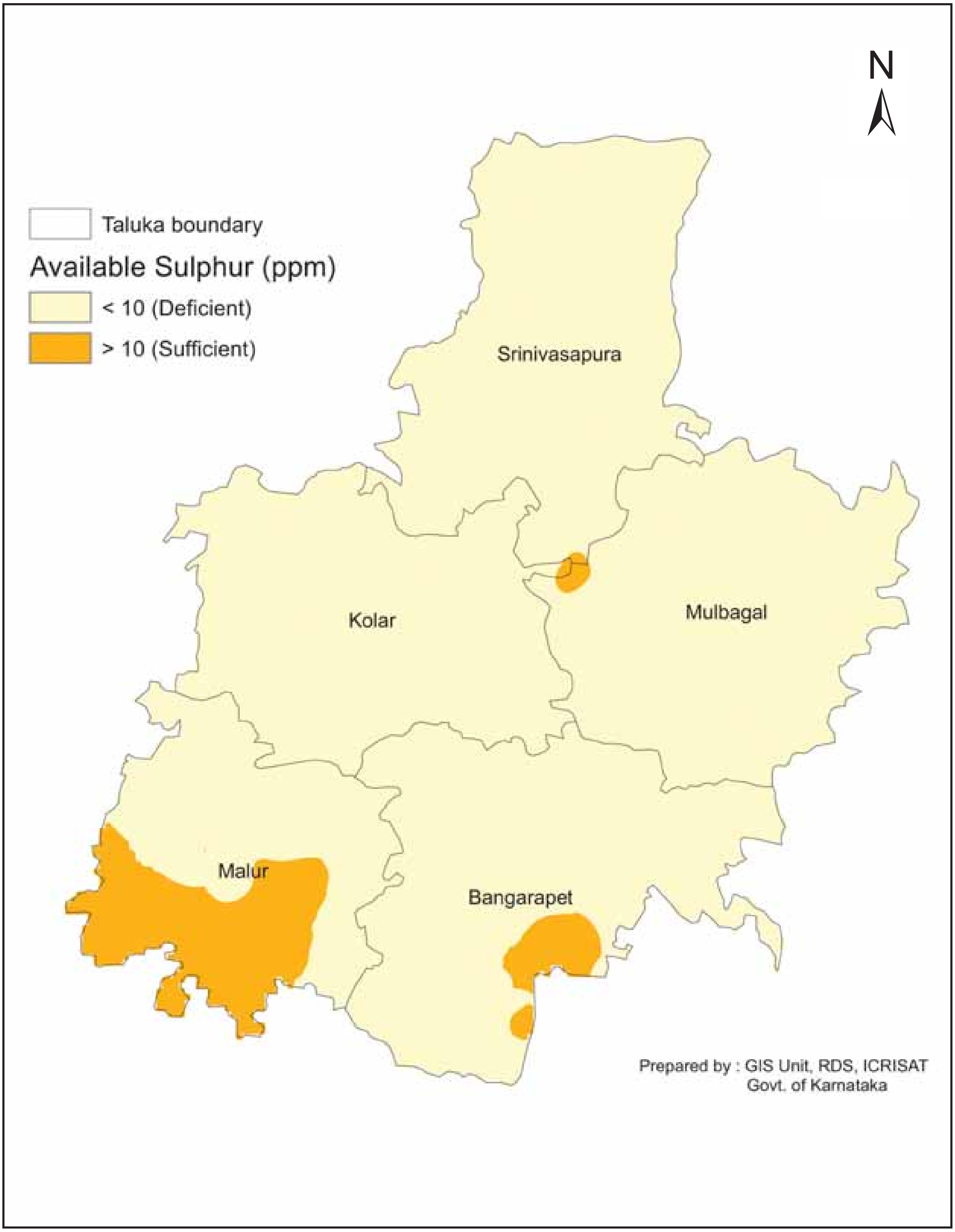


Figure 175. Available sulphur status in Kolar district

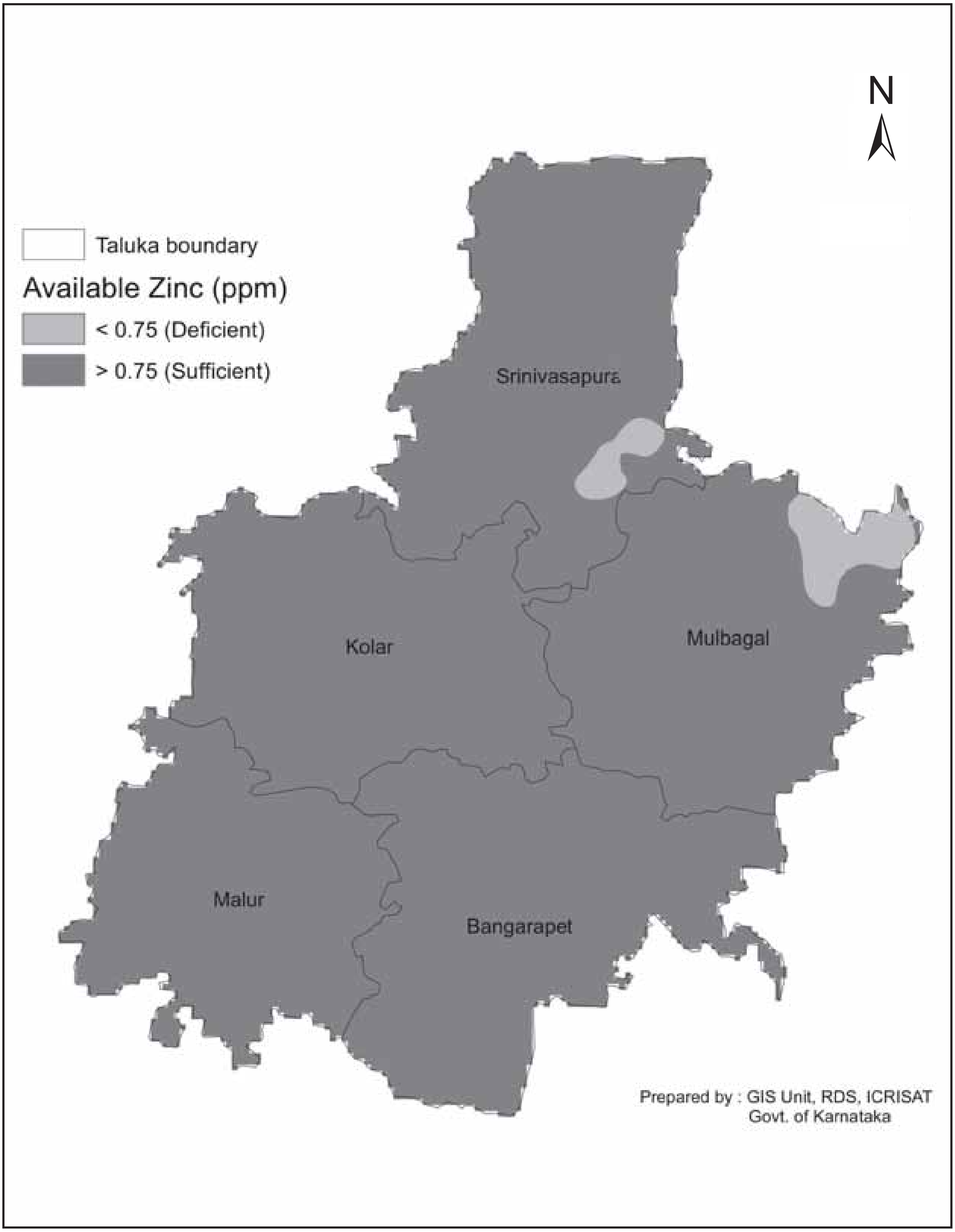


Figure 176. Available zinc status in Kolar district

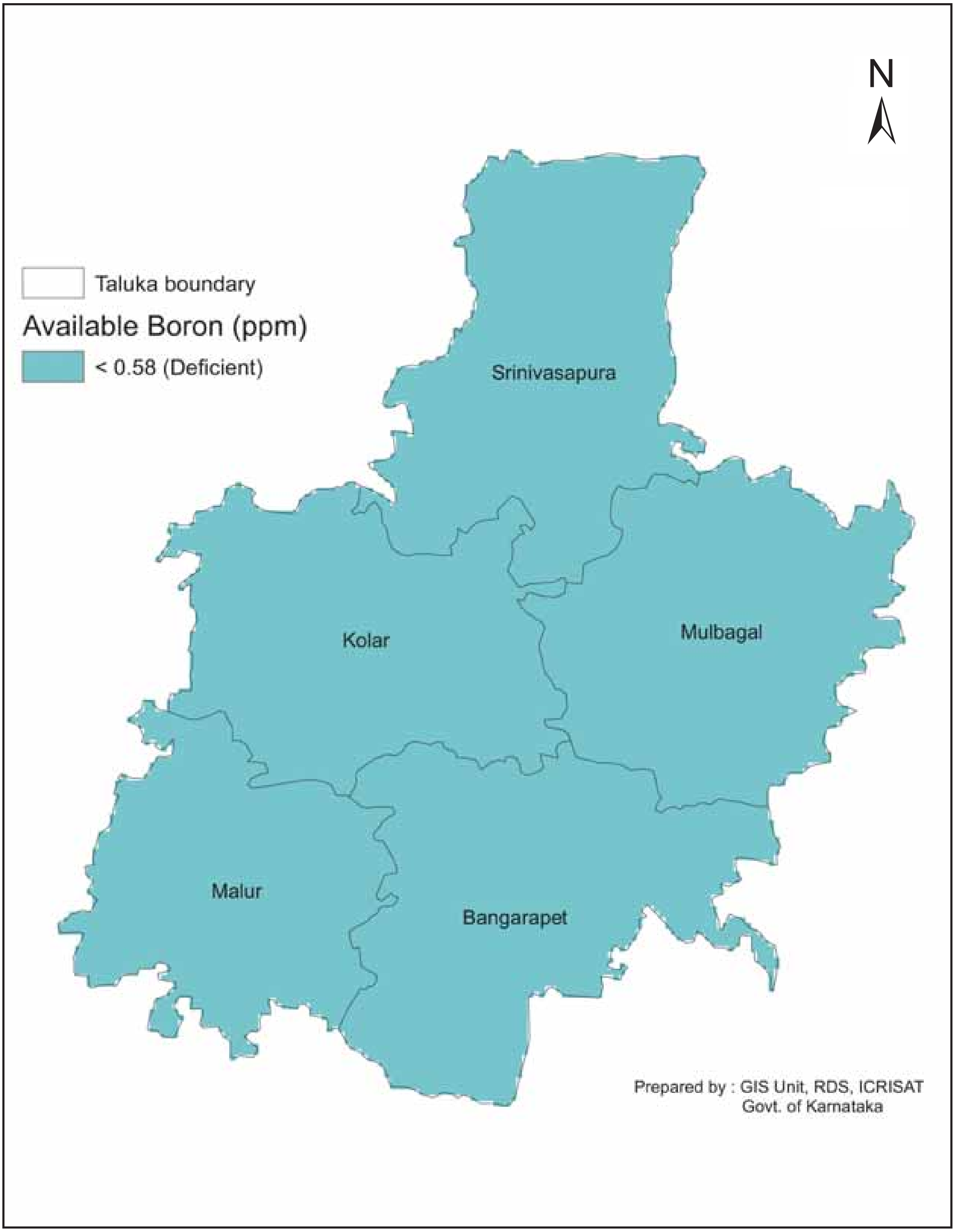


Figure 177. Available boron status in Kolar district

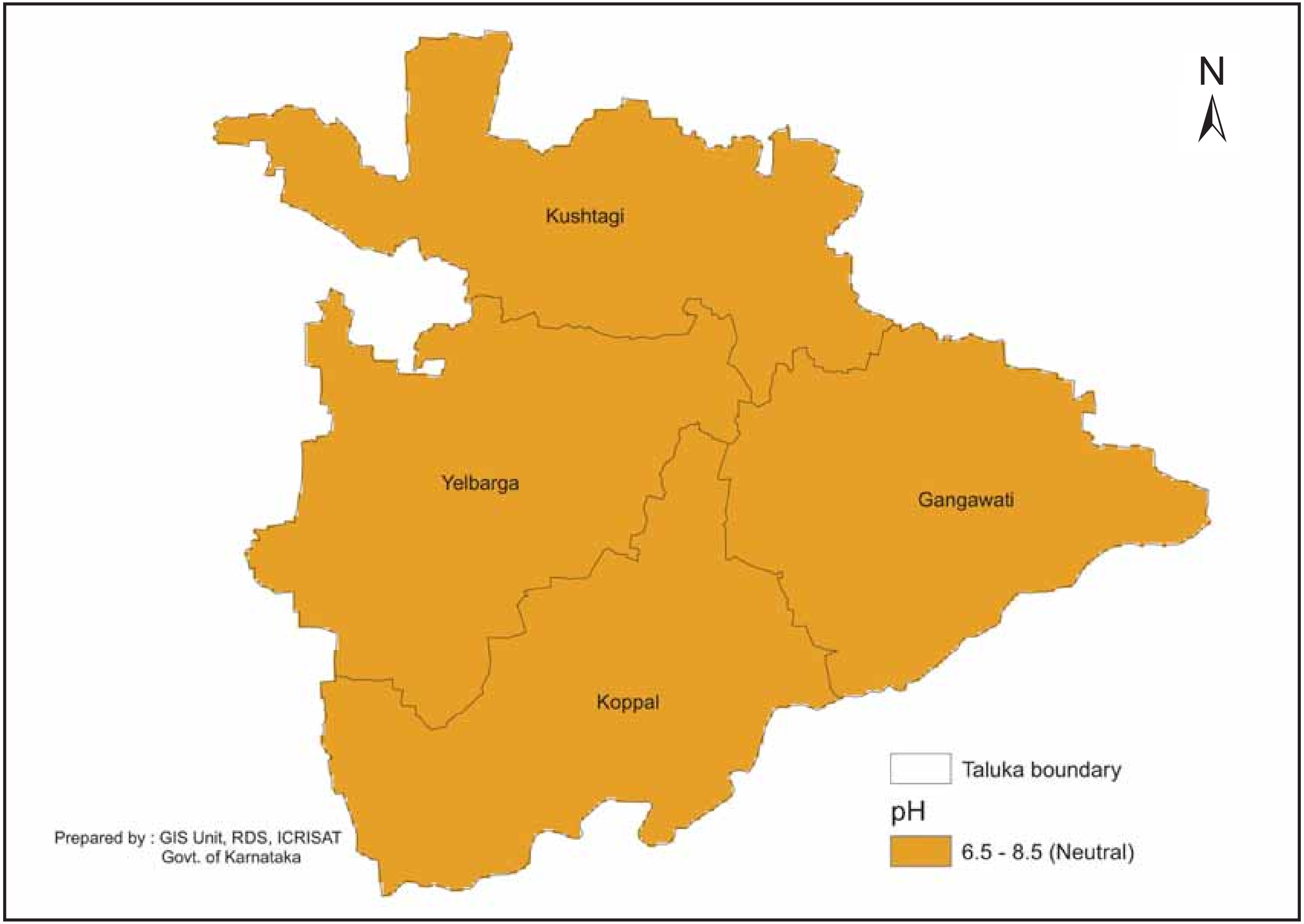


Figure 178. pH status in Koppal district

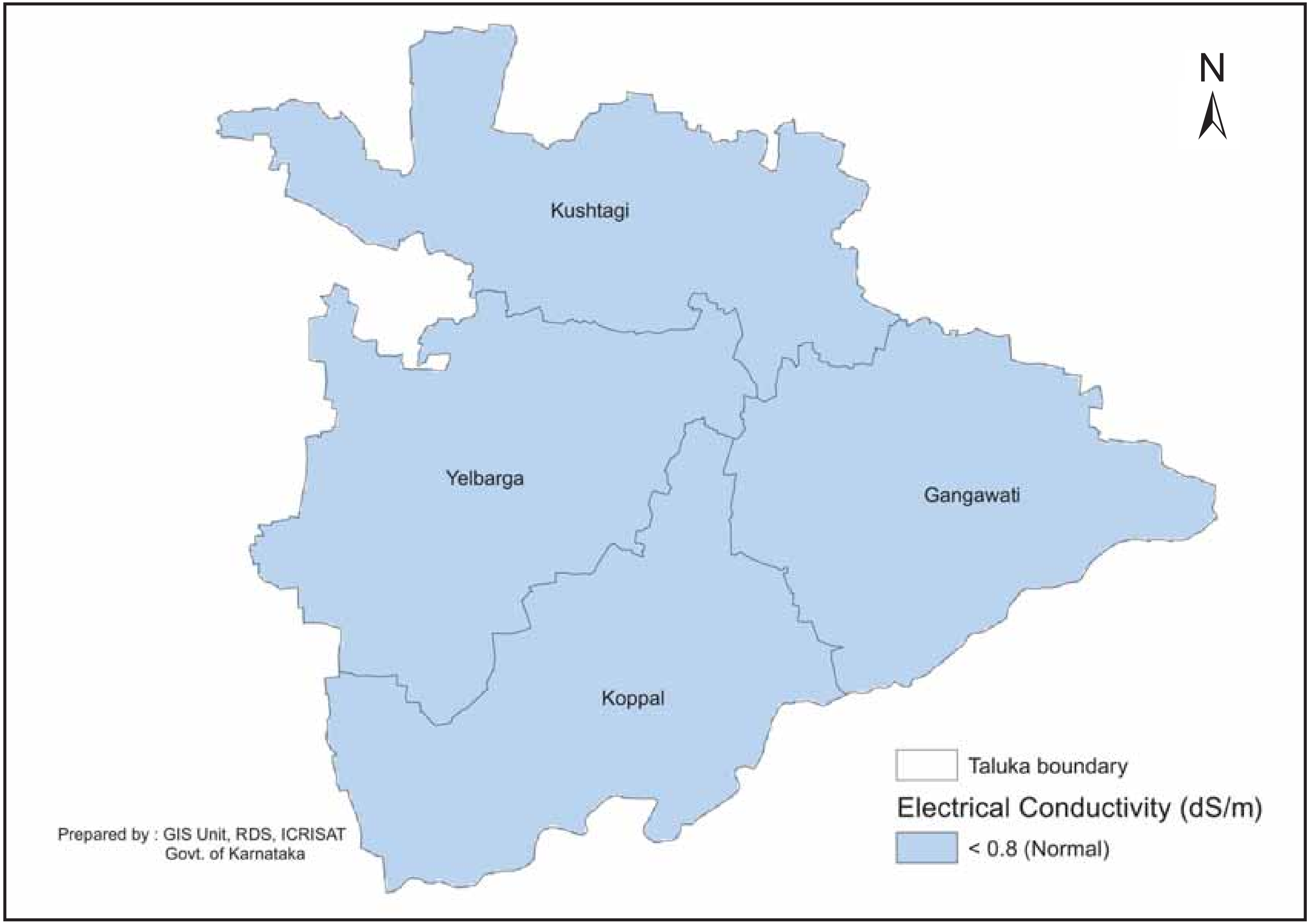


Figure 179. Electrical conductivity status in Koppal district

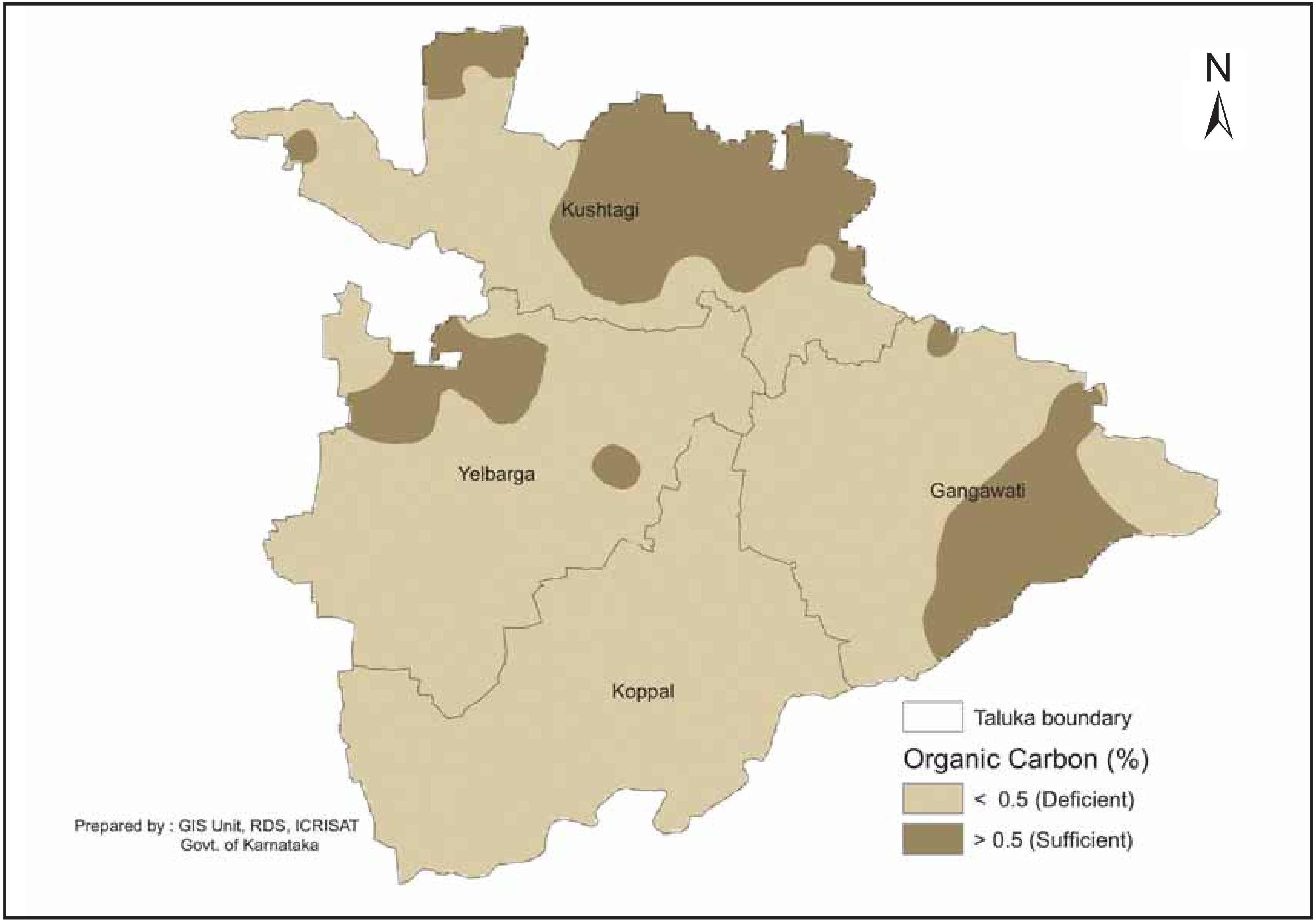


Figure 180. Organic carbon status in Koppal district

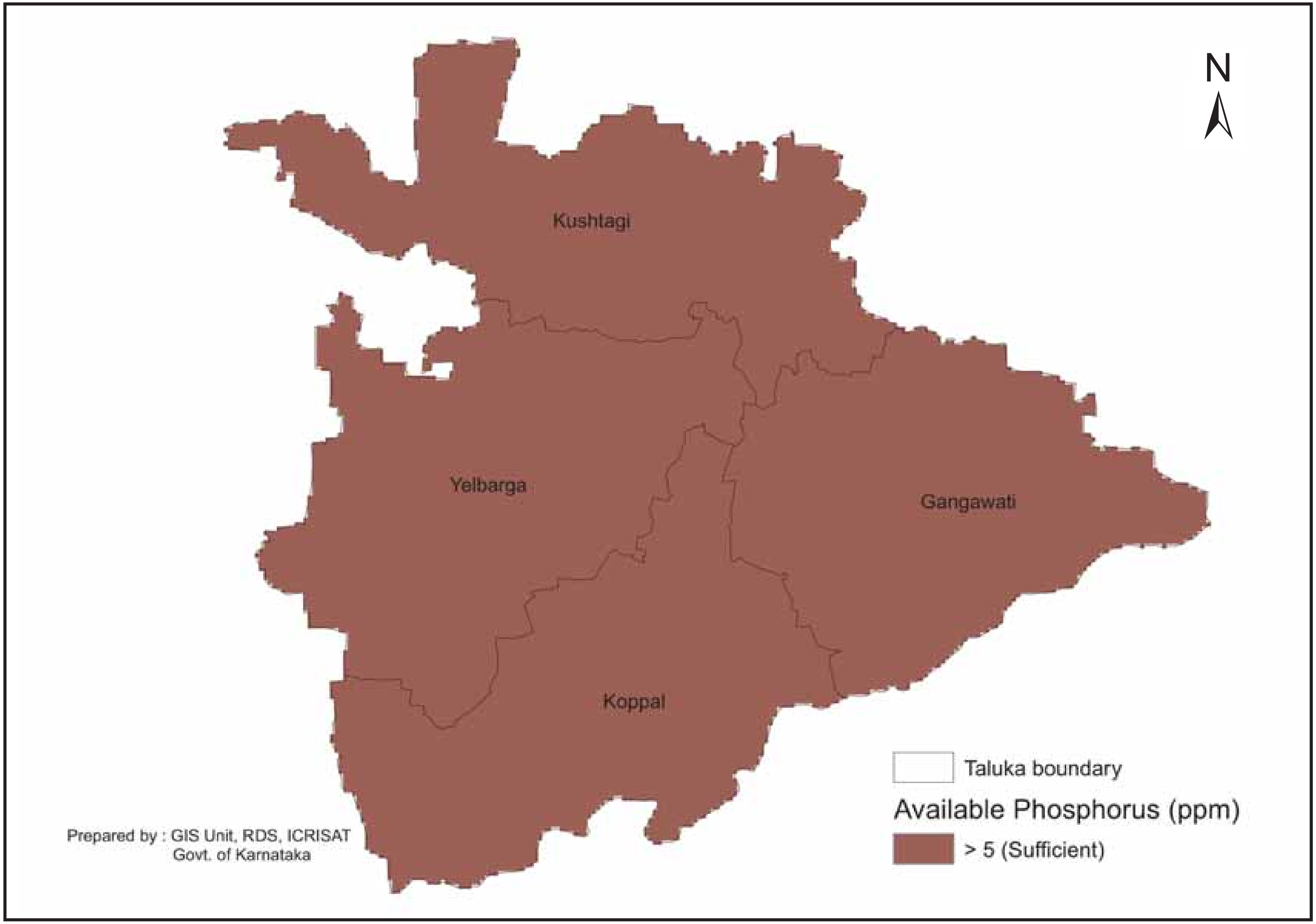


Figure 181. Available phosphorus status in Koppal district

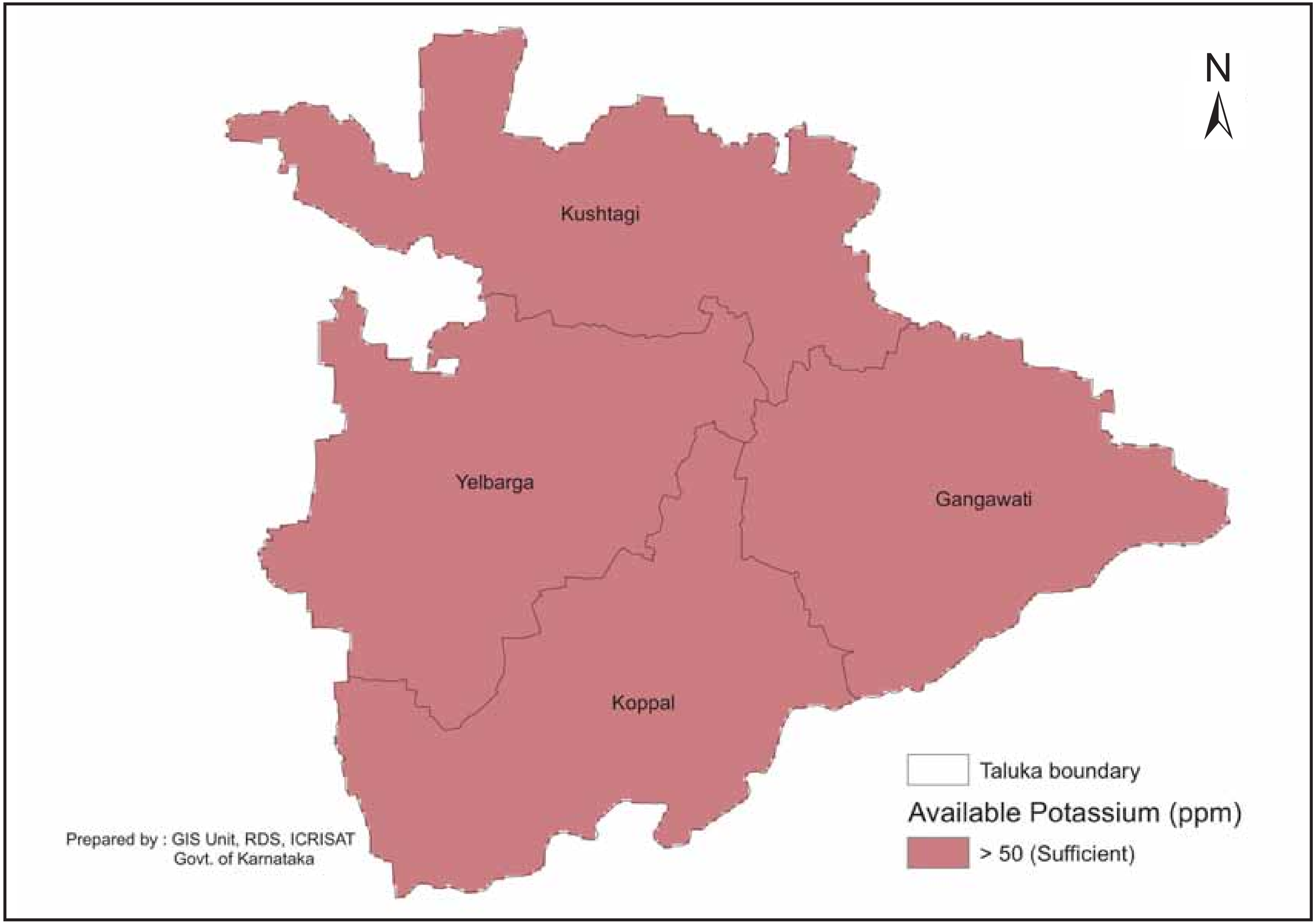


Figure 182. Available potassium status in Koppal district

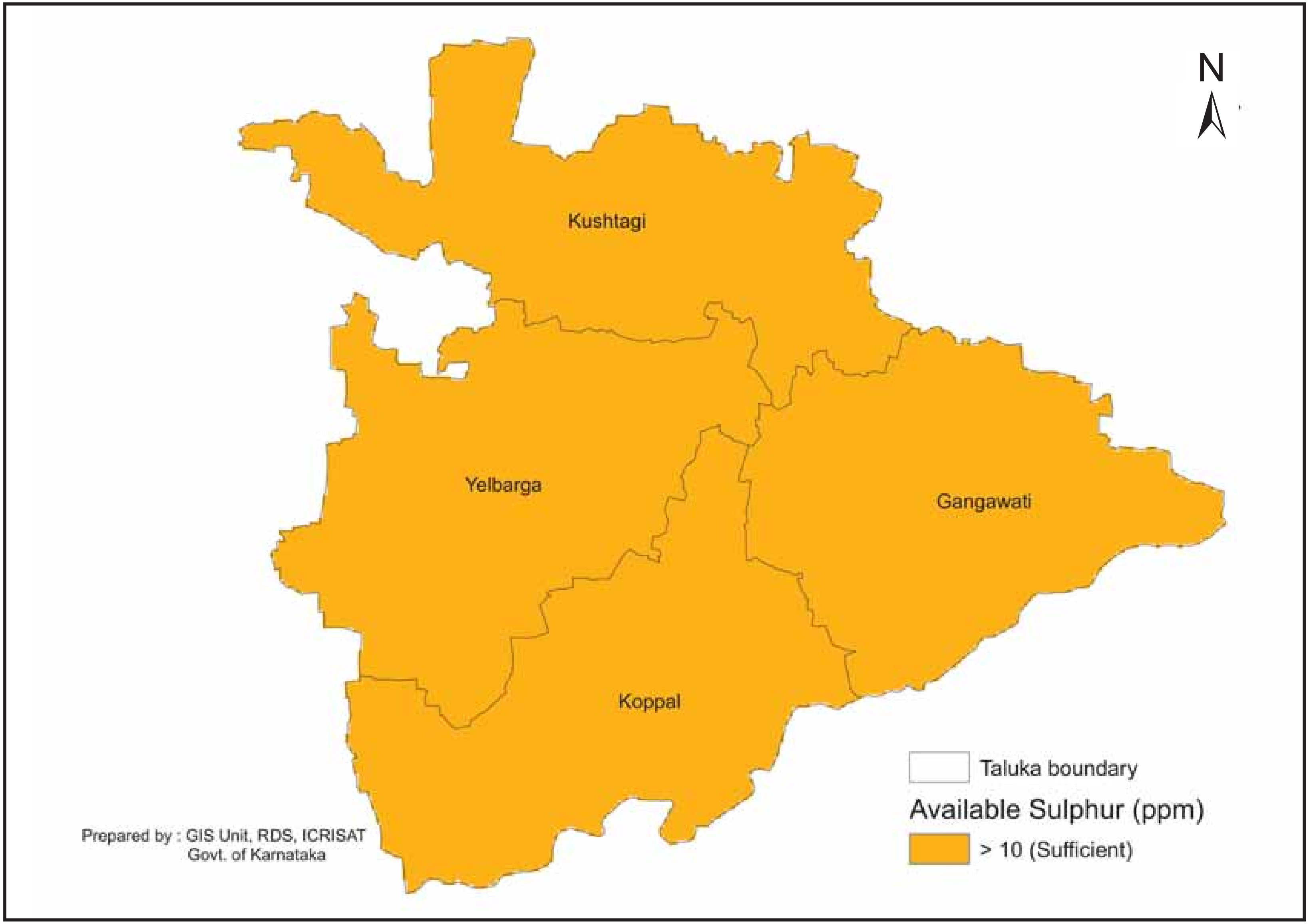


Figure 183. Available sulphur status in Koppal district

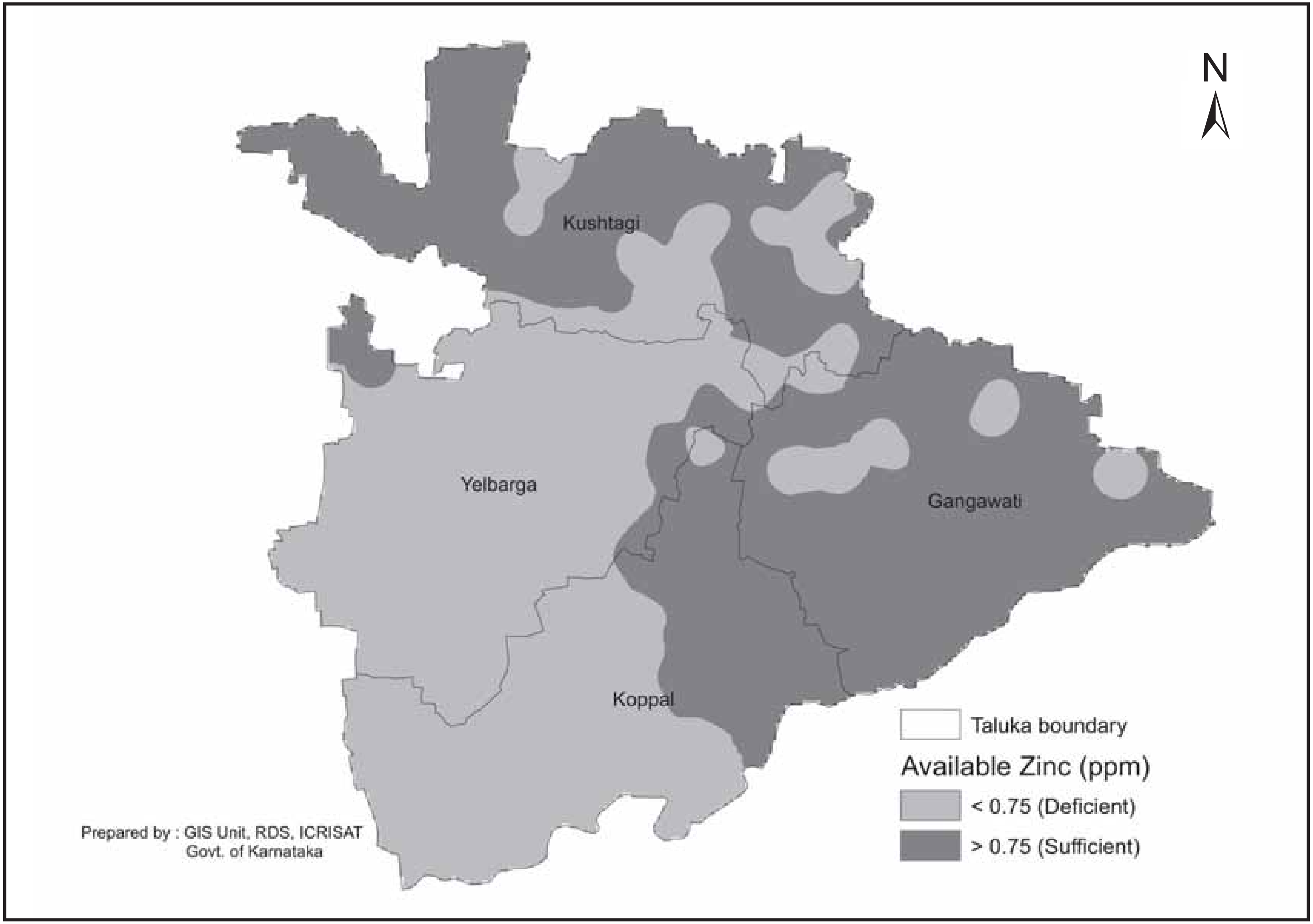


Figure 184. Available zinc status in Koppal district

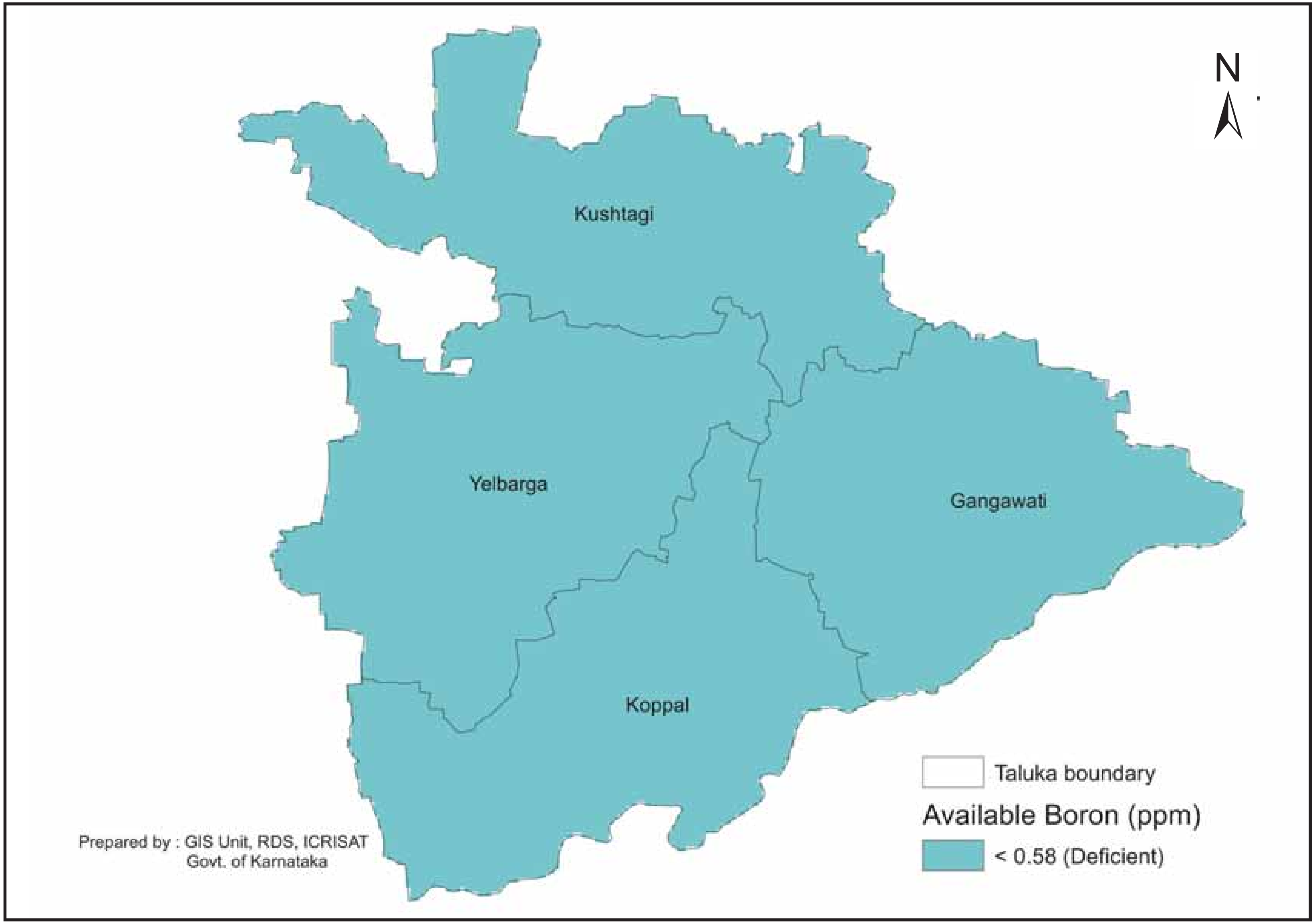


Figure 185. Available boron status in Koppal district

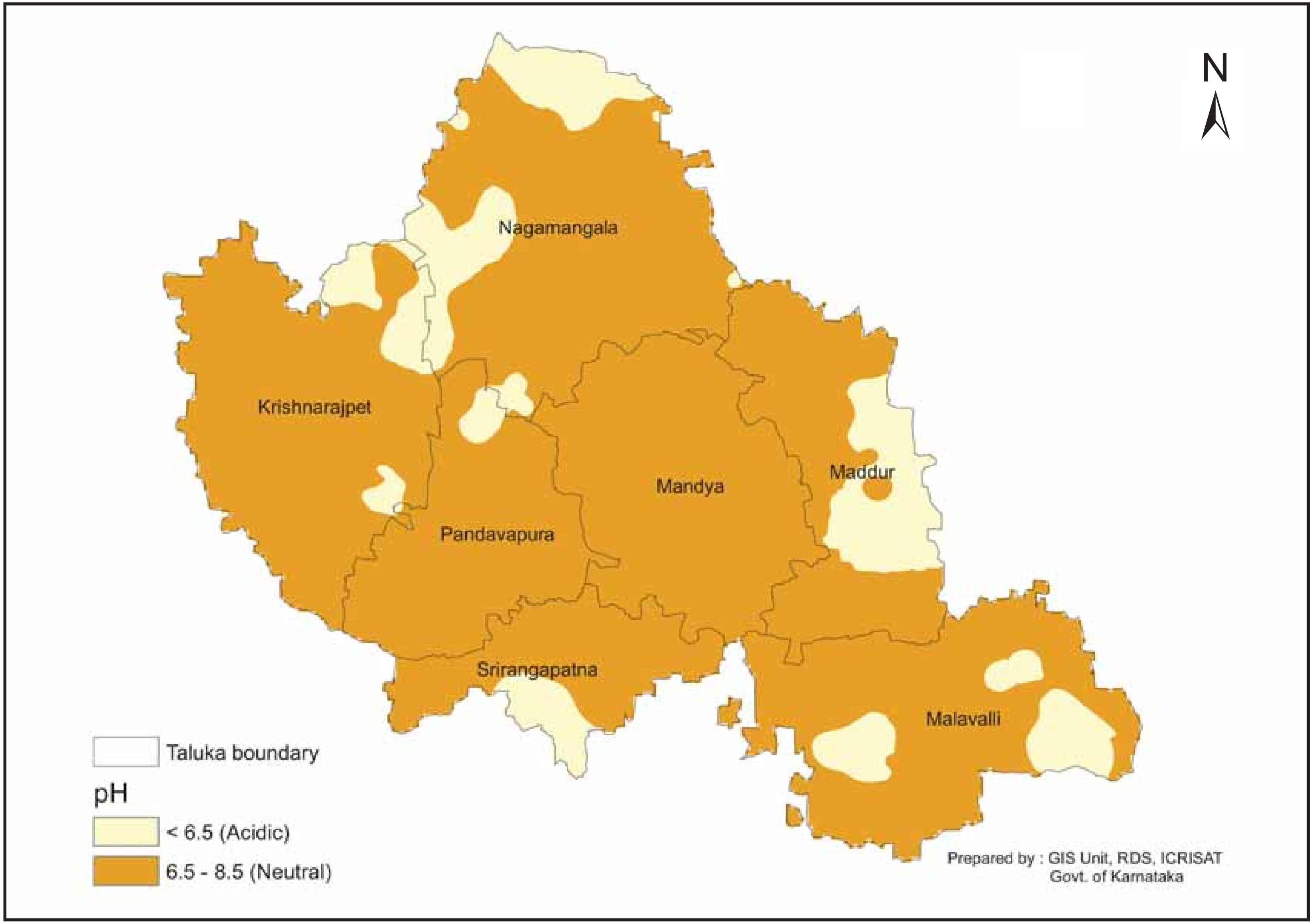


Figure 186. pH status in Mandya district

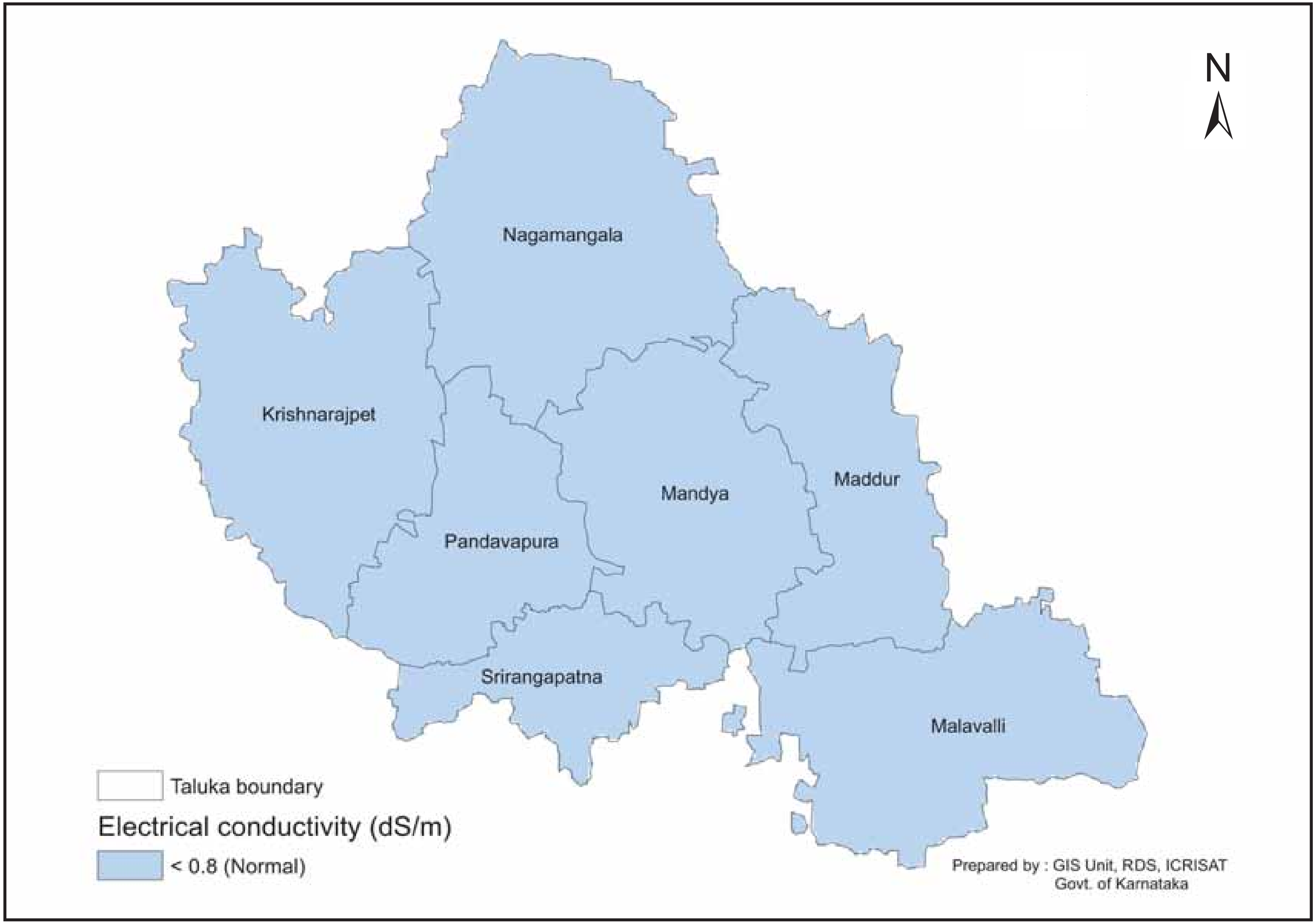


Figure 187. Electrical conductivity status in Mandya district

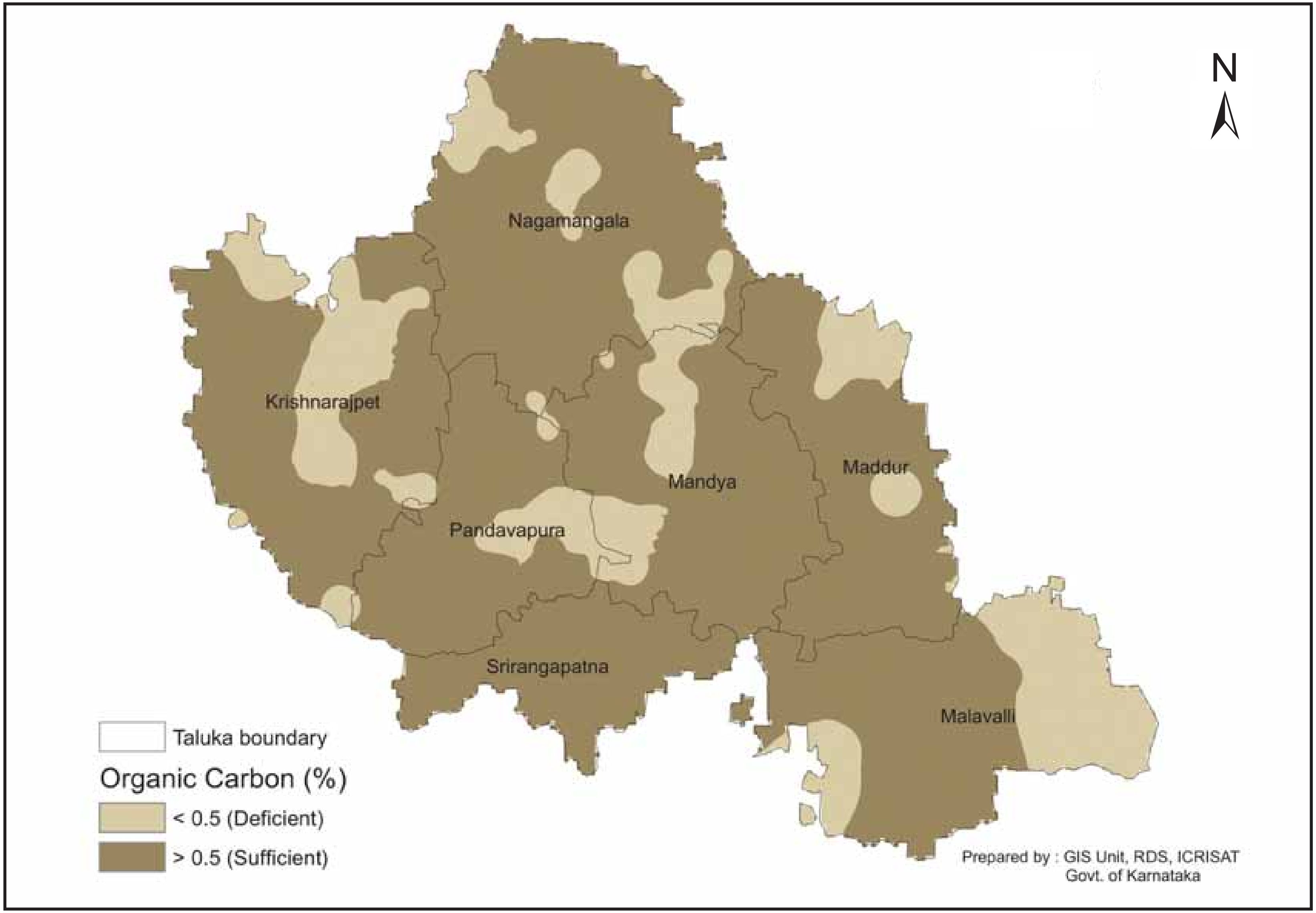


Figure 188. Organic carbon status in Mandya district

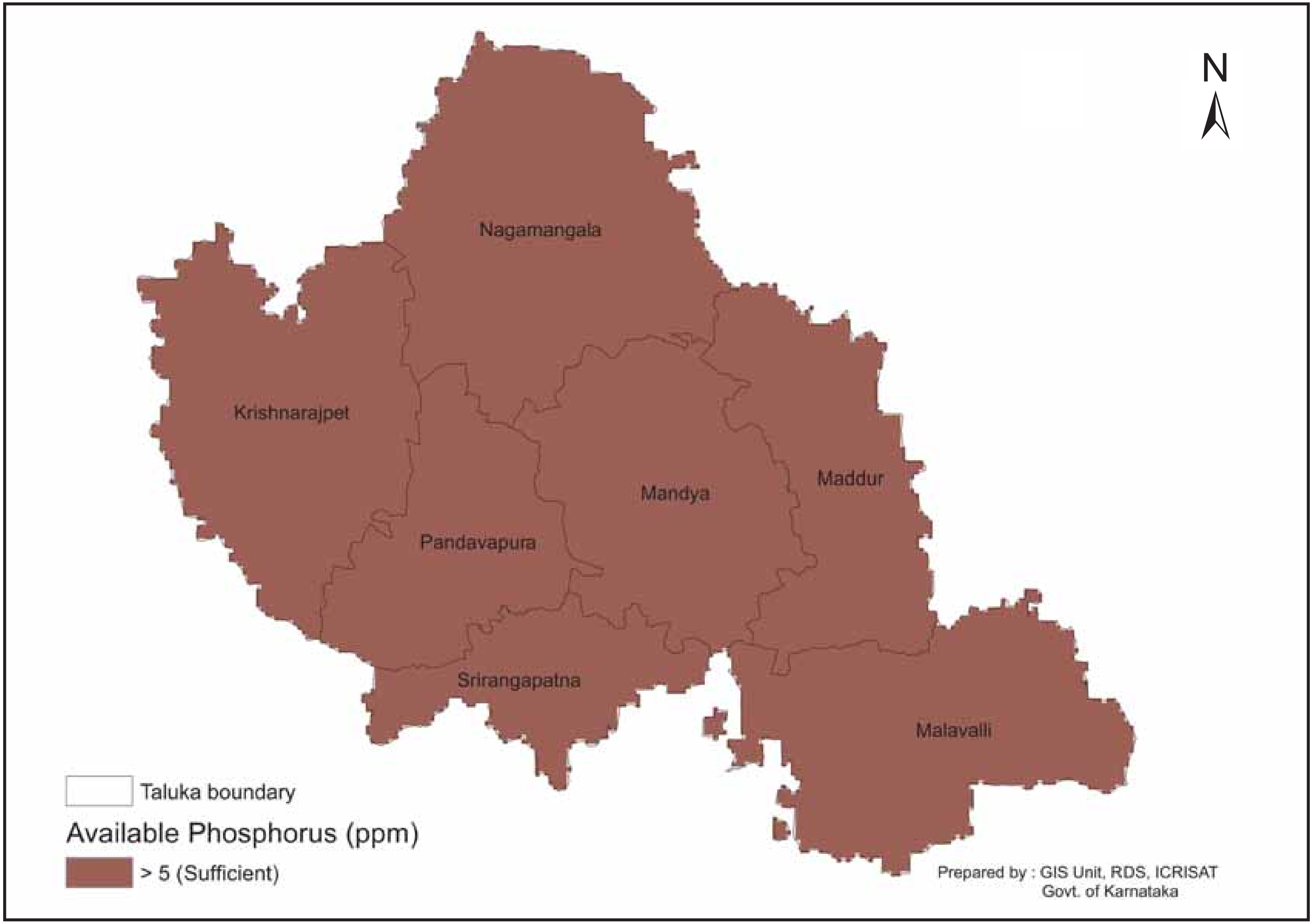


Figure 189. Available phosphorus status in Mandya district

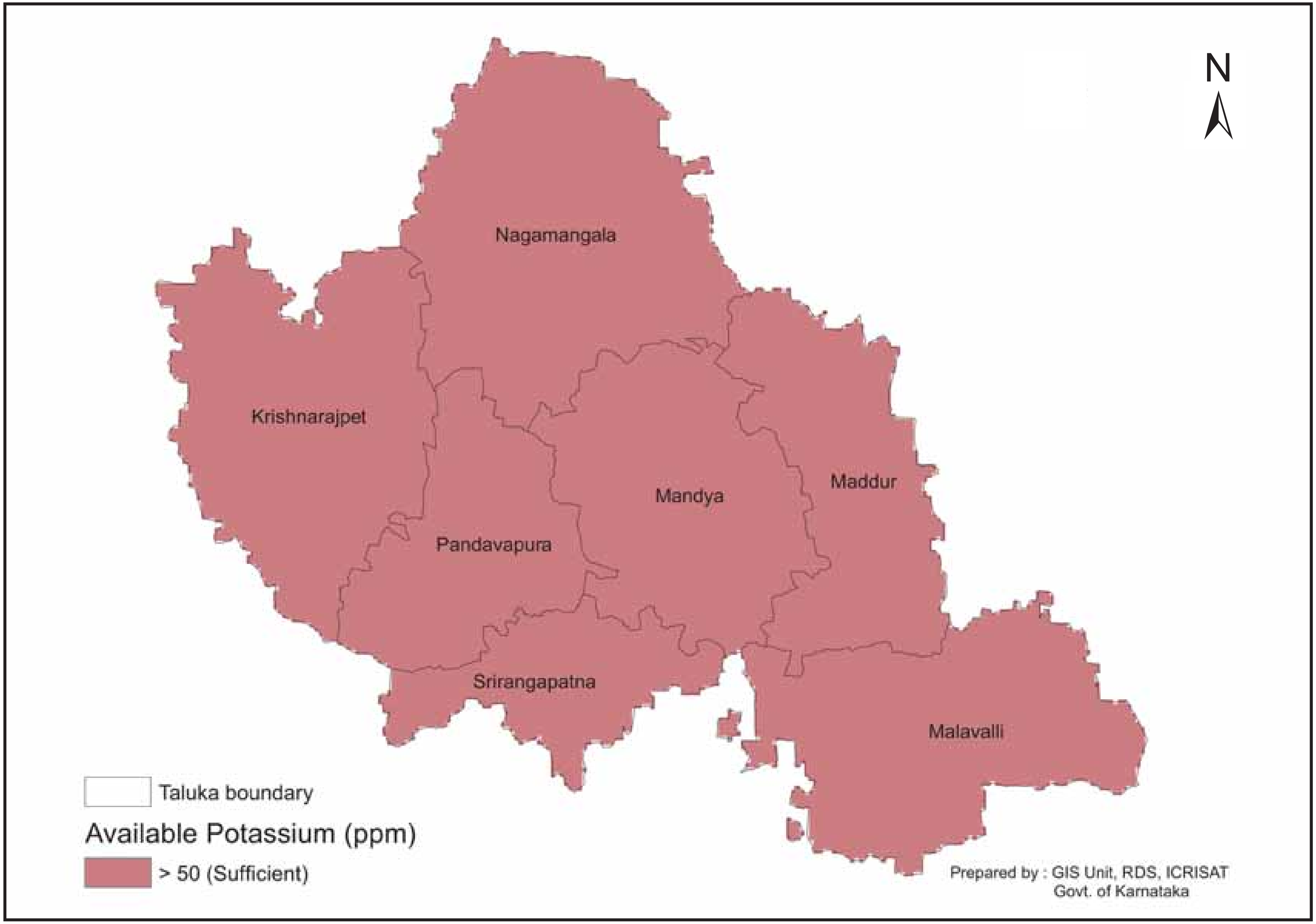


Figure 190. Available potassium status in Mandya district

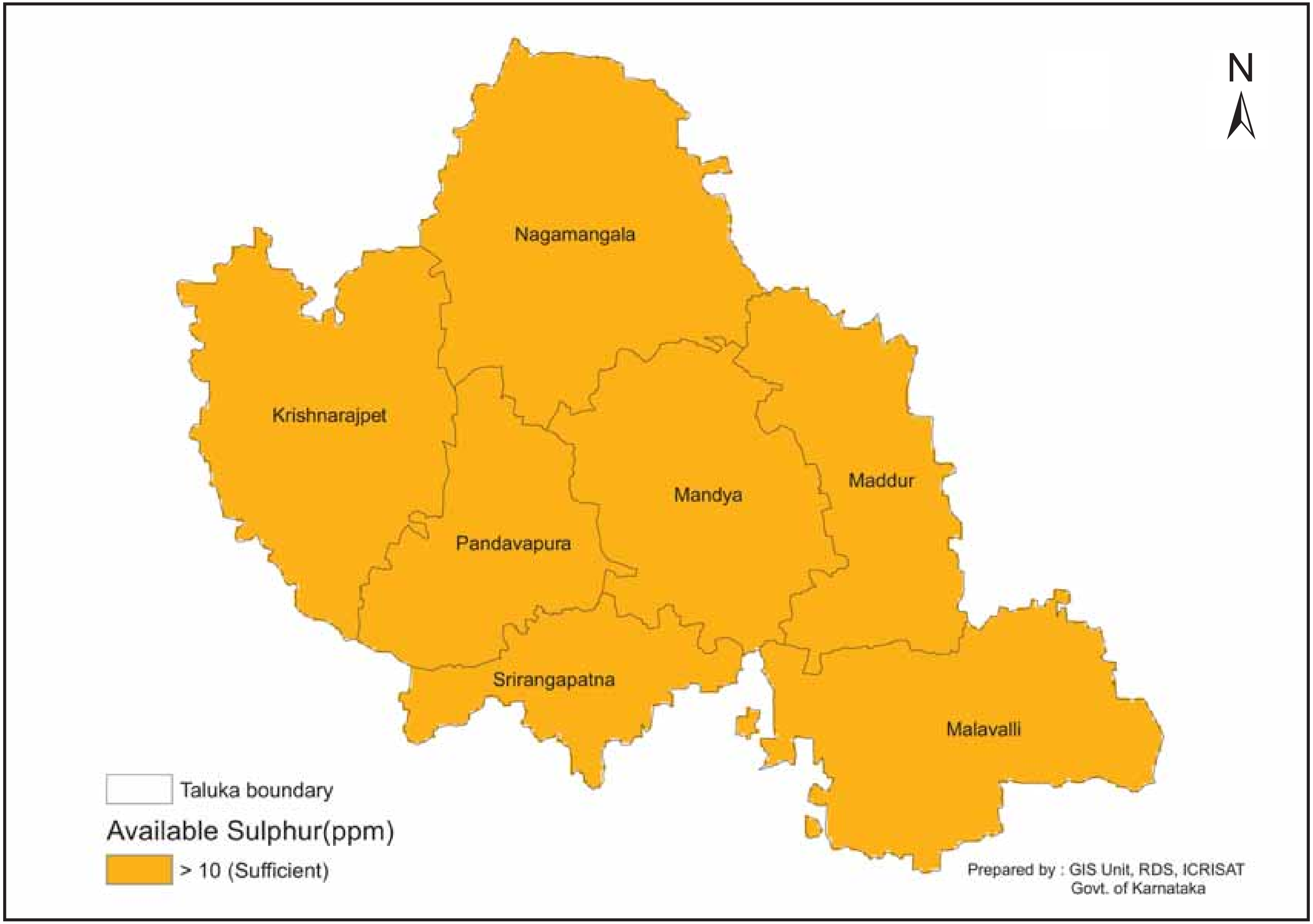


Figure 191. Available sulphur status in Mandya district

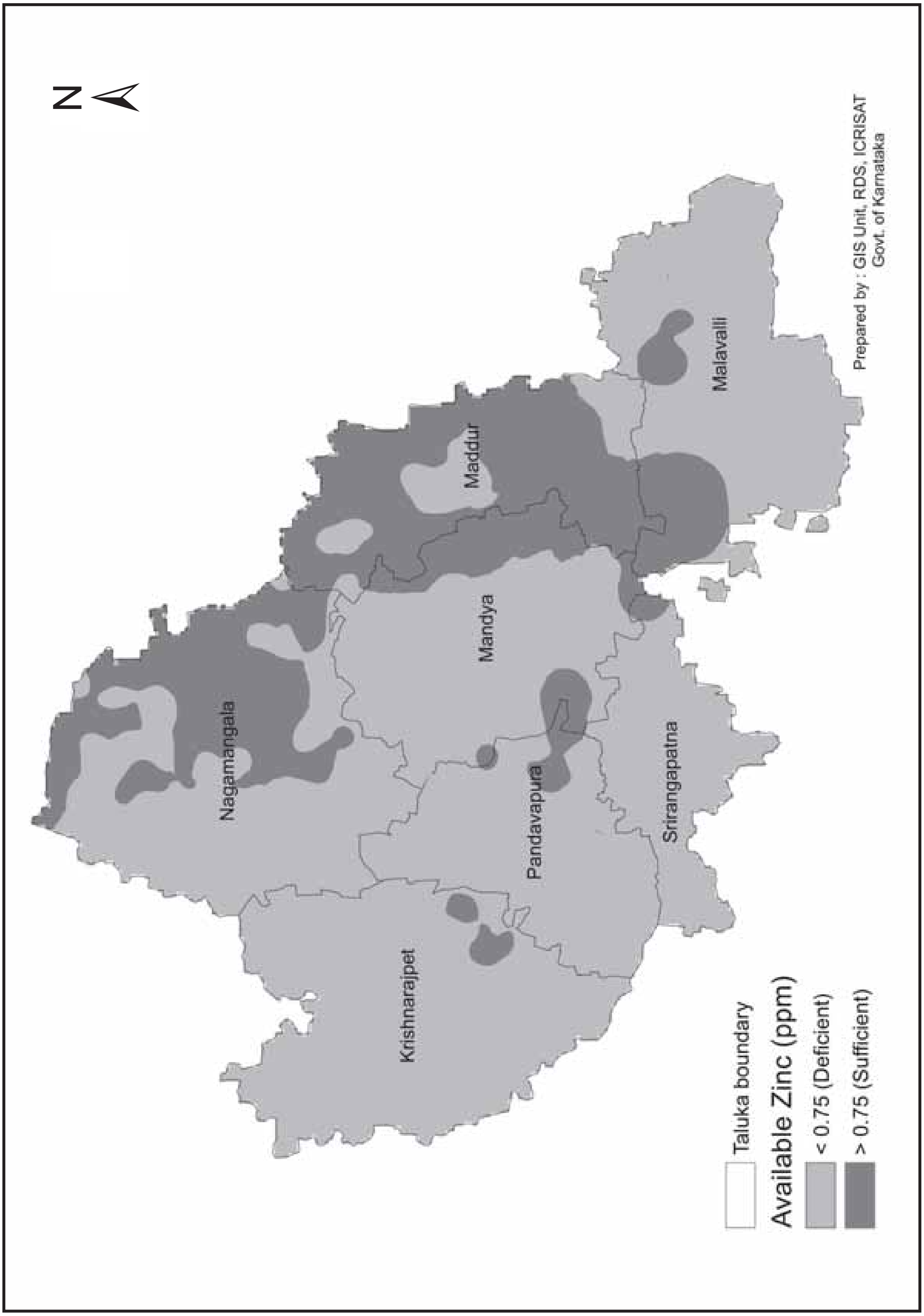


Figure 192. Available zinc status in Mandya district

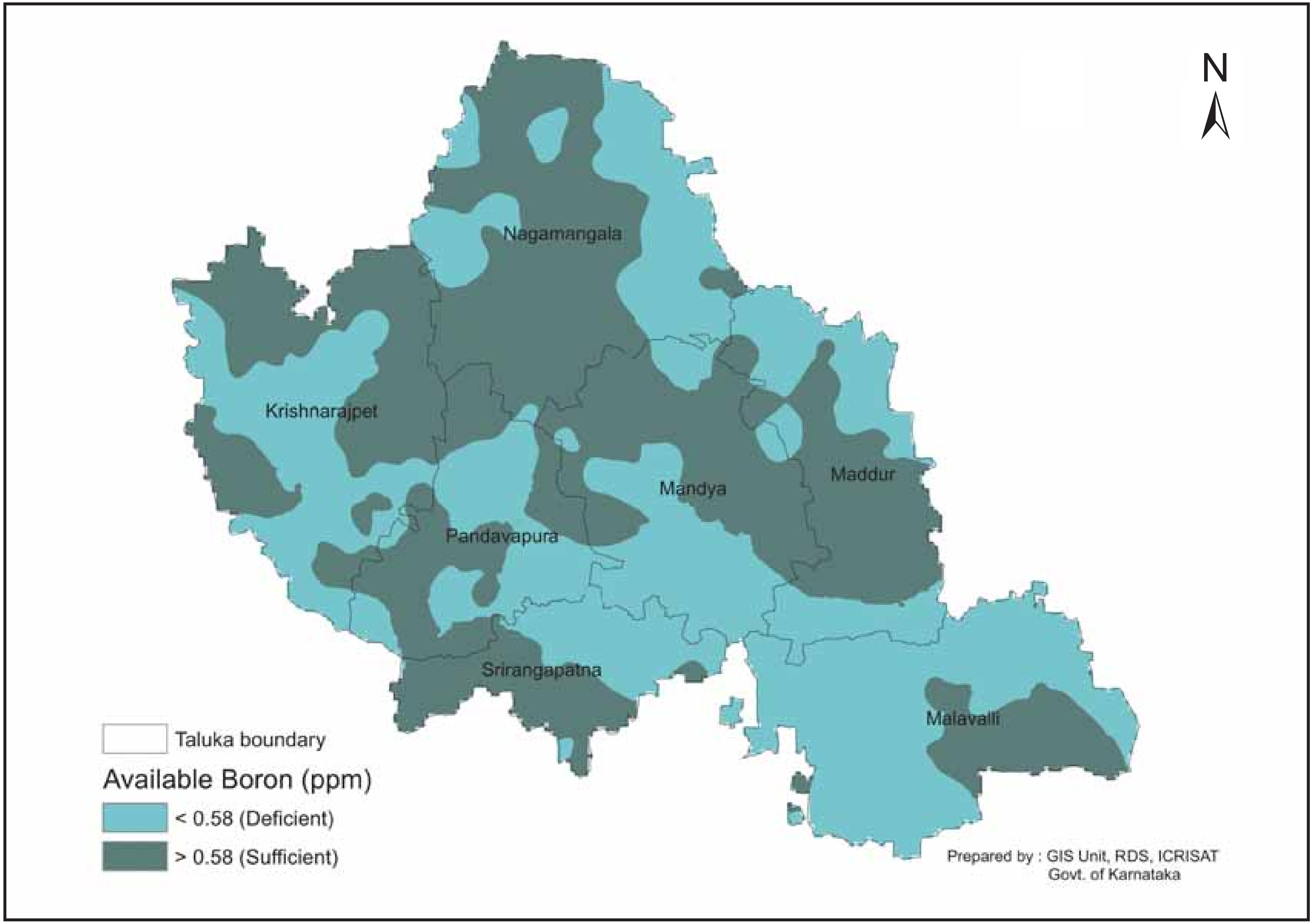


Figure 193. Available boron status in Mandya district

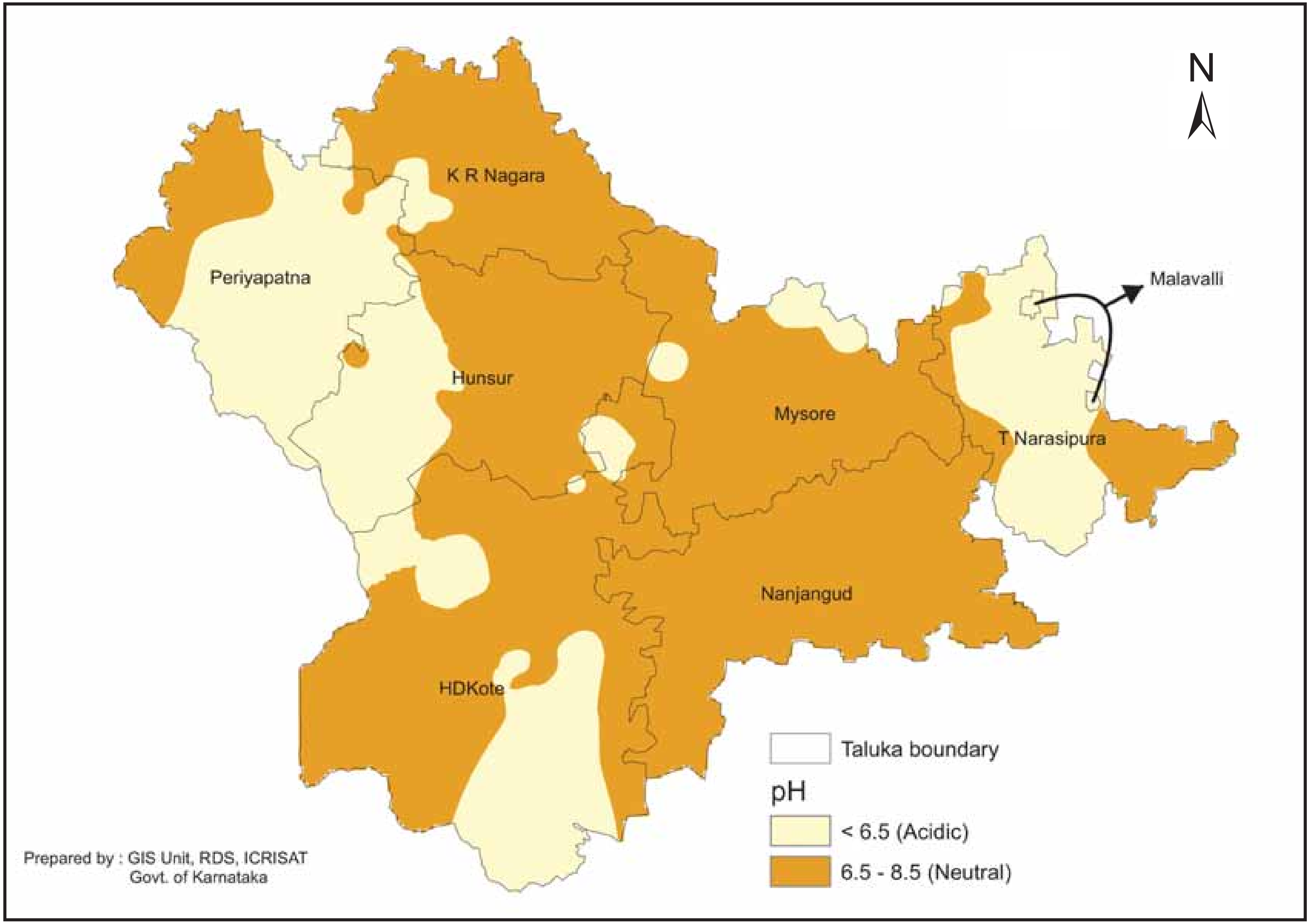


Figure 194. pH status in Mysore district

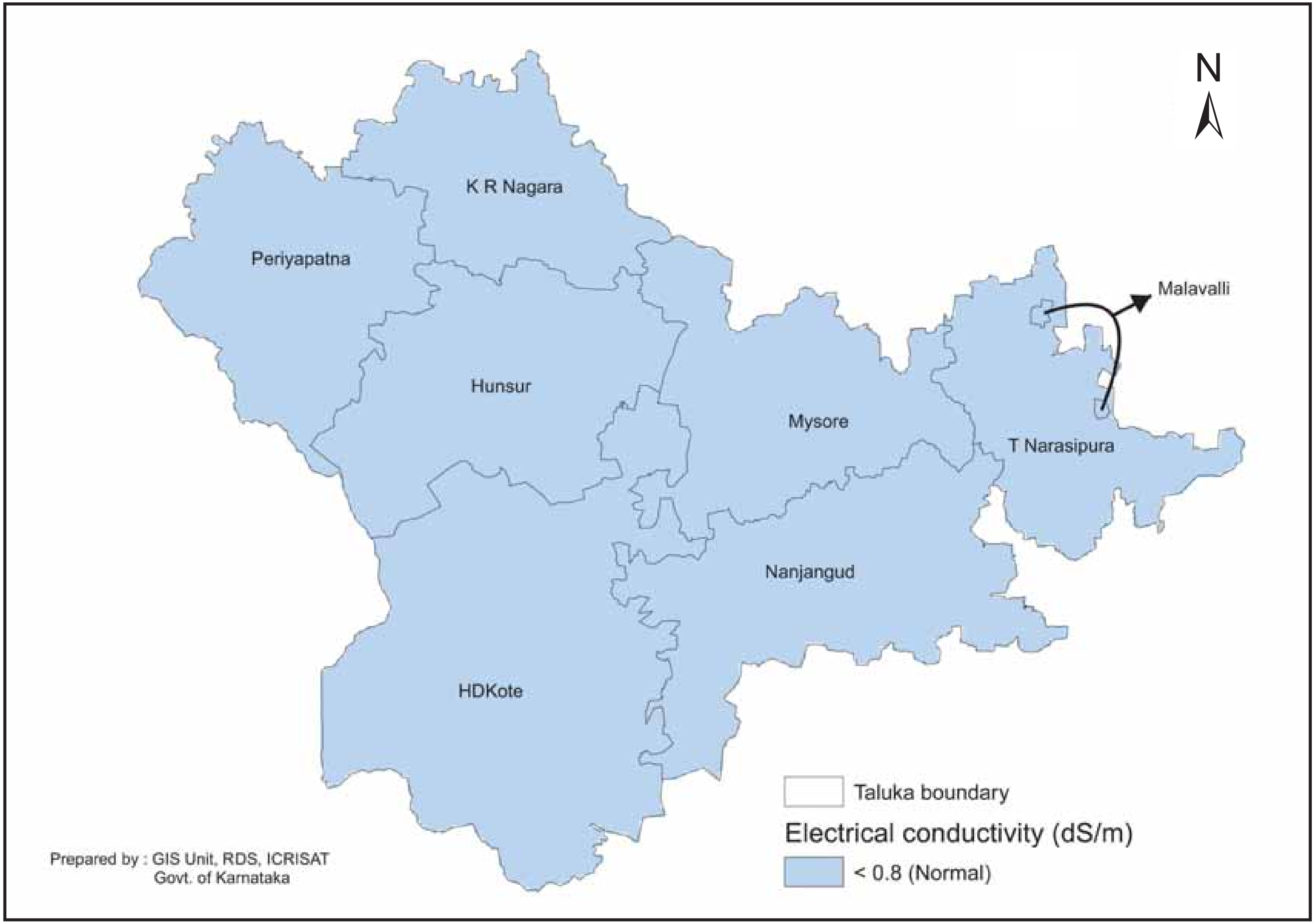


Figure 195. Electrical conductivity status in Mysore district

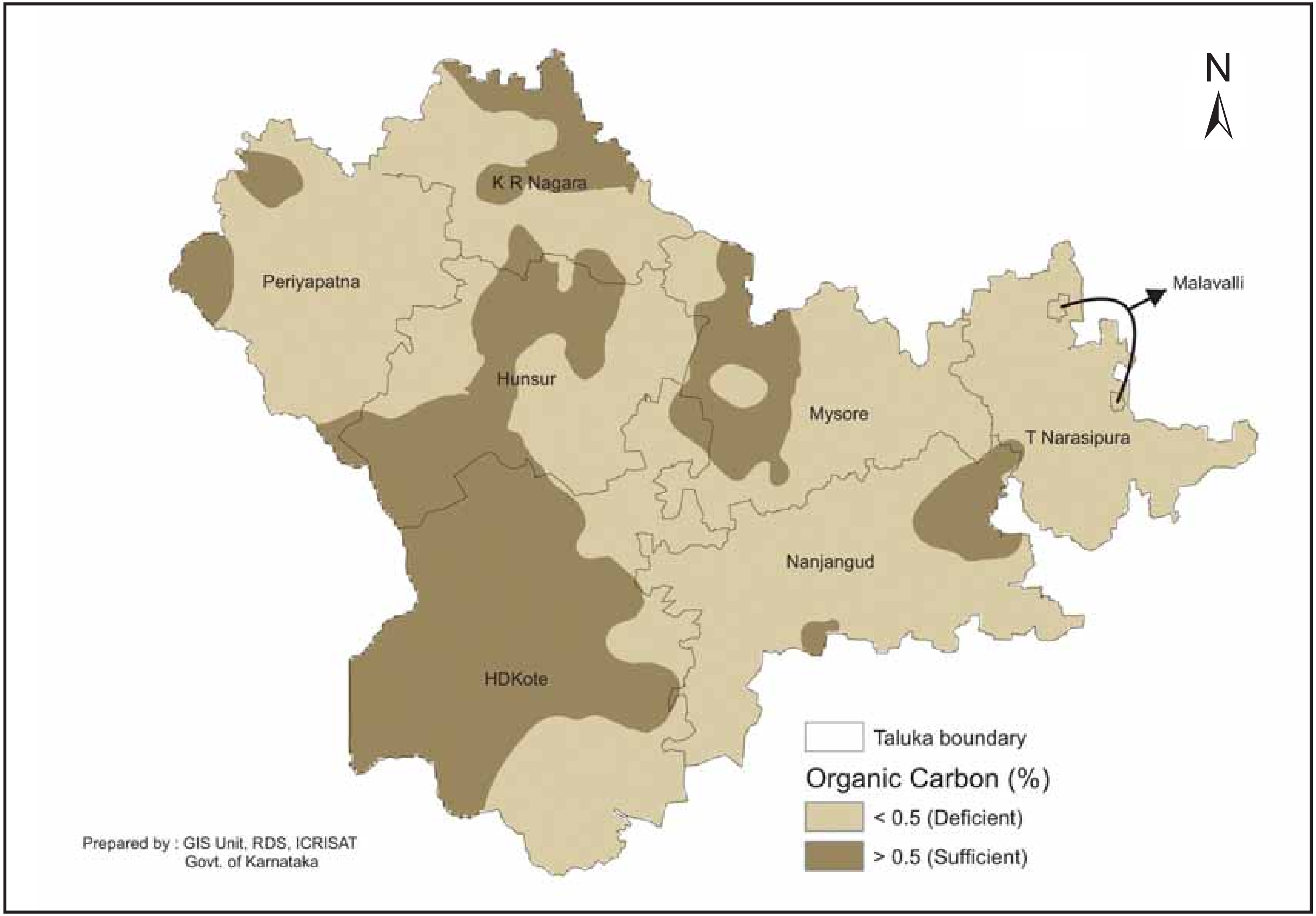


Figure 196. Organic carbon status in Mysore district

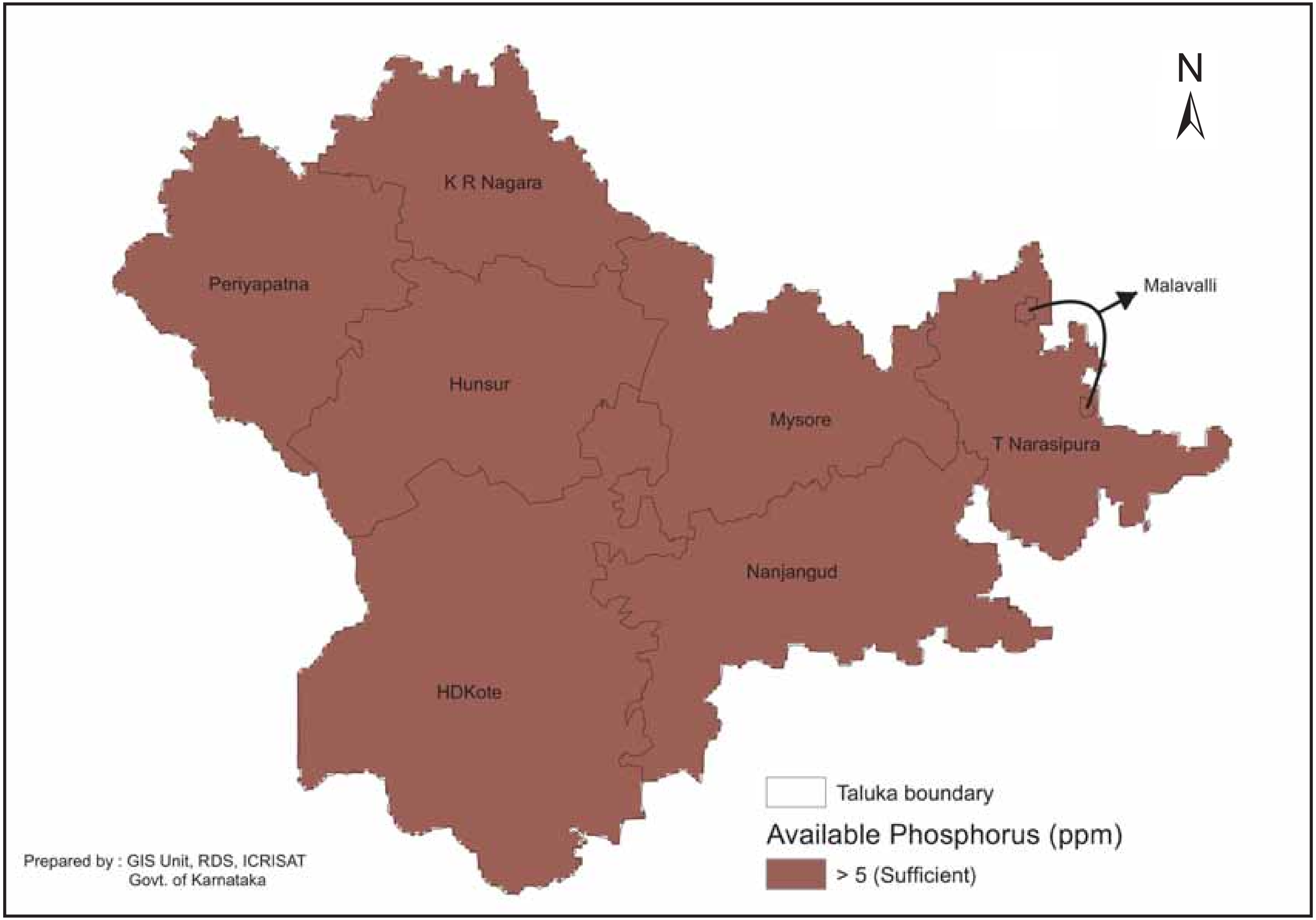


Figure 197. Available phosphorus status in Mysore district

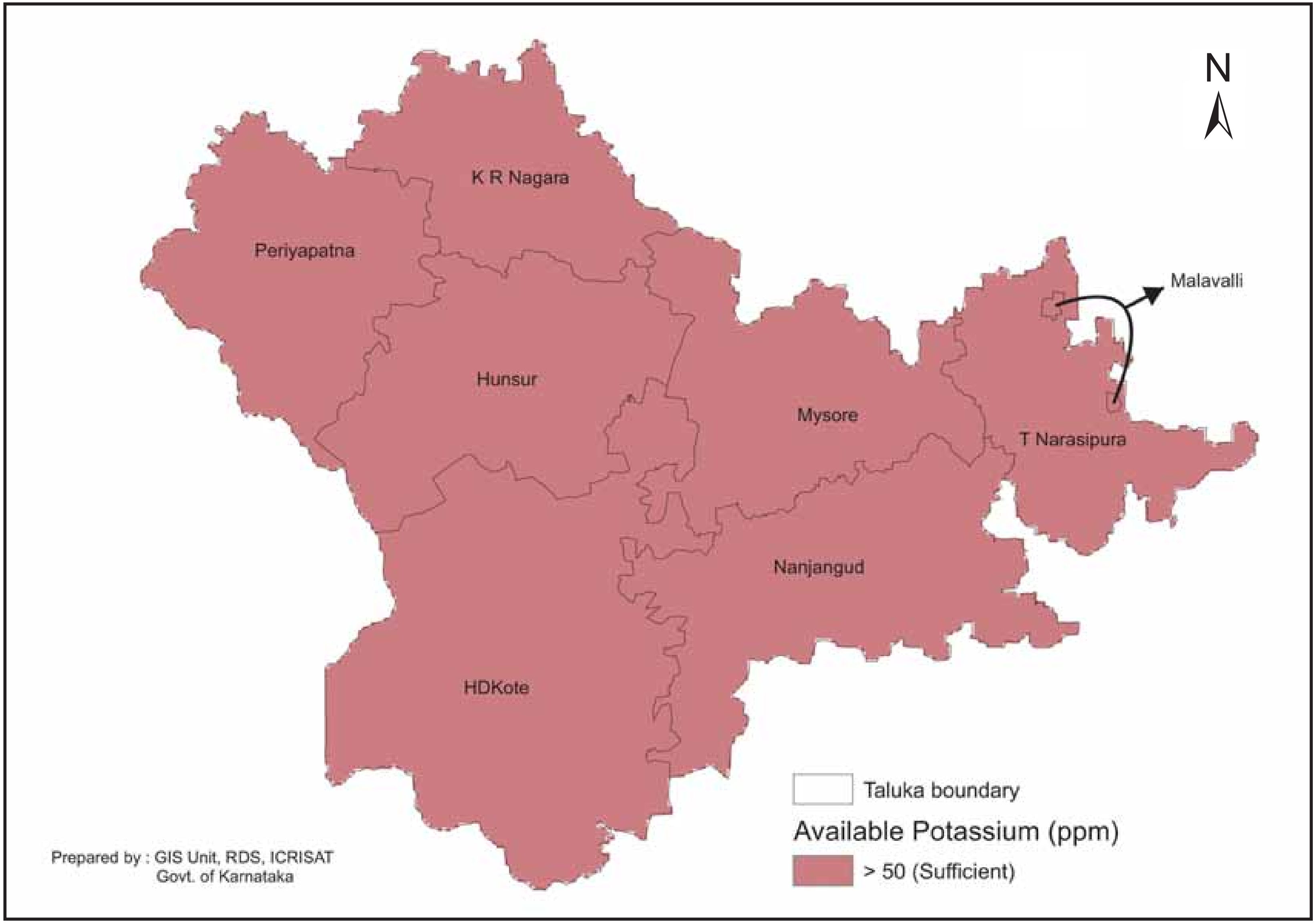


Figure 198. Available potassium status in Mysore district

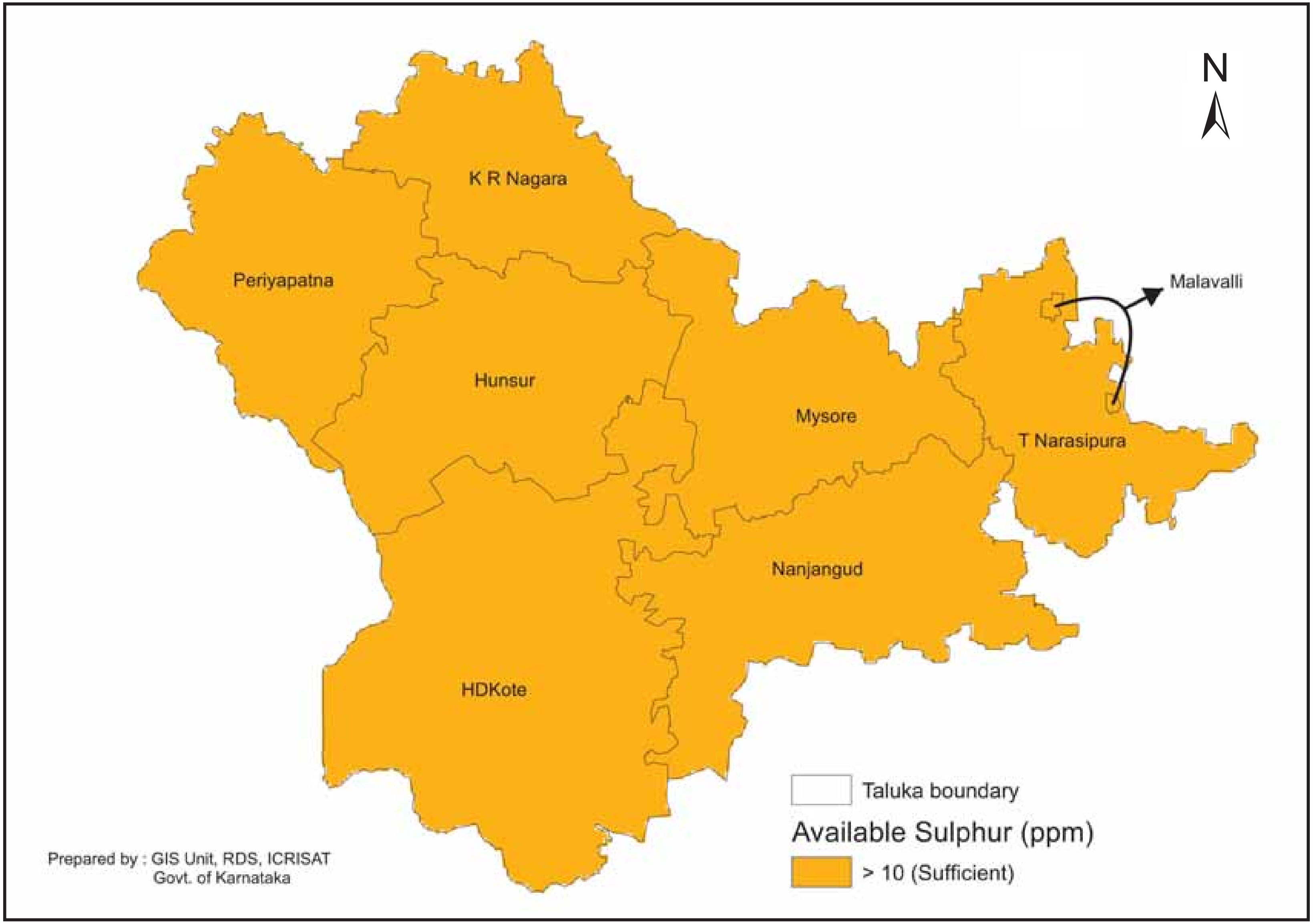


Figure 199. Available sulphur status in Mysore district

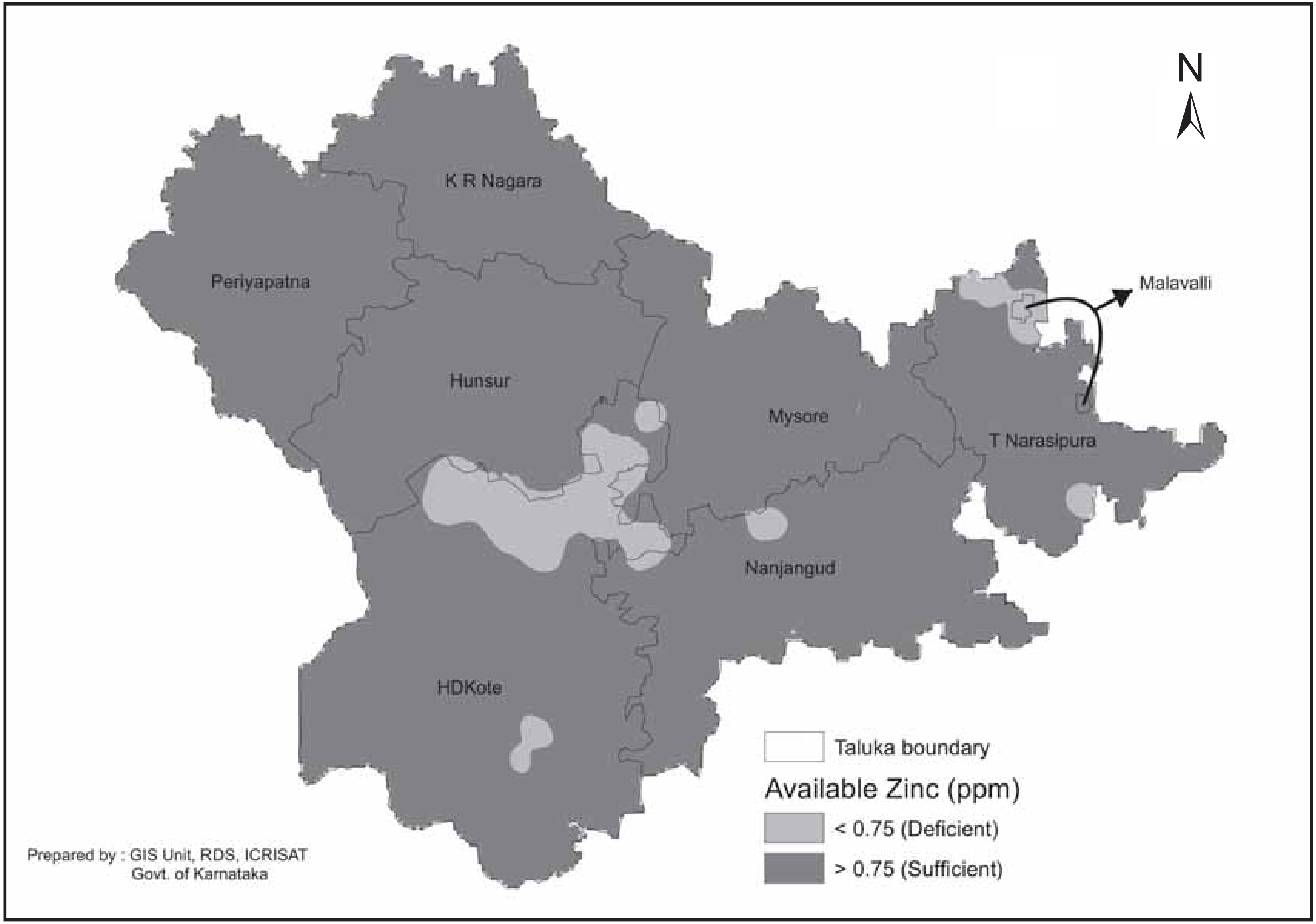


Figure 200. Available zinc status in Mysore district

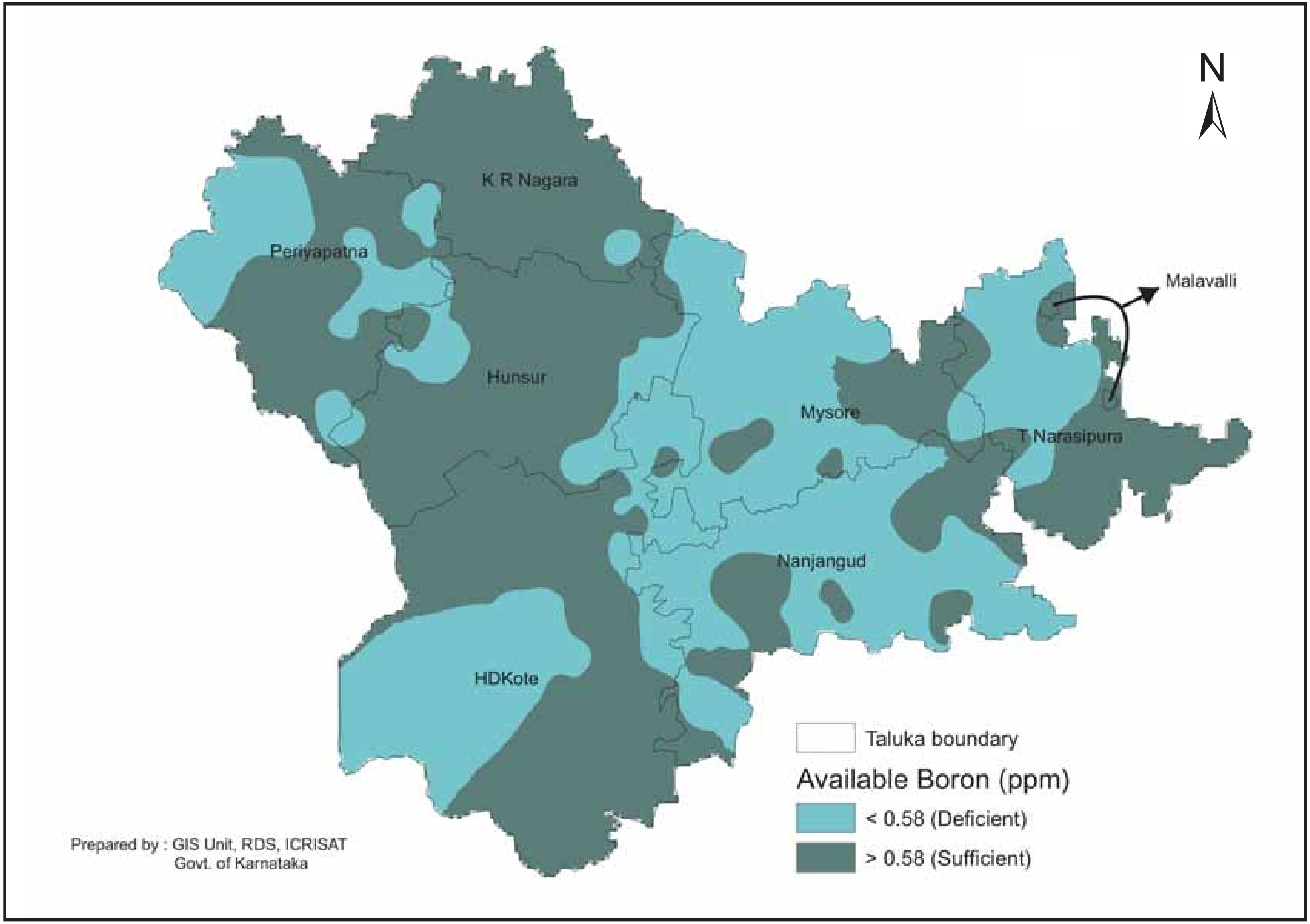


Figure 201. Available boron status in Mysore district

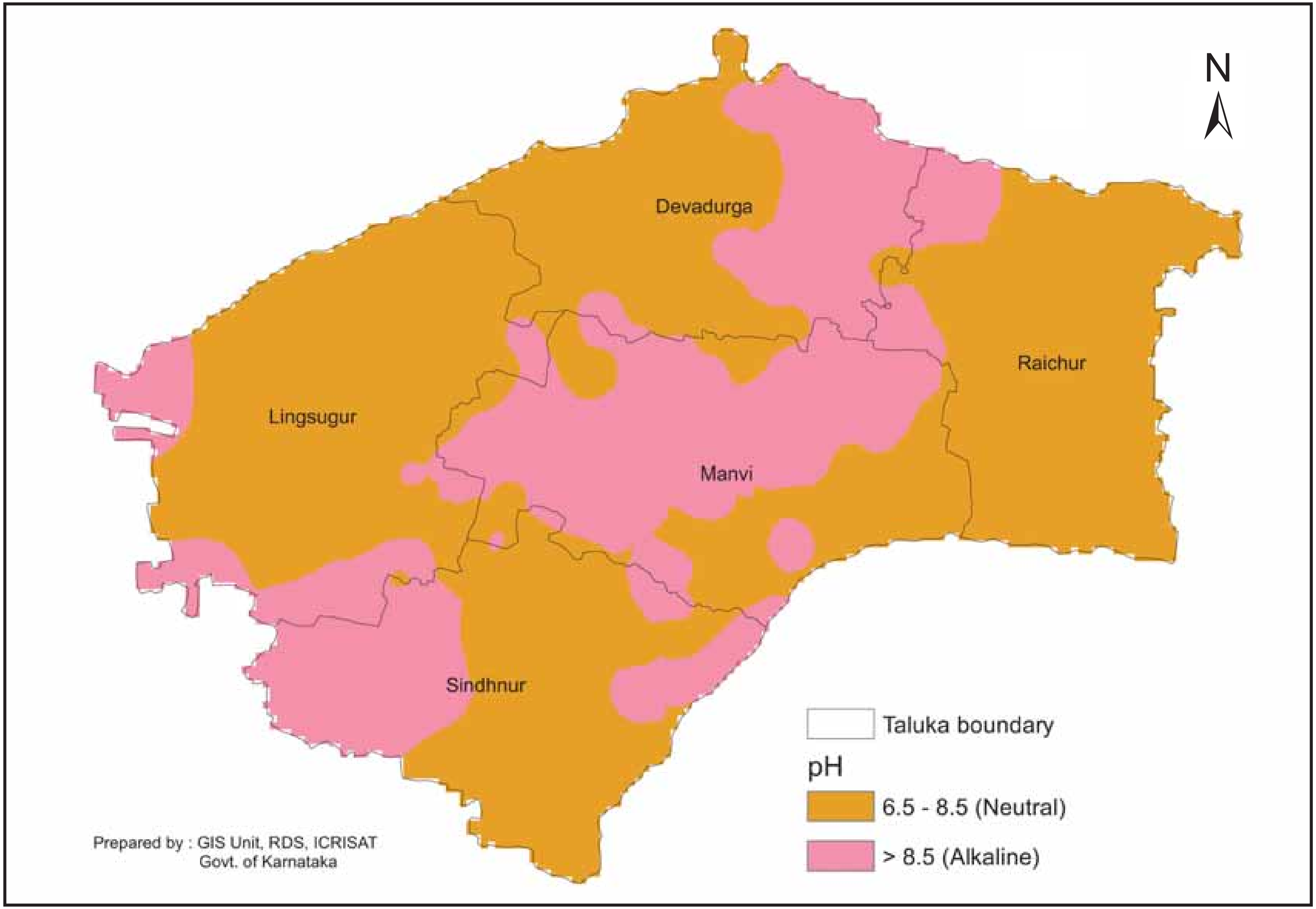


Figure 202. pH status in Raichur district

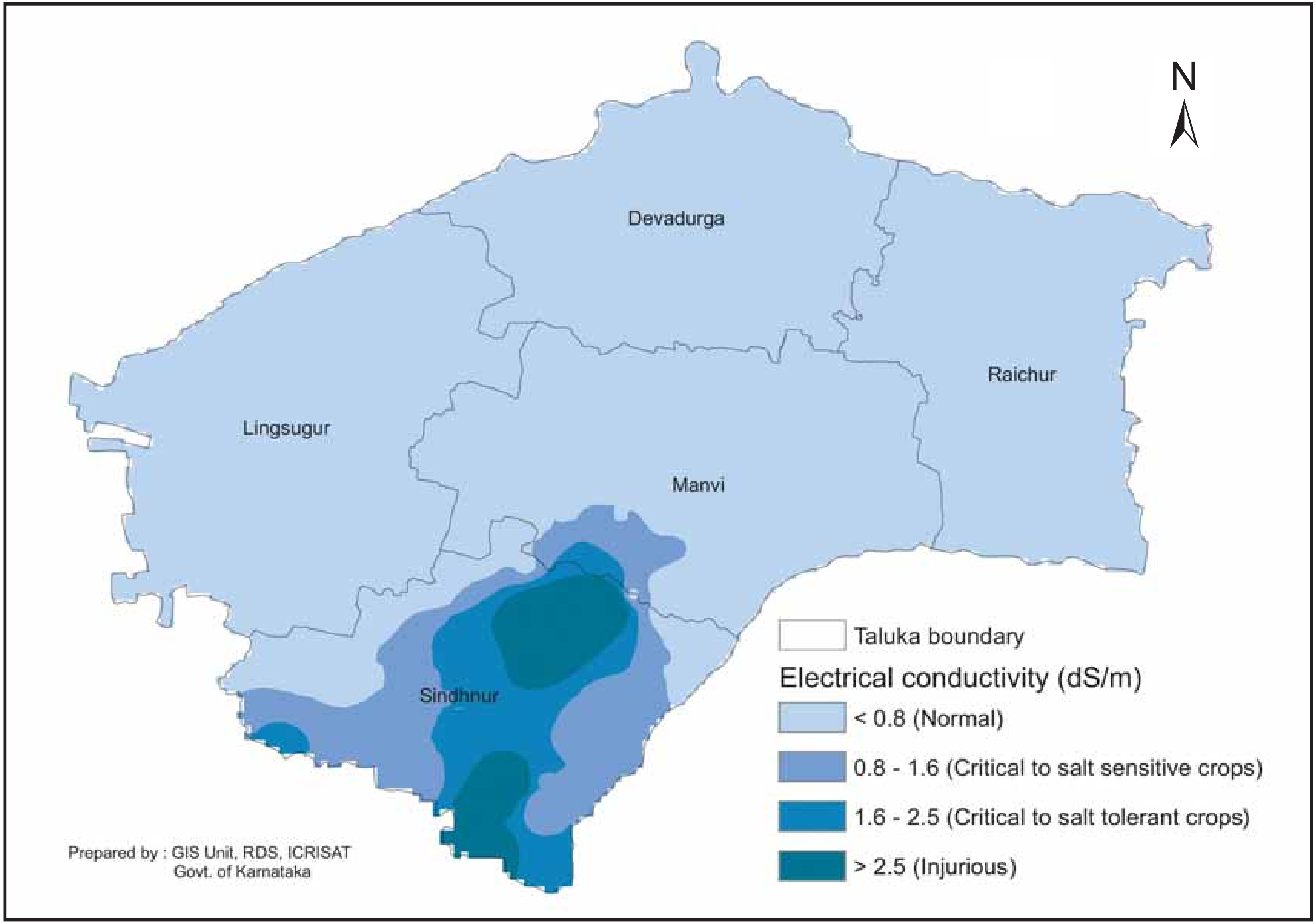


Figure 203. Electrical conductivity status in Raichur district

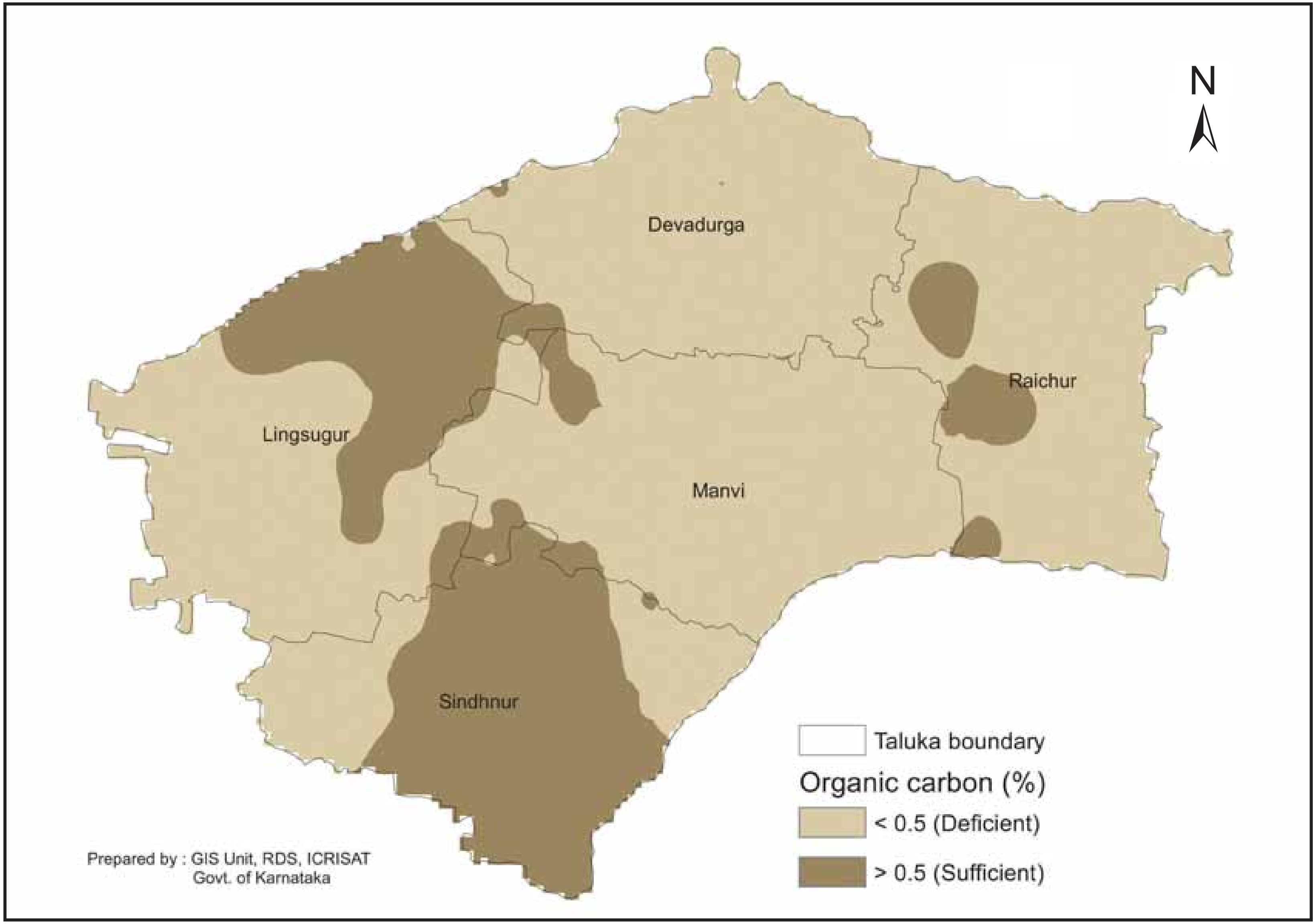


Figure 204. Organic carbon status in Raichur district

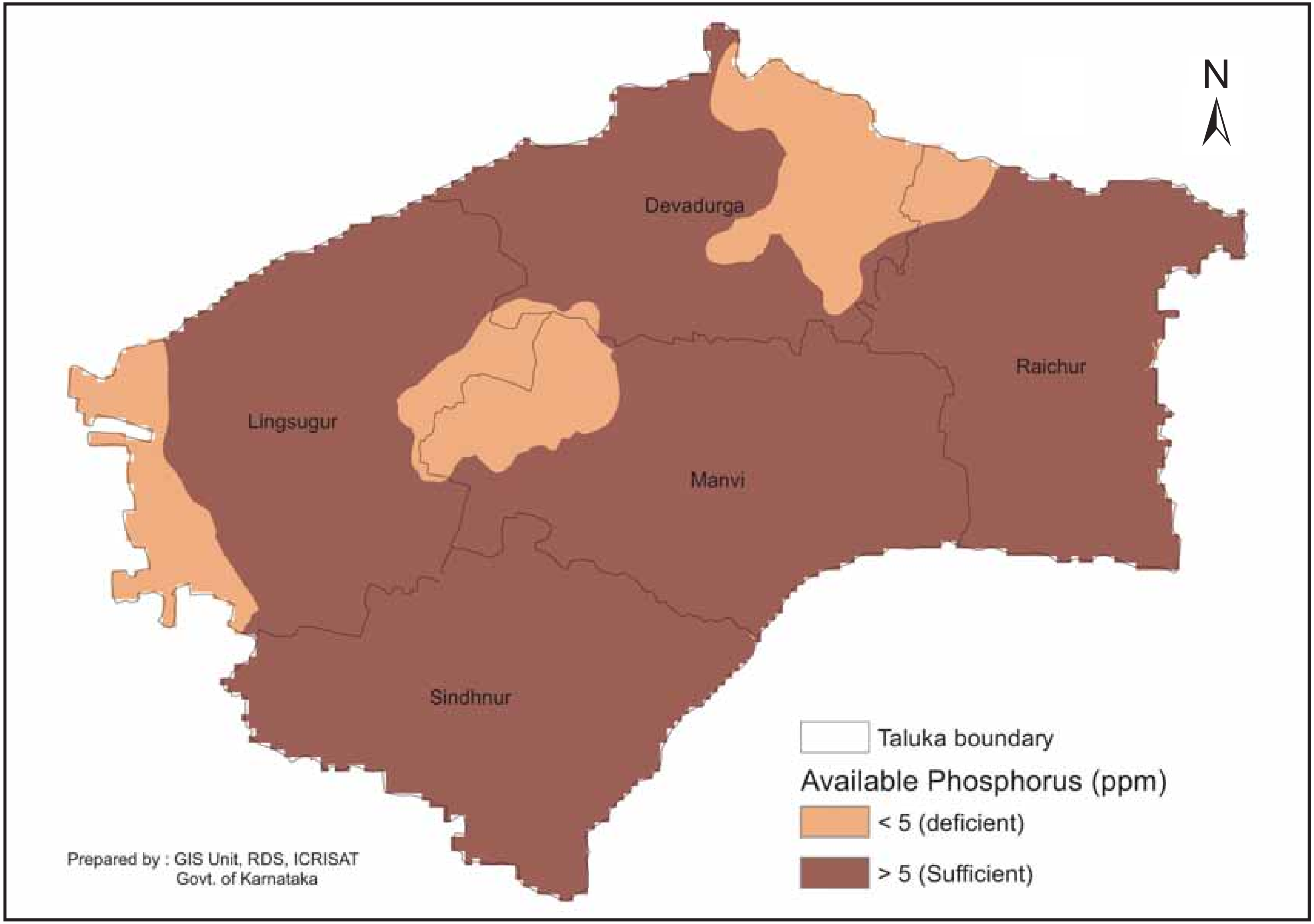


Figure 205. Available phosphorus status in Raichur district

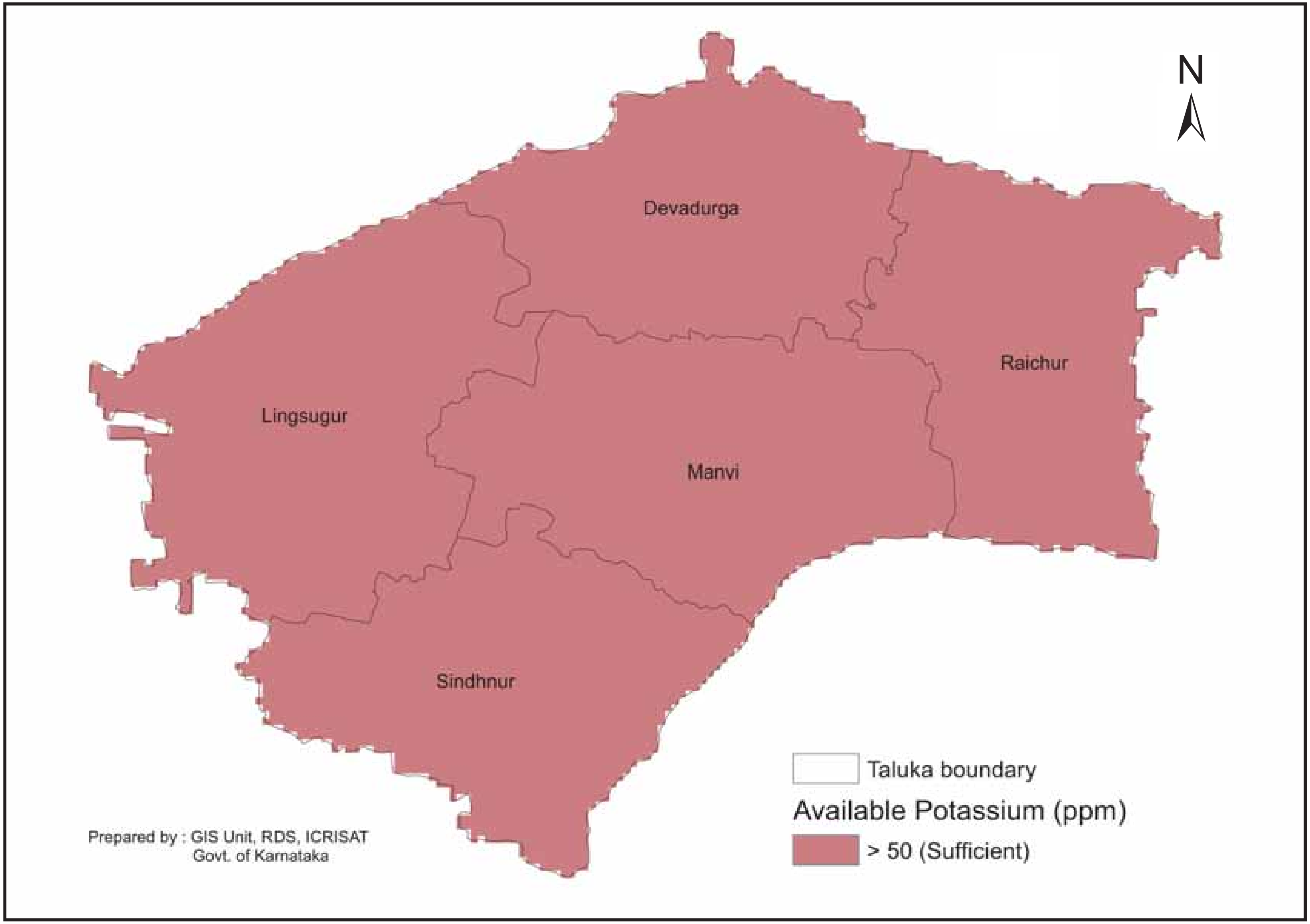


Figure 206. Available potassium status in Raichur district

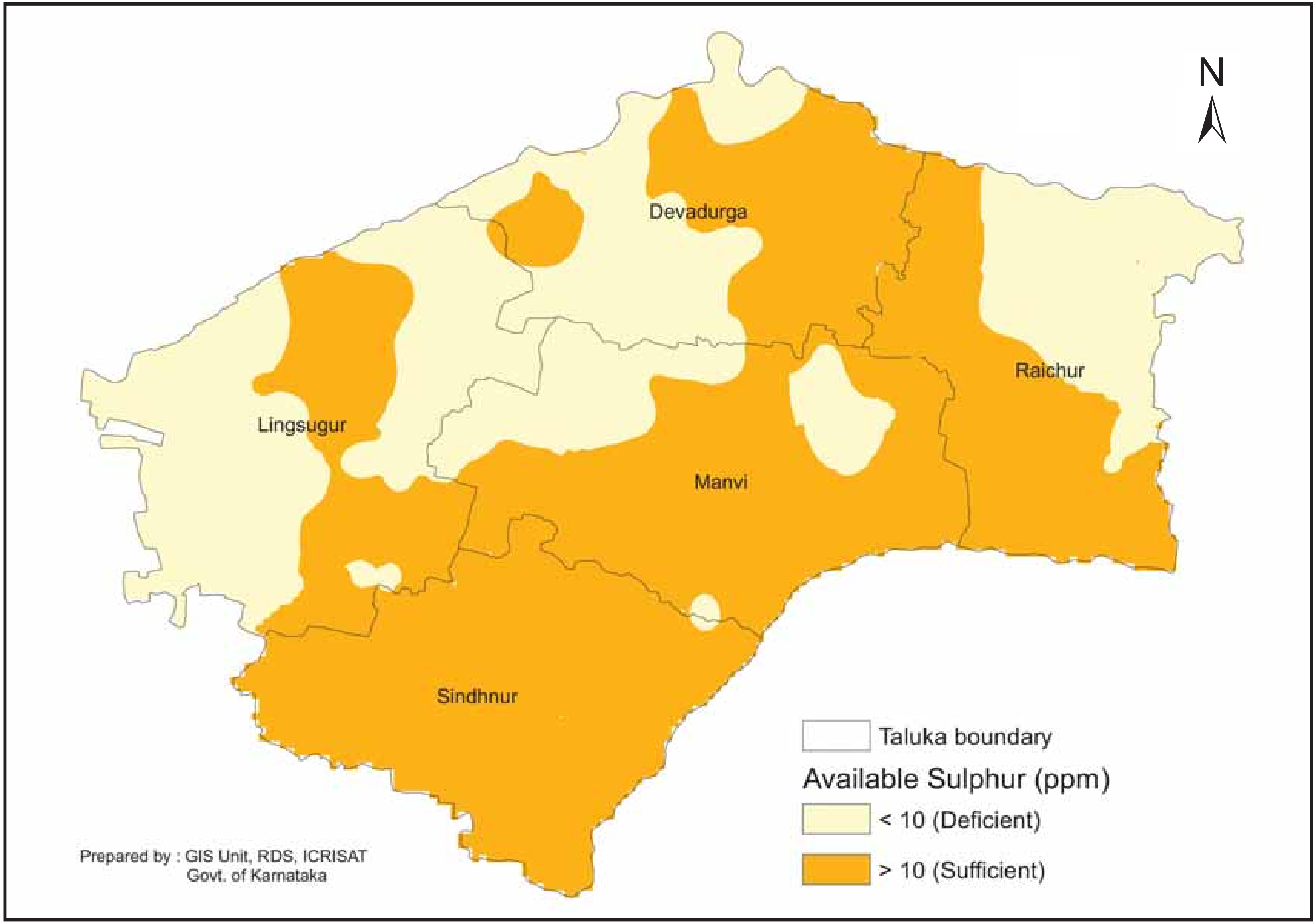


Figure 207. Available sulphur status in Raichur district

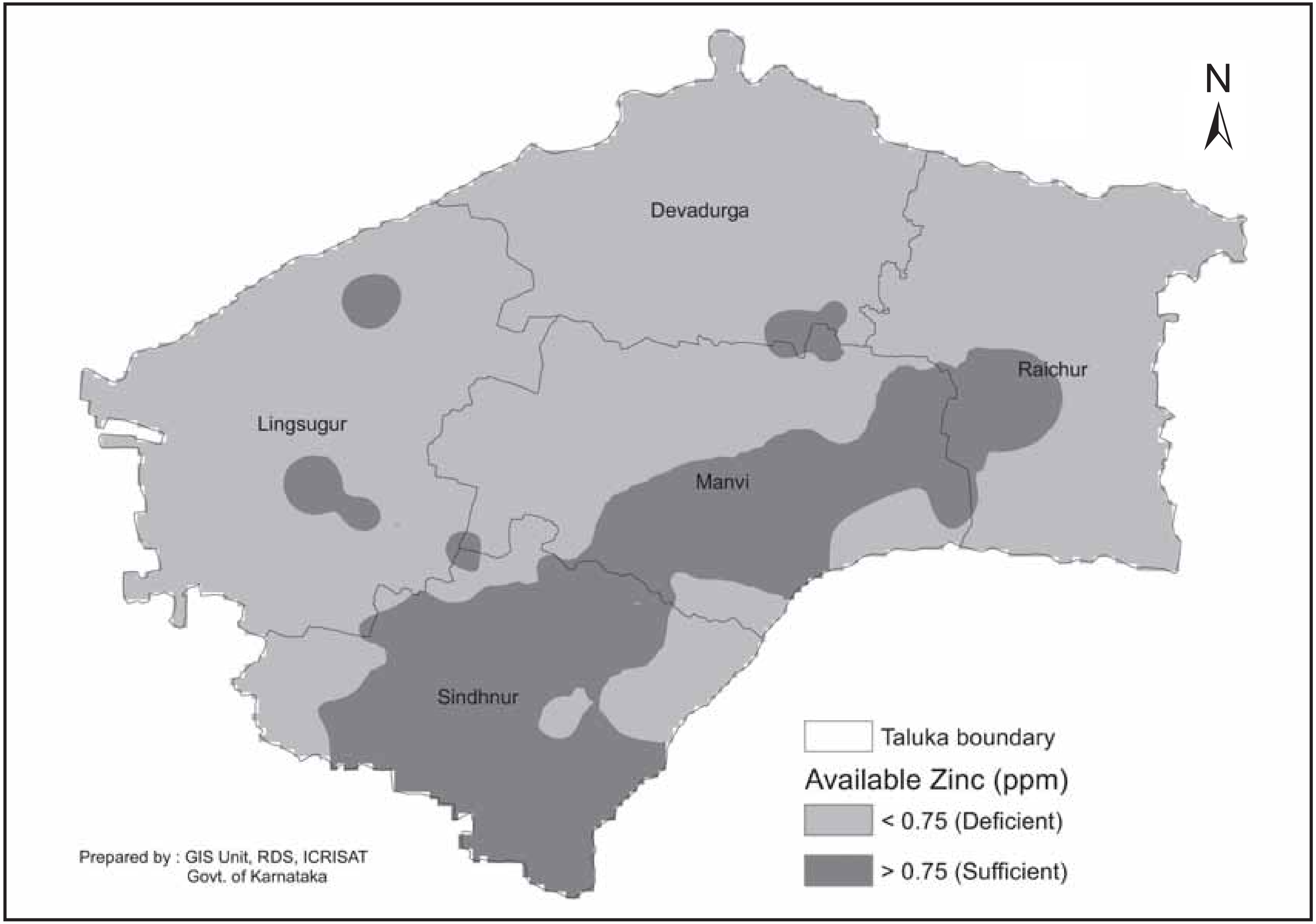


Figure 208. Available zinc status in Raichur district

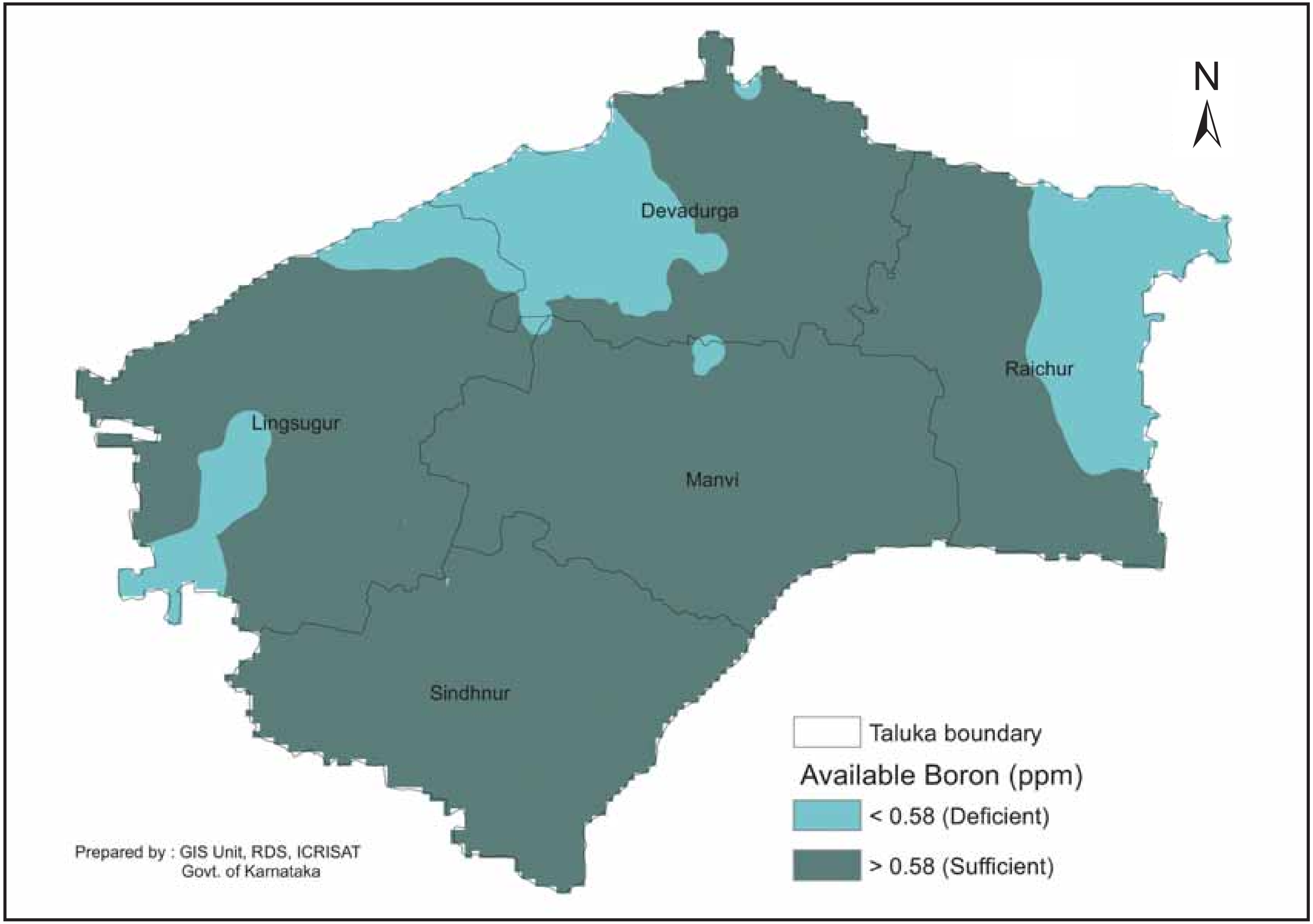


Figure 209. Available boron status in Raichur district

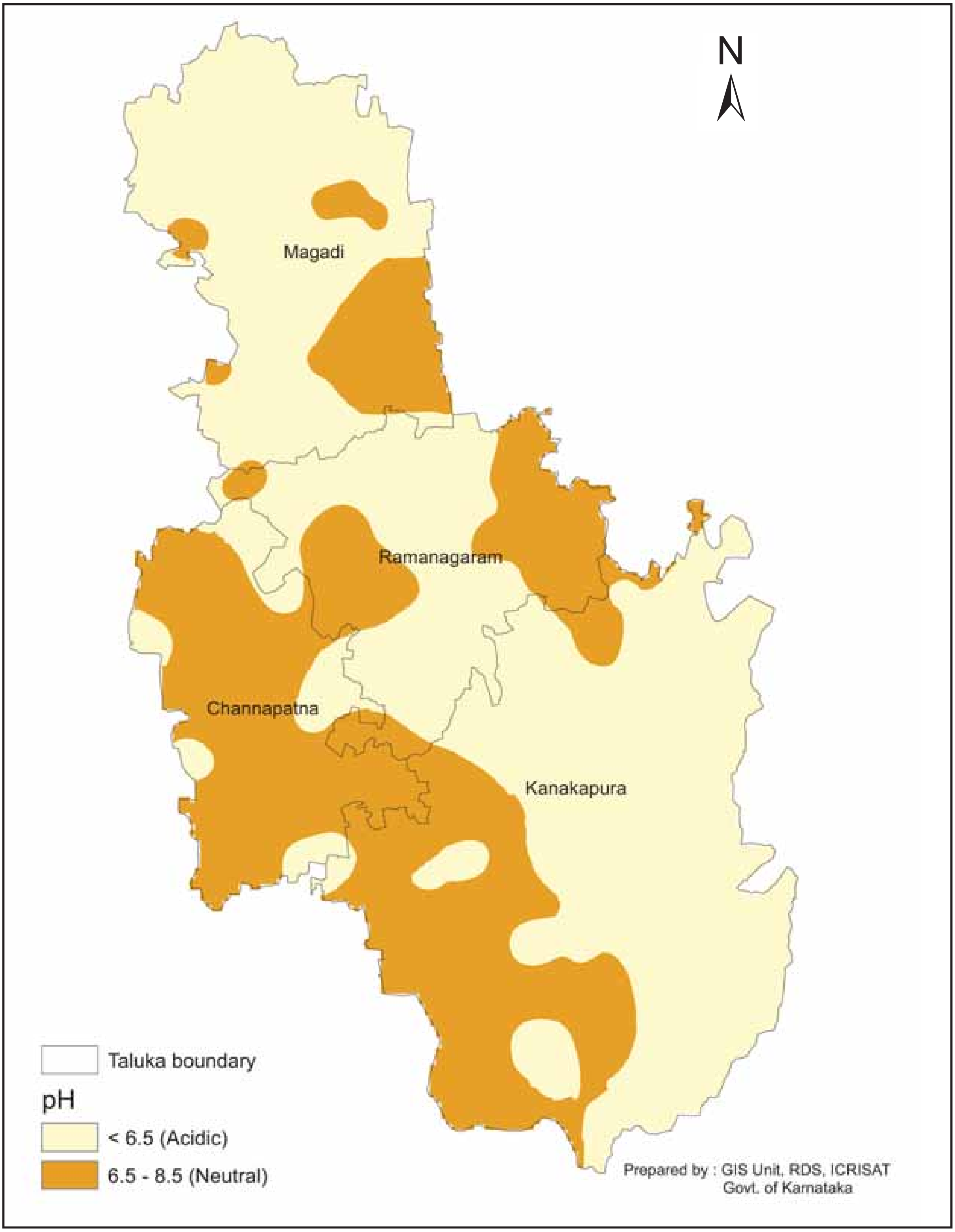


Figure 210. pH status in Ramanagara district

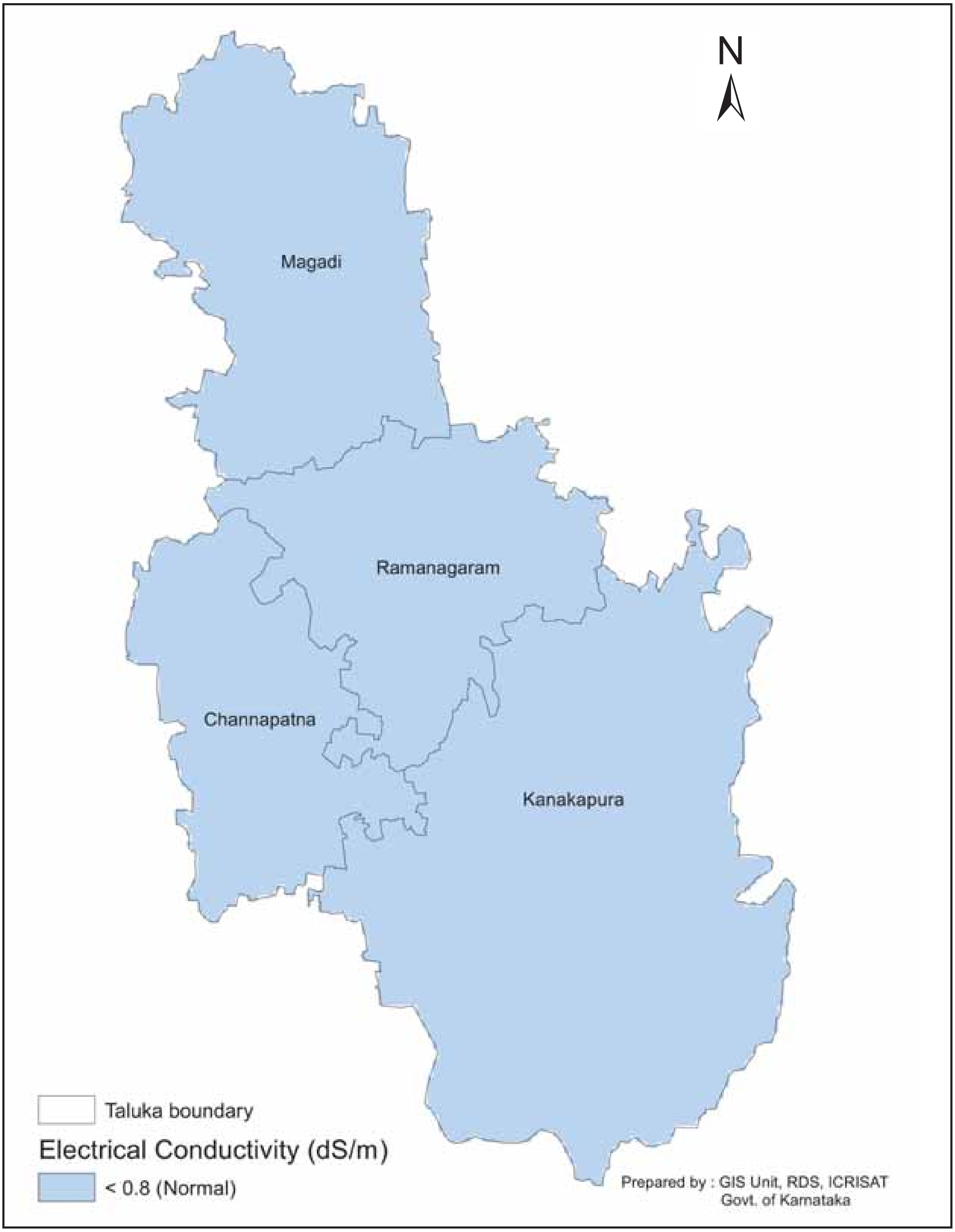


Figure 211. Electrical conductivity status in Ramanagara district

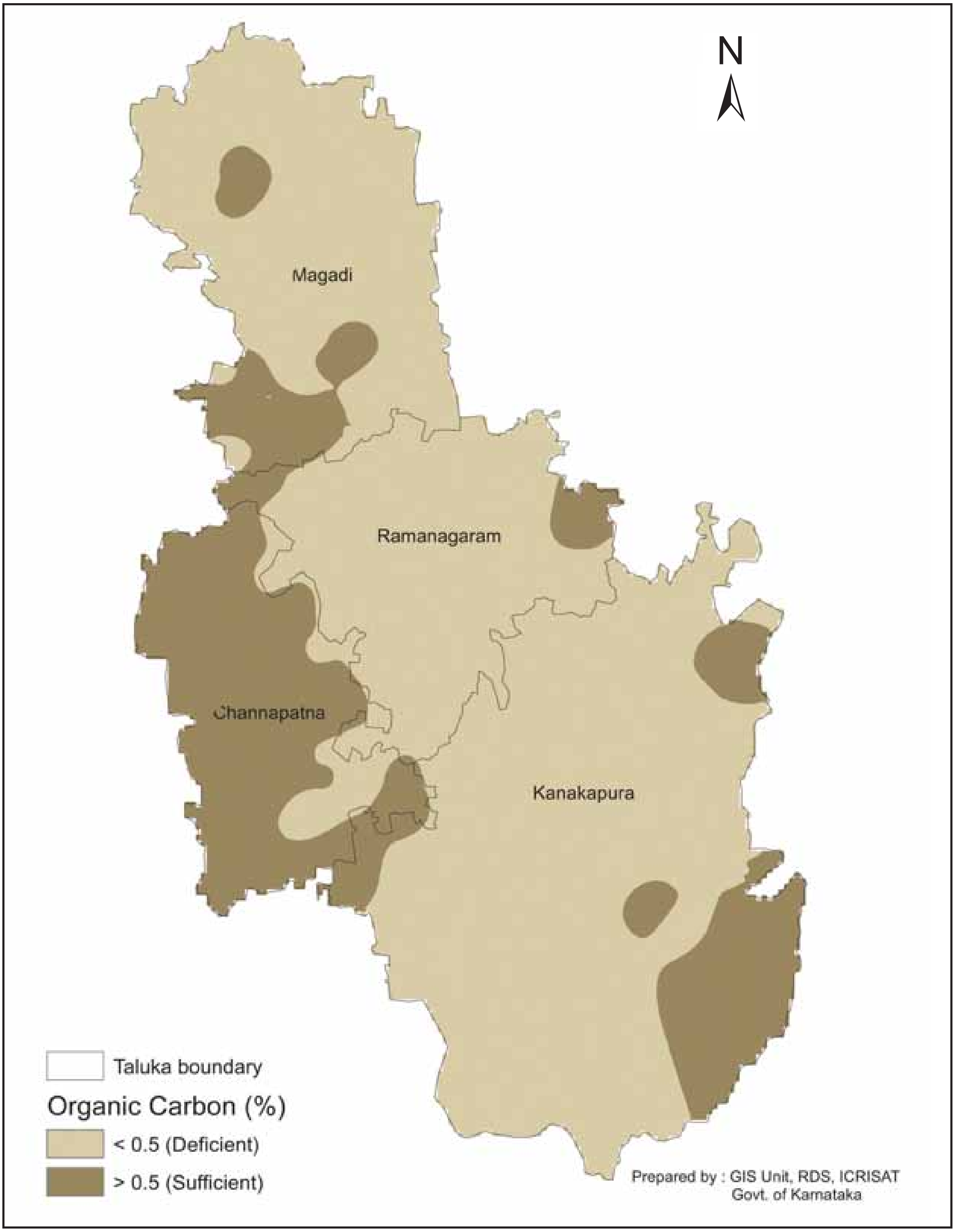


Figure 212. Organic carbon status in Ramanagara district

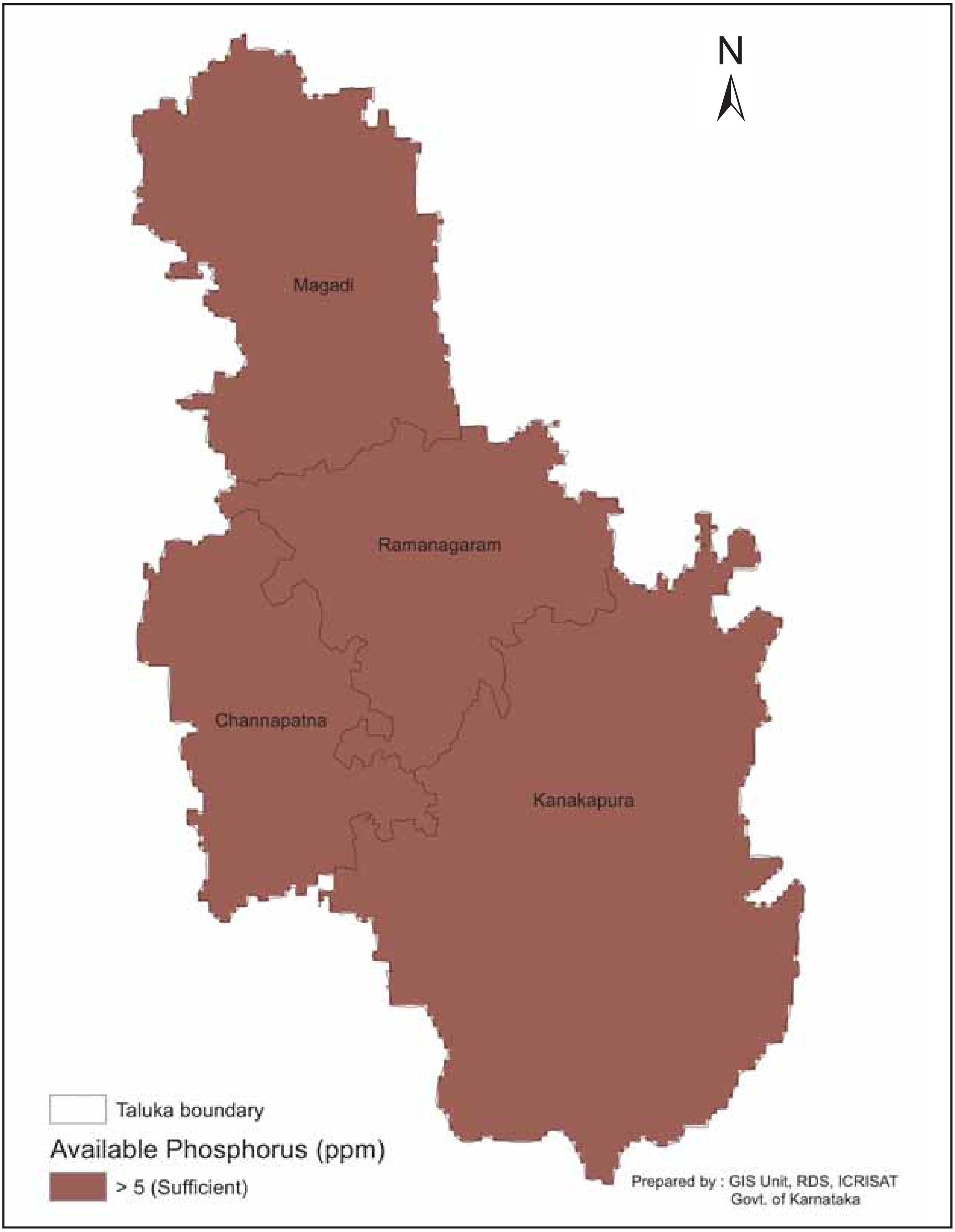


Figure 213. Available phosphorus status in Ramanagara district

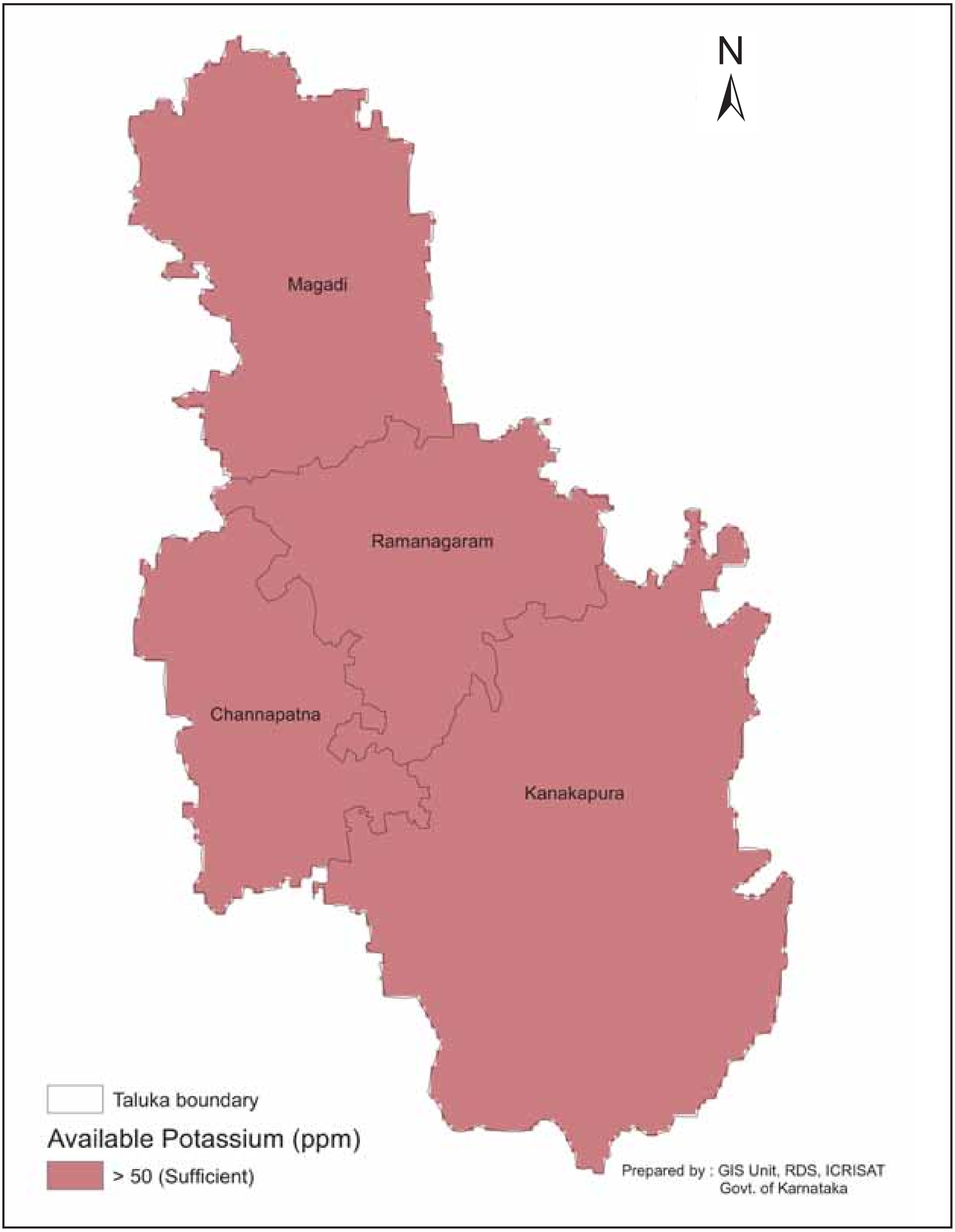


Figure 214. Available potassium status in Ramanagara district

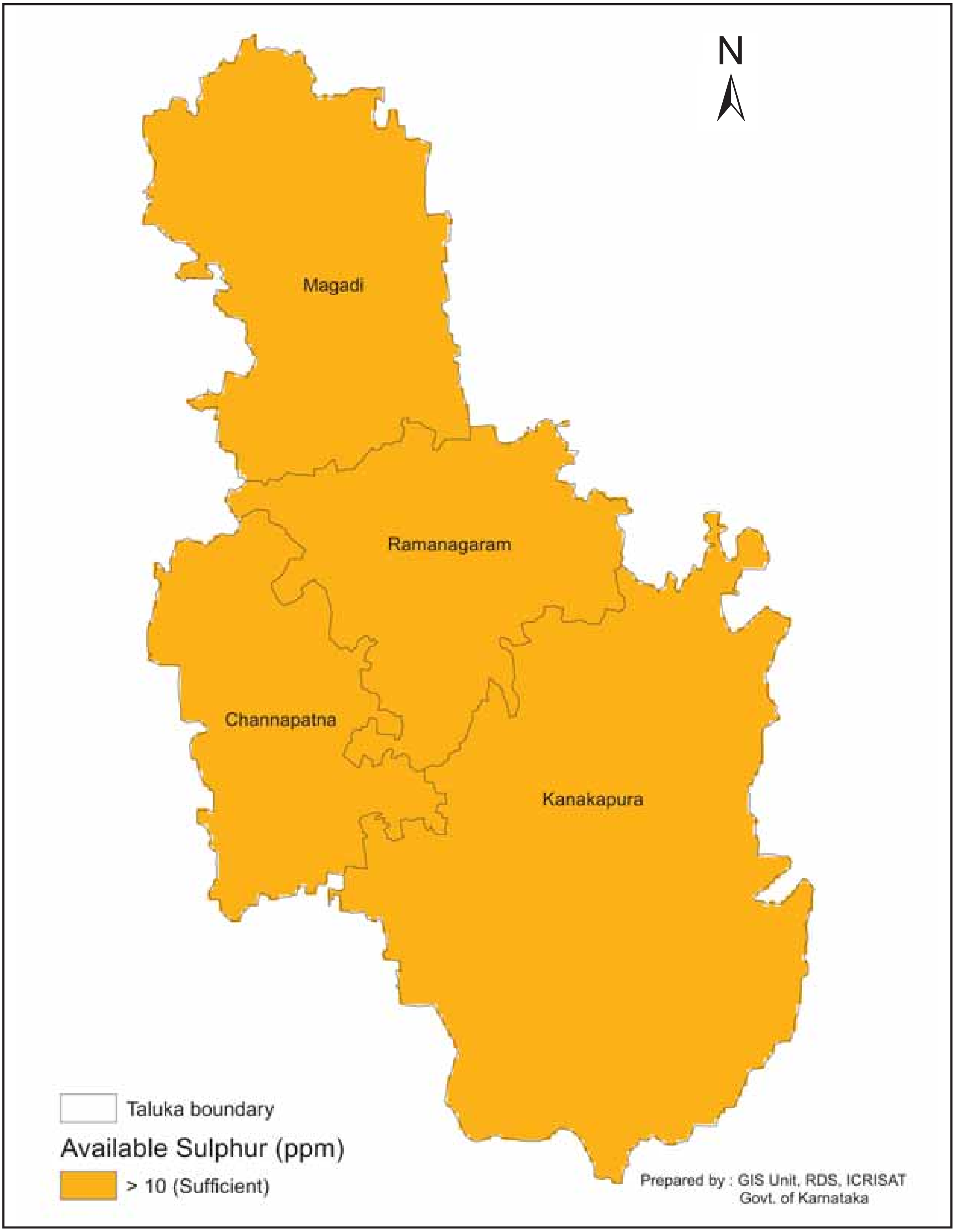


Figure 215. Available sulphur status in Ramanagara district

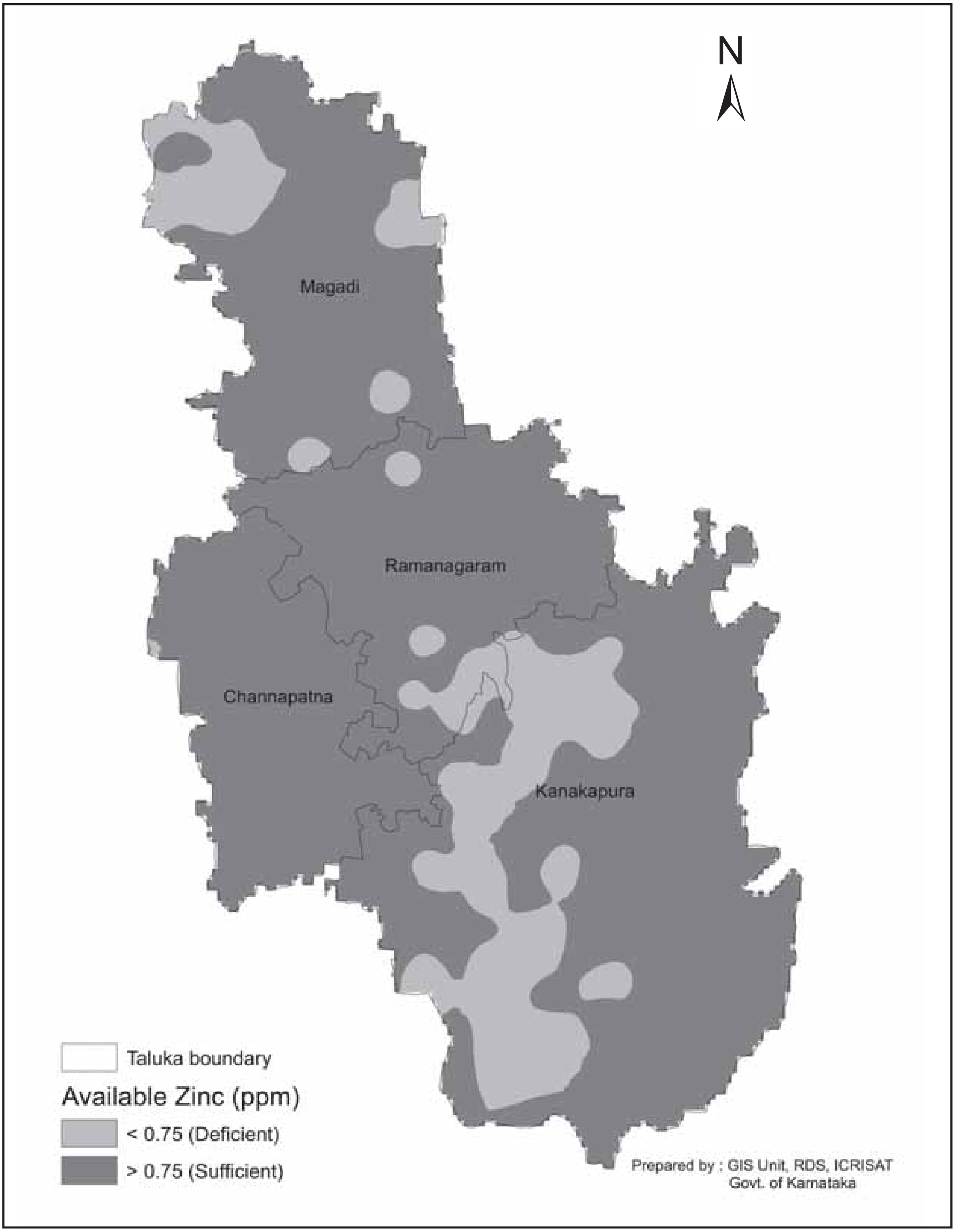


Figure 216. Available zinc status in Ramanagara district

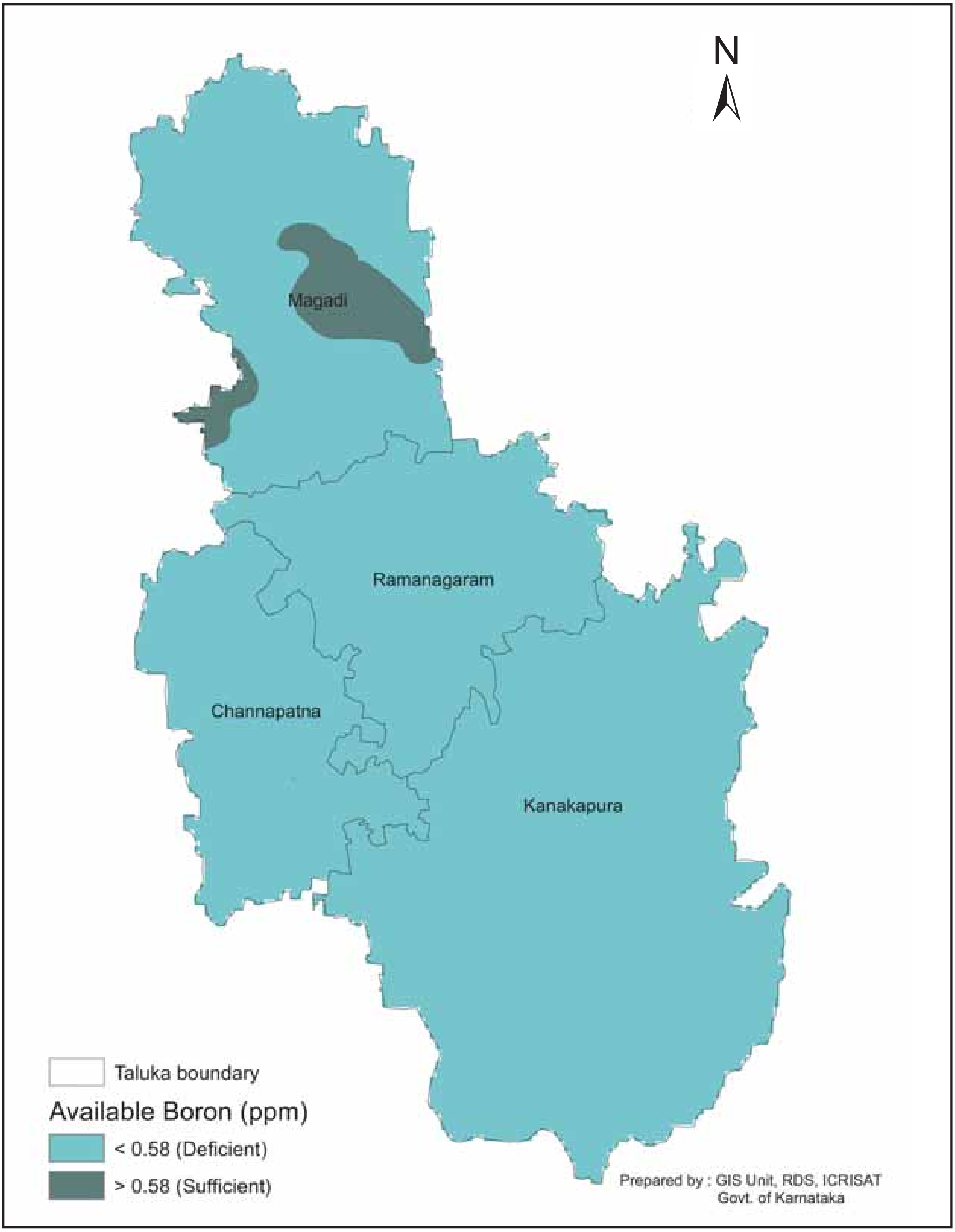


Figure 217. Available boron status in Ramanagara district

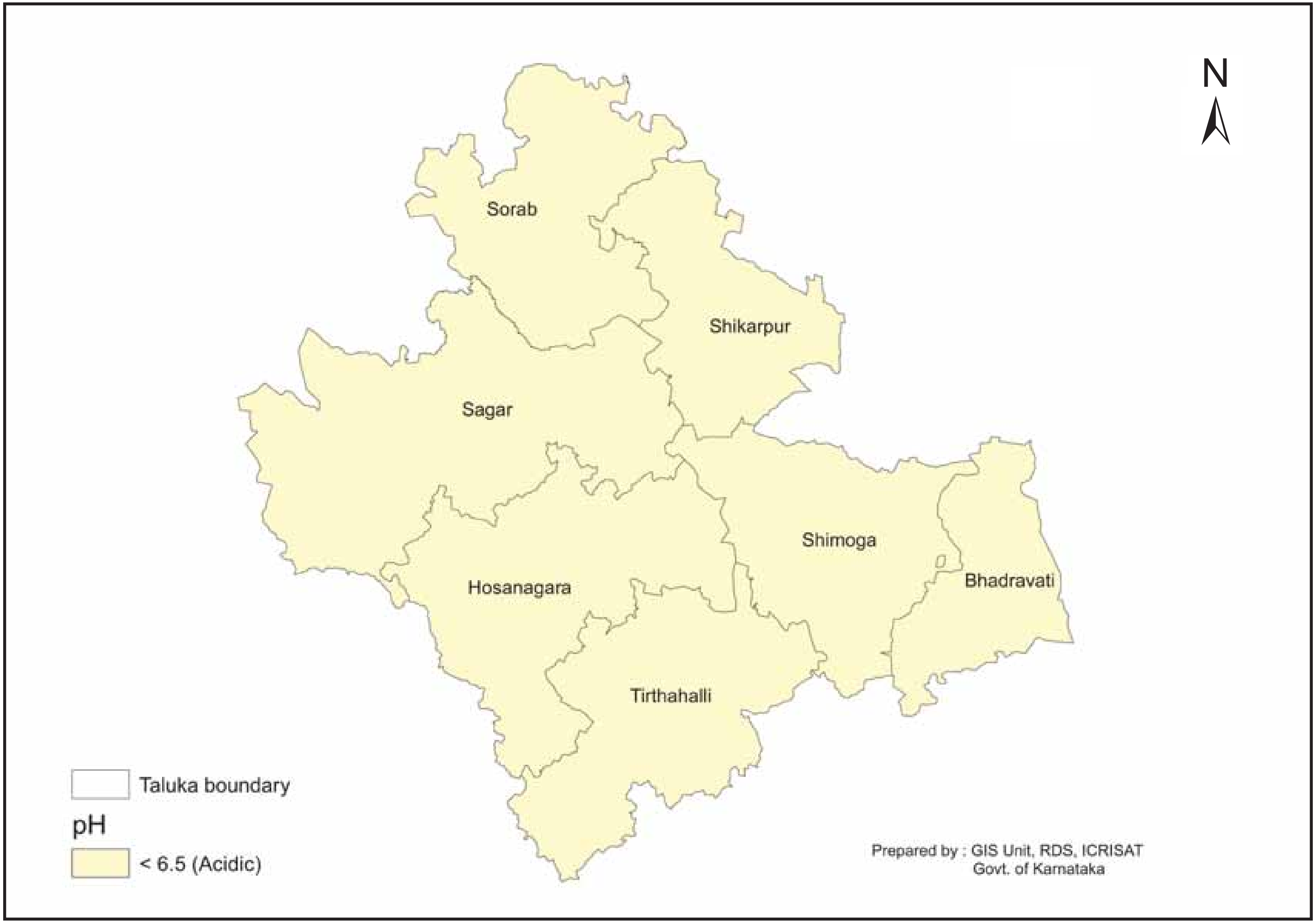


Figure 218. pH status in Shimoga district

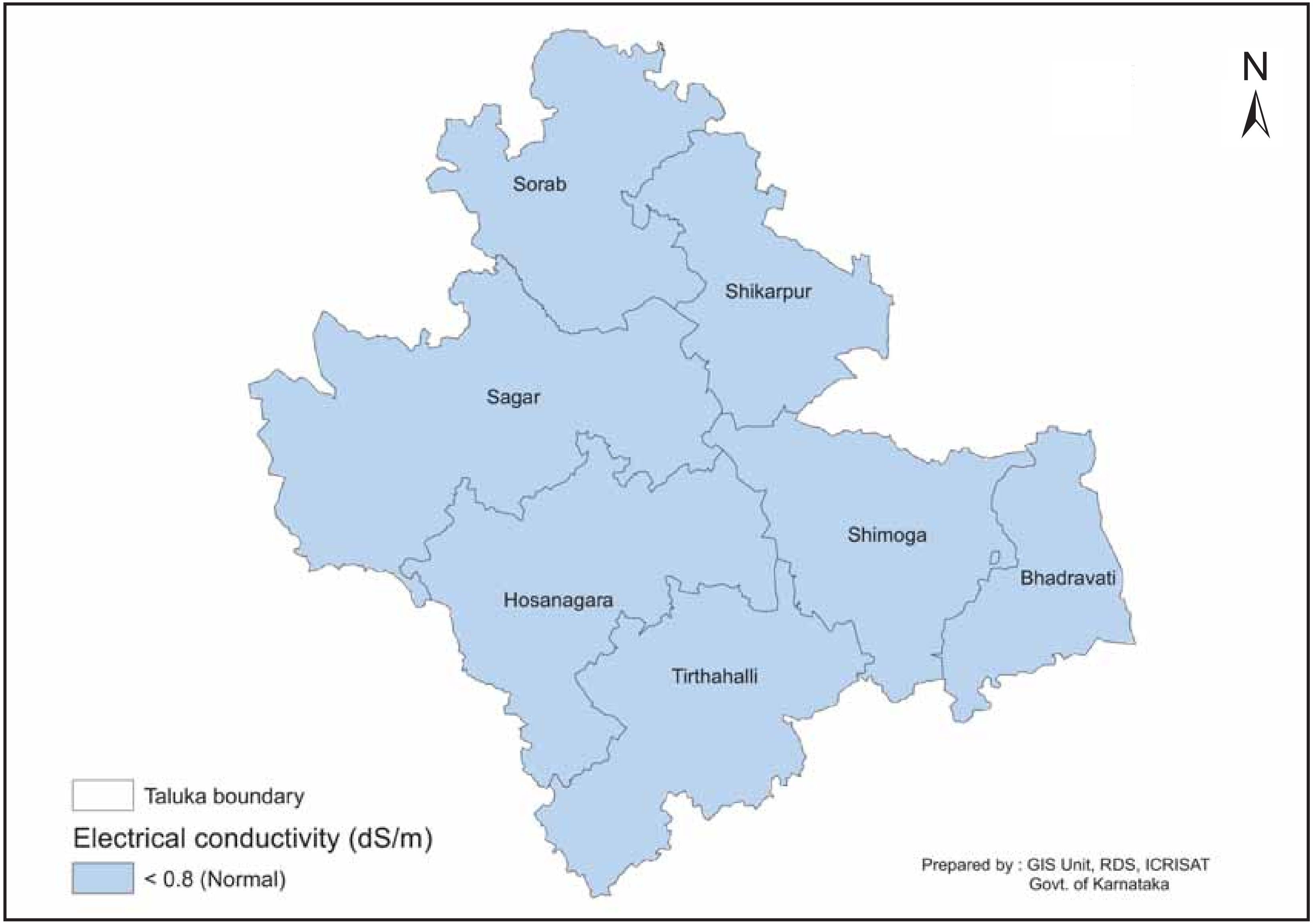


Figure 219. Electrical conductivity status in Shimoga district

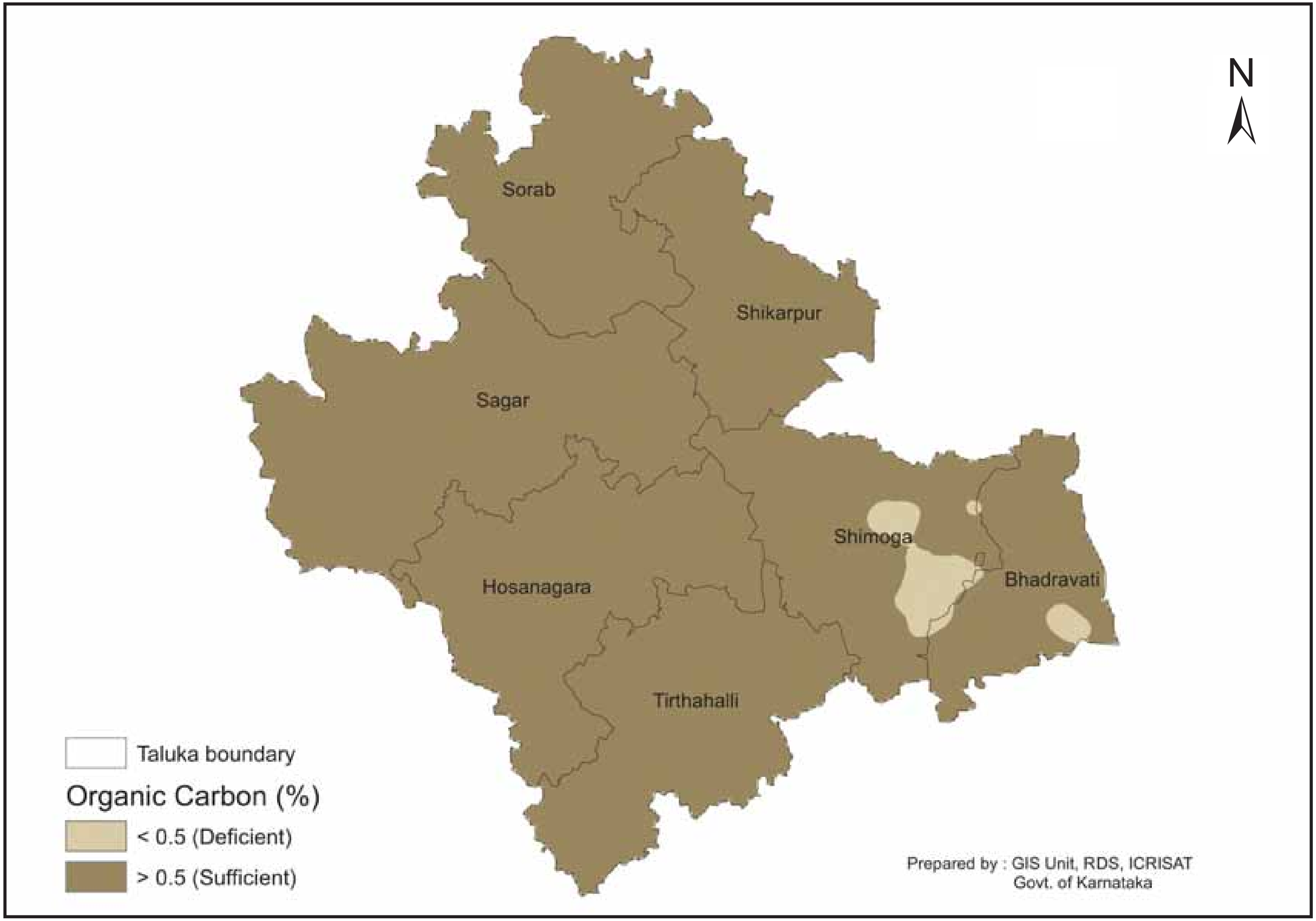


Figure 220. Organic carbon status in Shimoga district

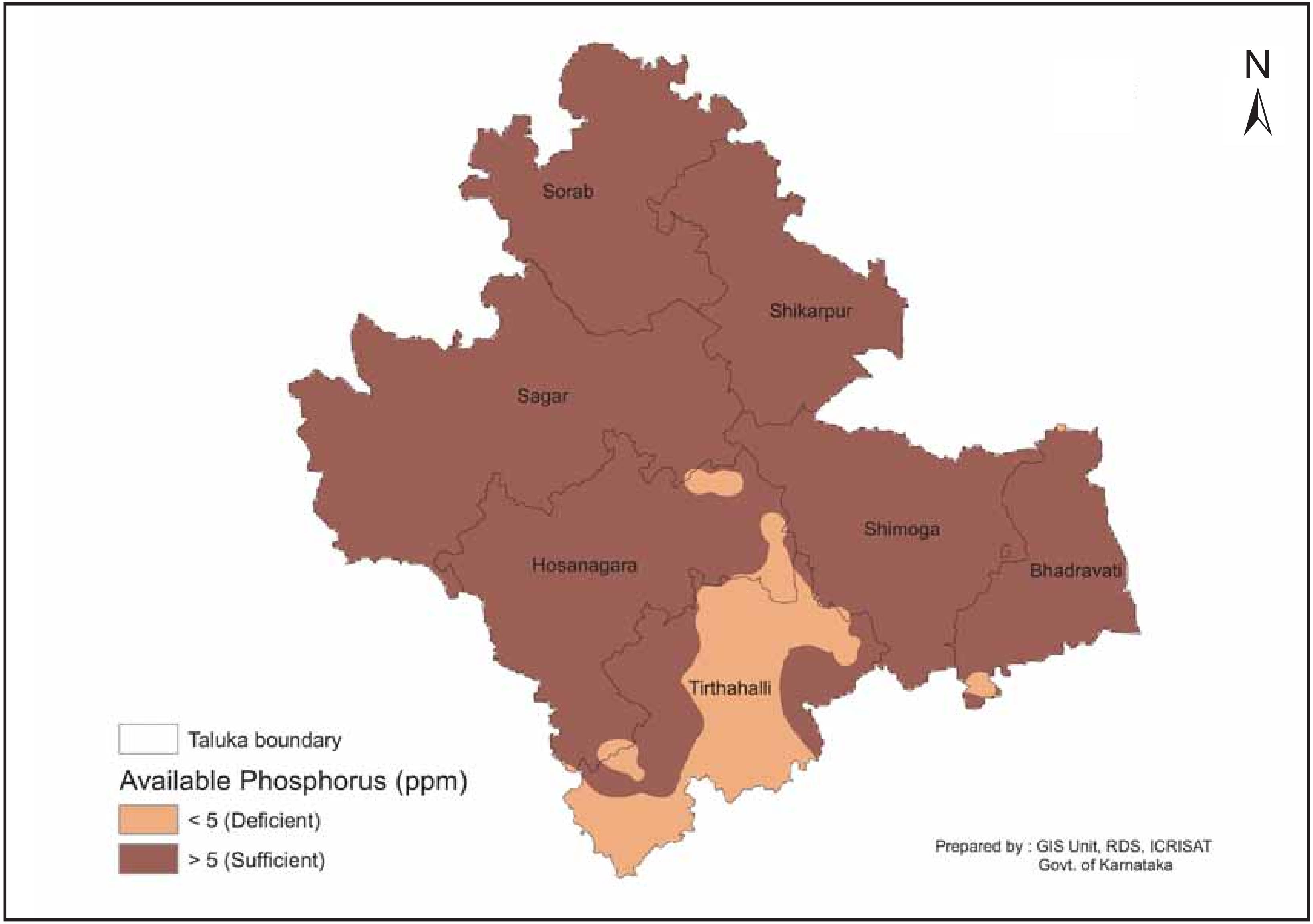


Figure 221. Available phosphorus status in Shimoga district

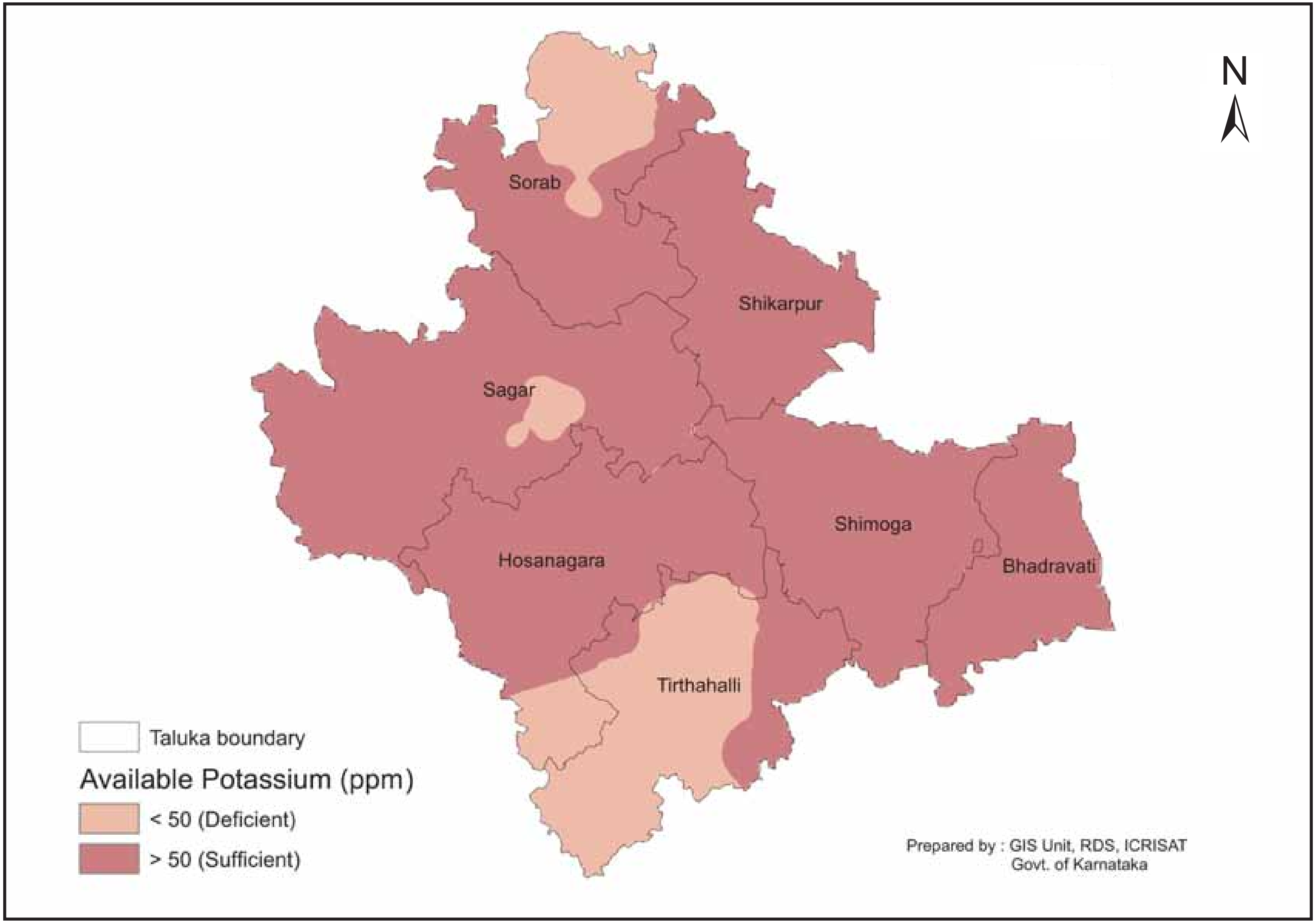


Figure 222. Available potassium status in Shimoga district

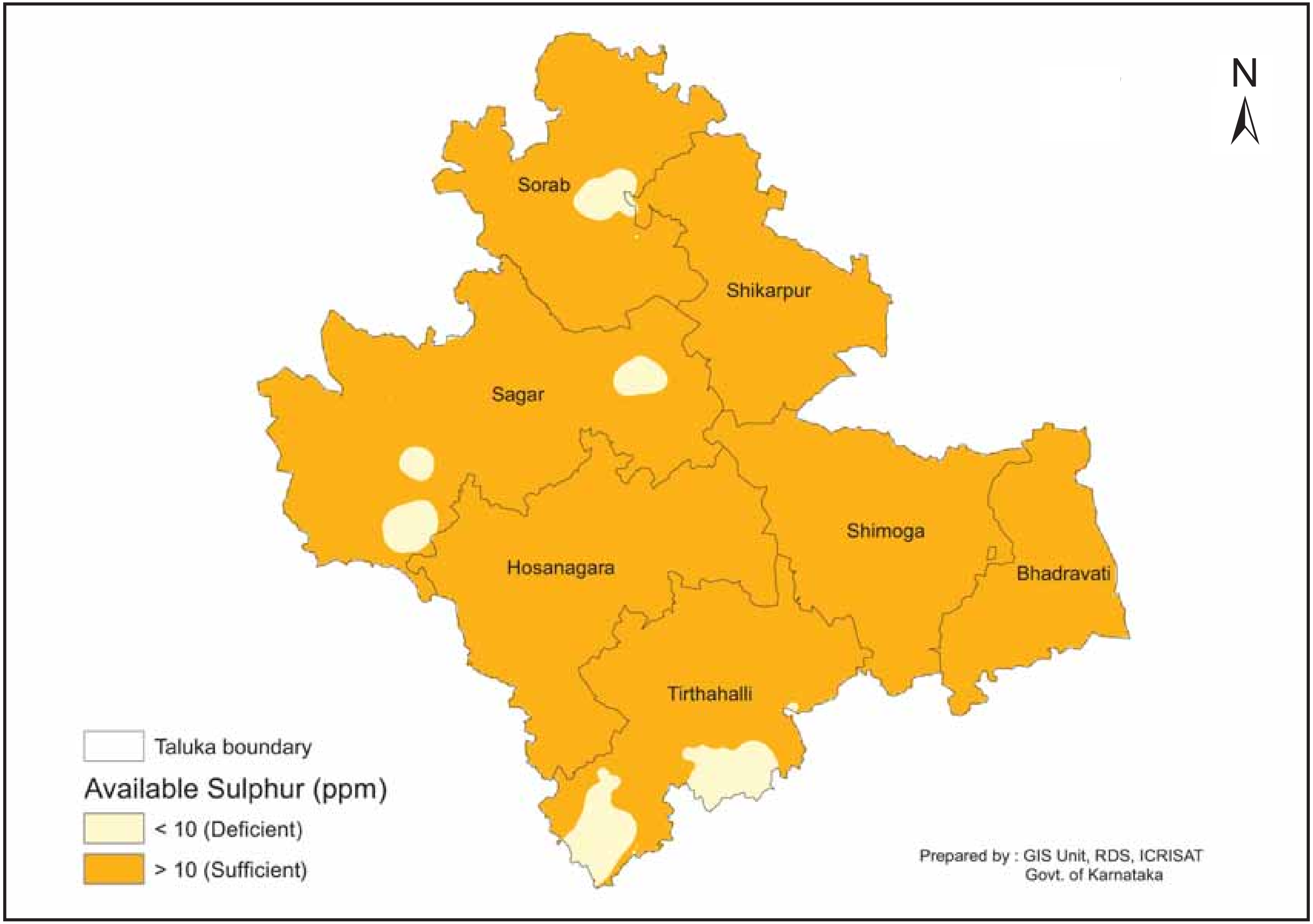


Figure 223. Available sulphur status in Shimoga district

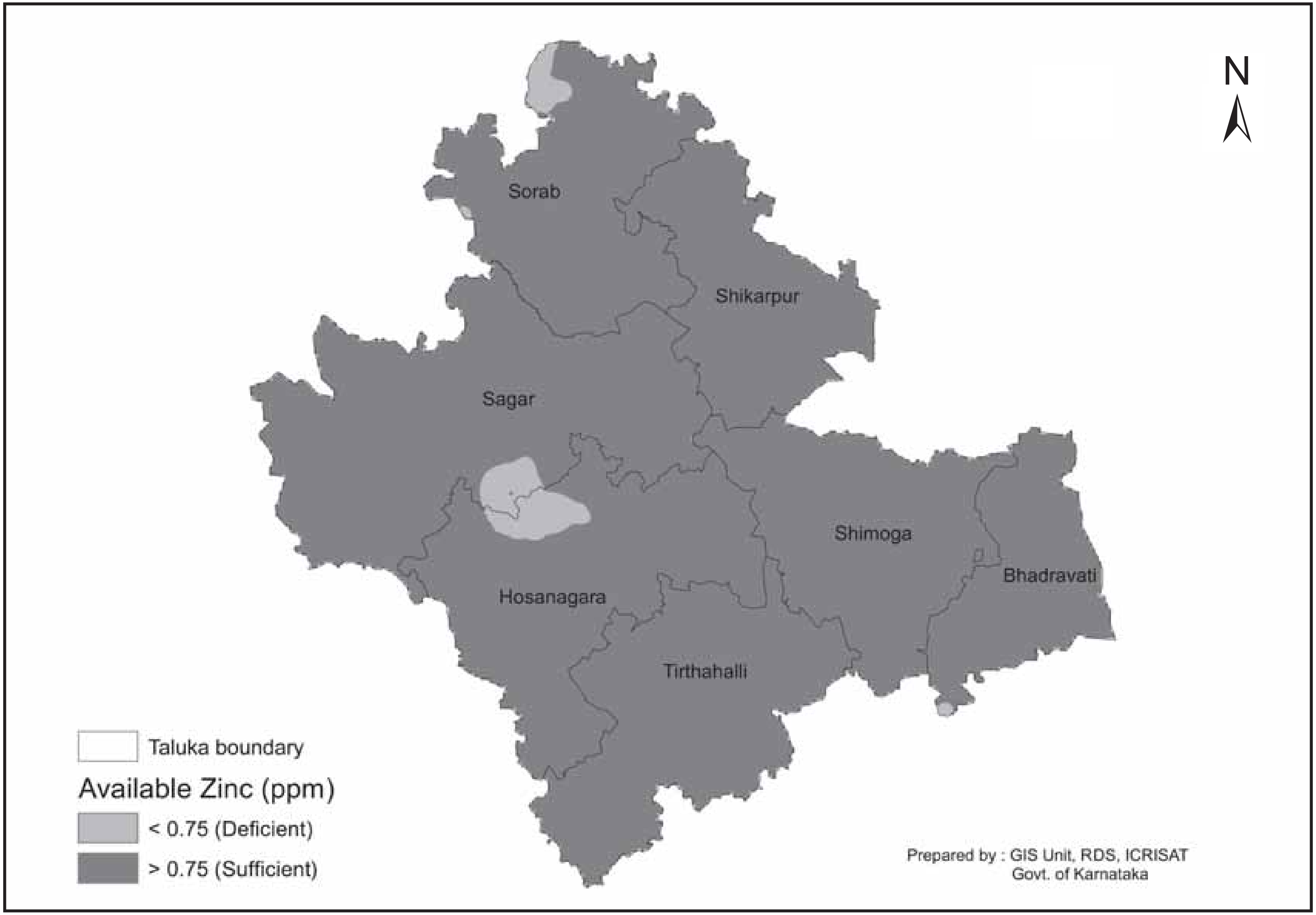


Figure 224. Available zinc status in Shimoga district

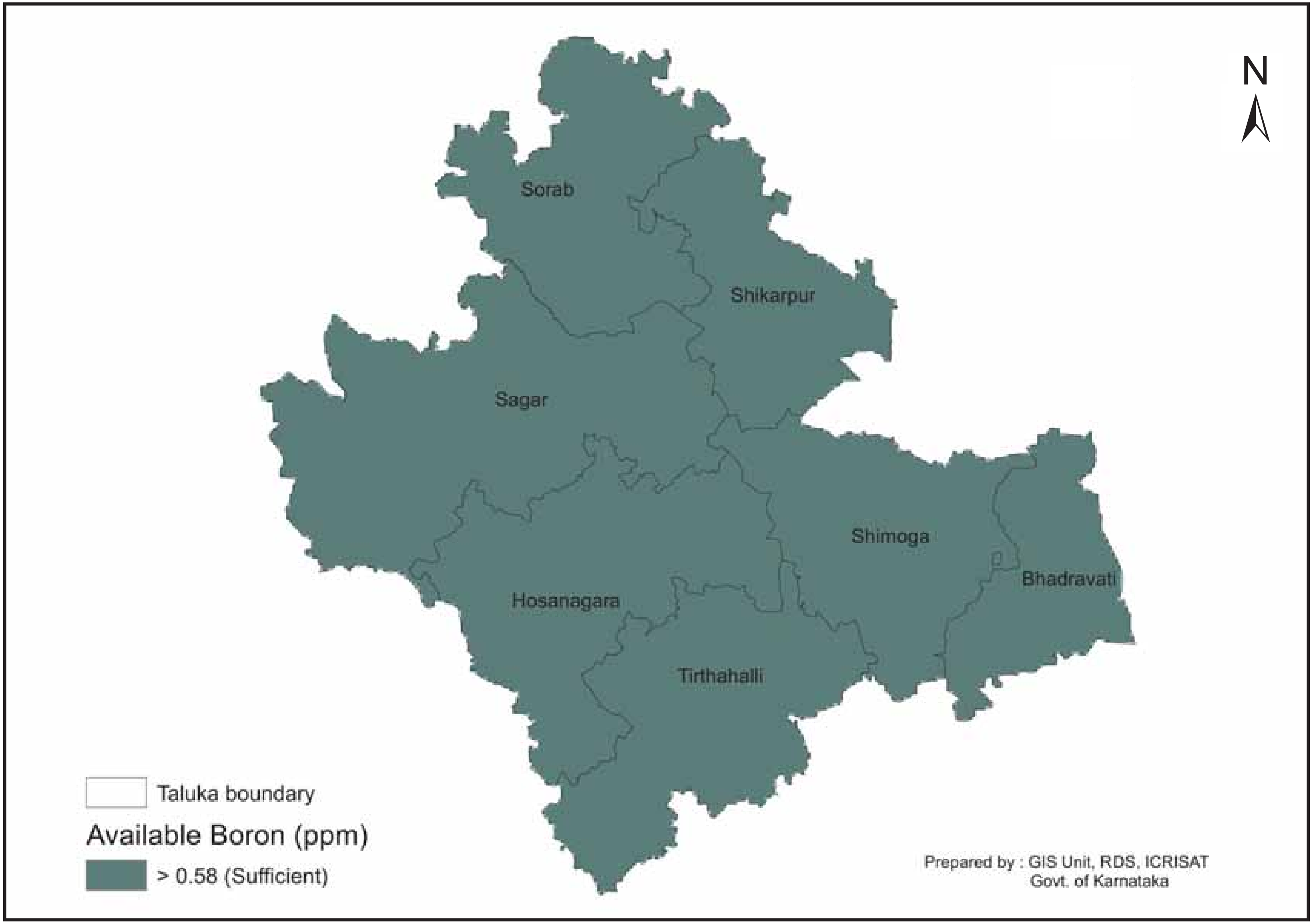


Figure 225. Available boron status in Shimoga district

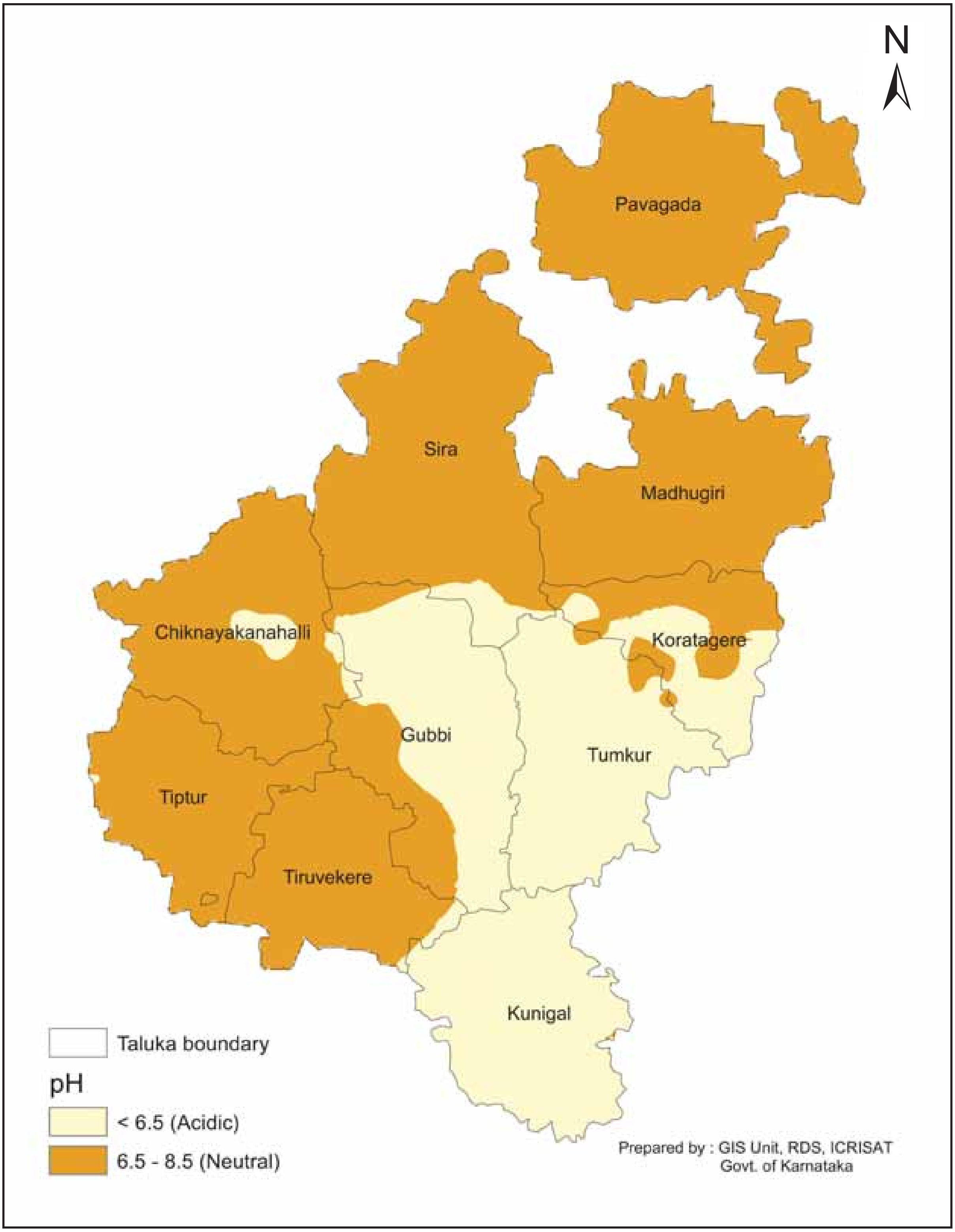


Figure 226. pH status in Tumkur district

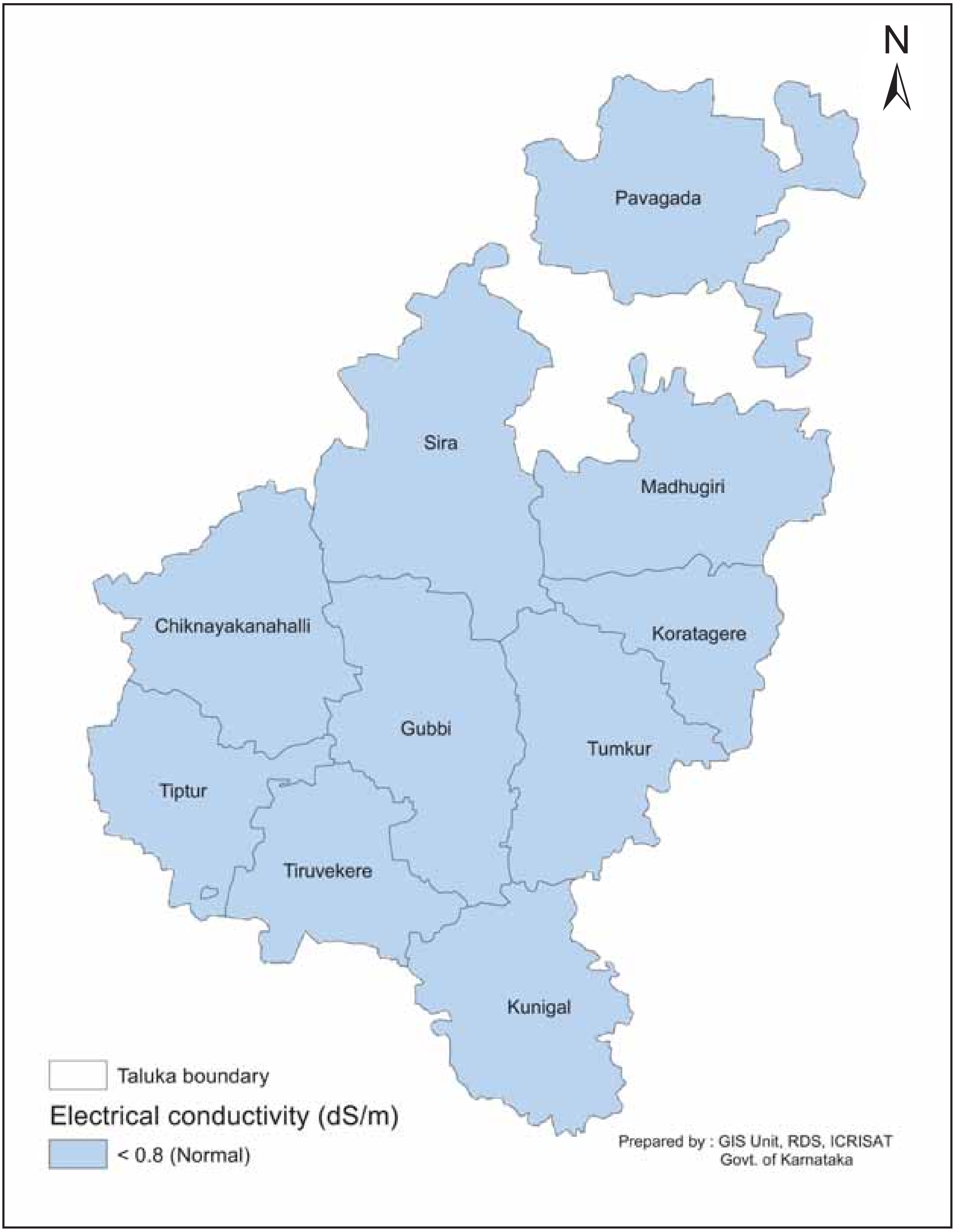


Figure 227. Electrical conductivity status in Tumkur district

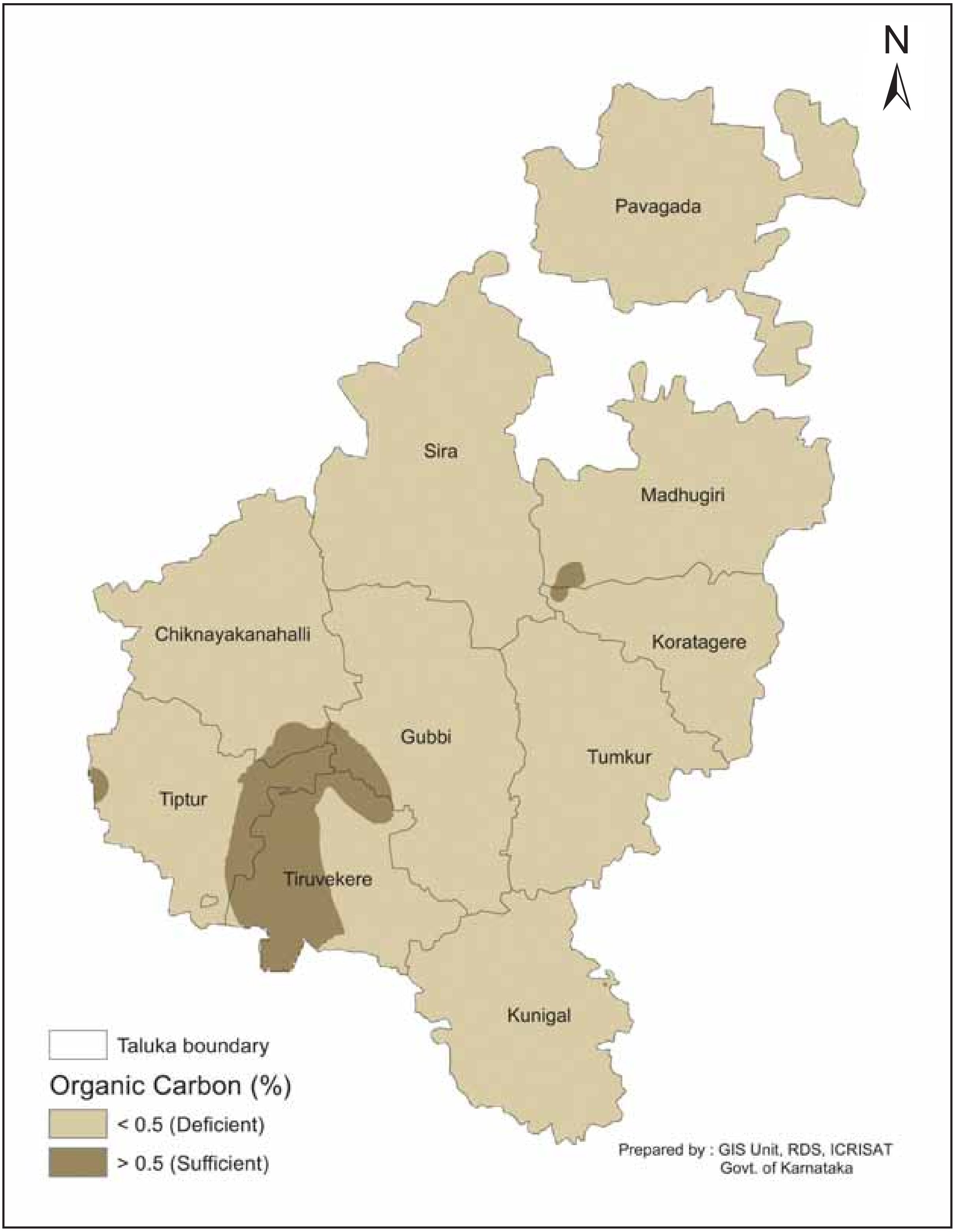


Figure 228. Organic carbon status in Tumkur district

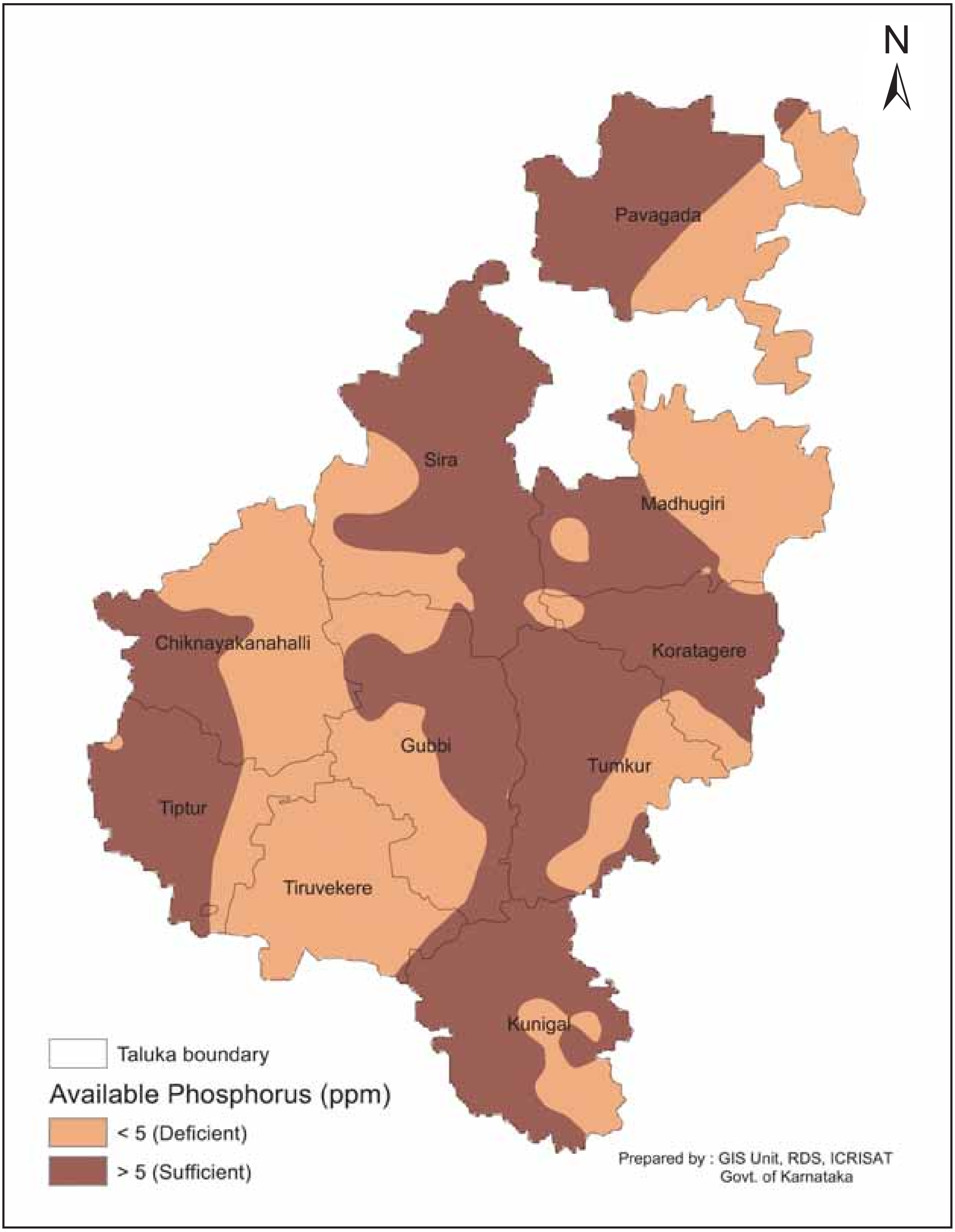


Figure 229. Available phosphorus status in Tumkur district

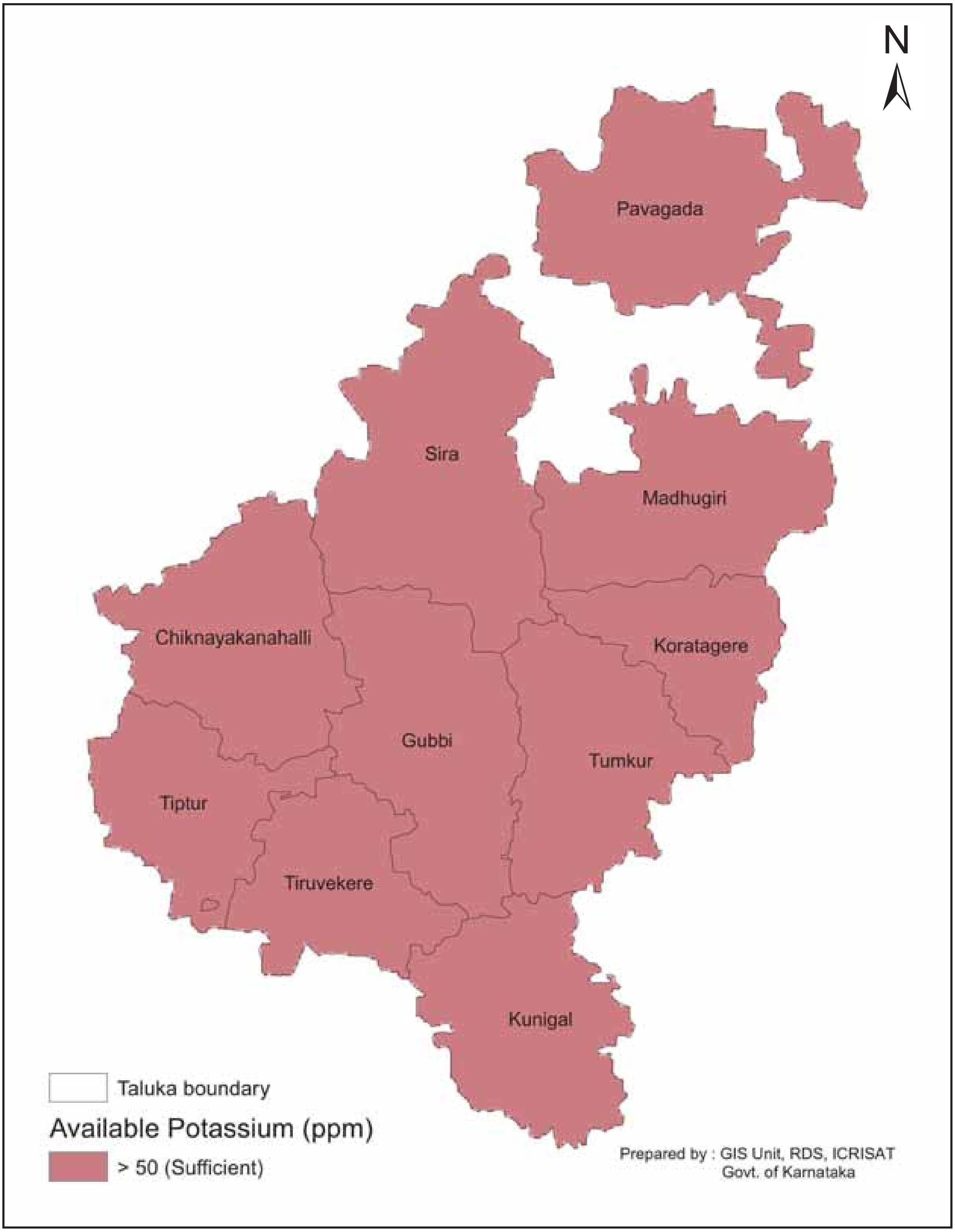


Figure 230. Available potassium status in Tumkur district

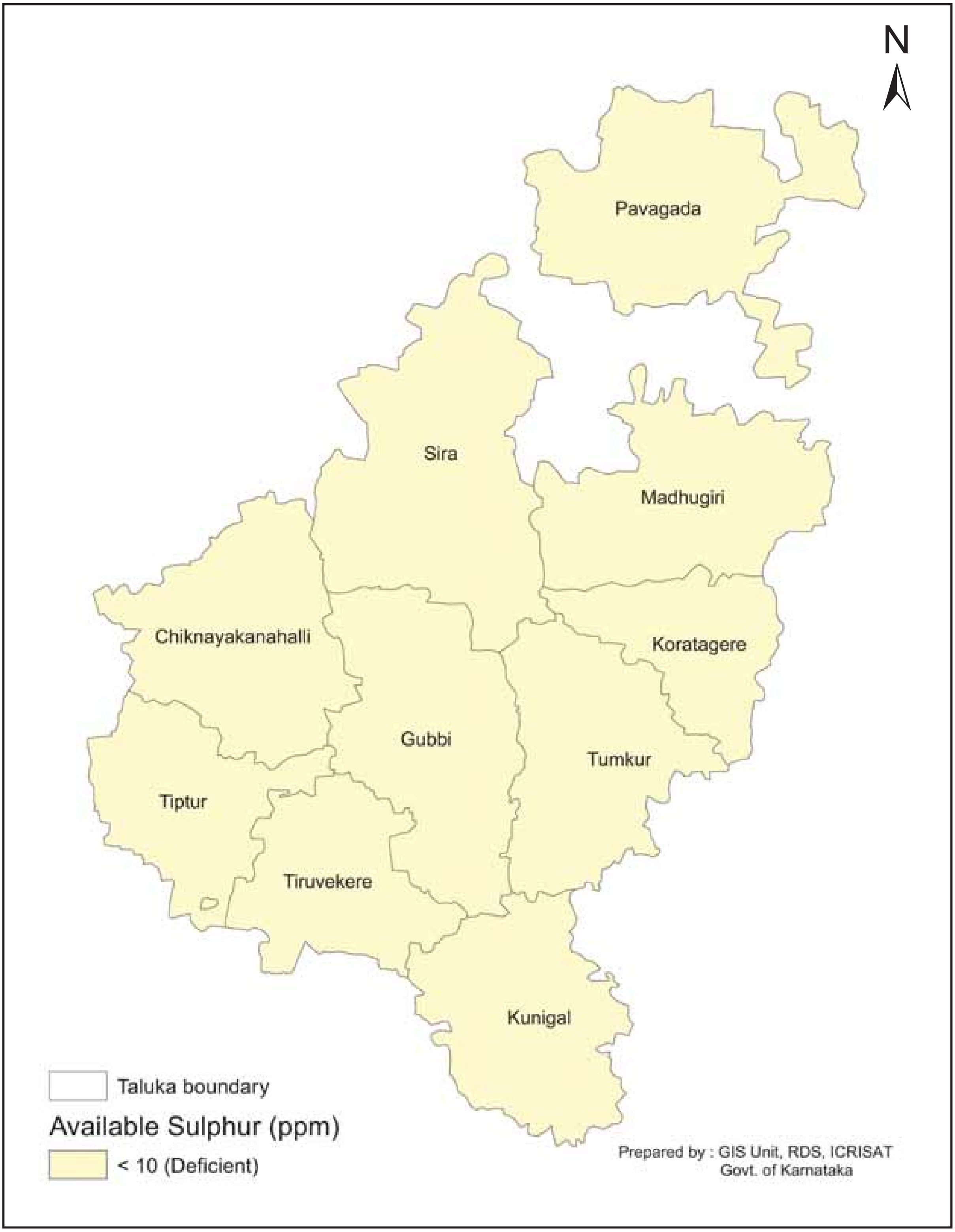


Figure 231. Available sulphur status in Tumkur district

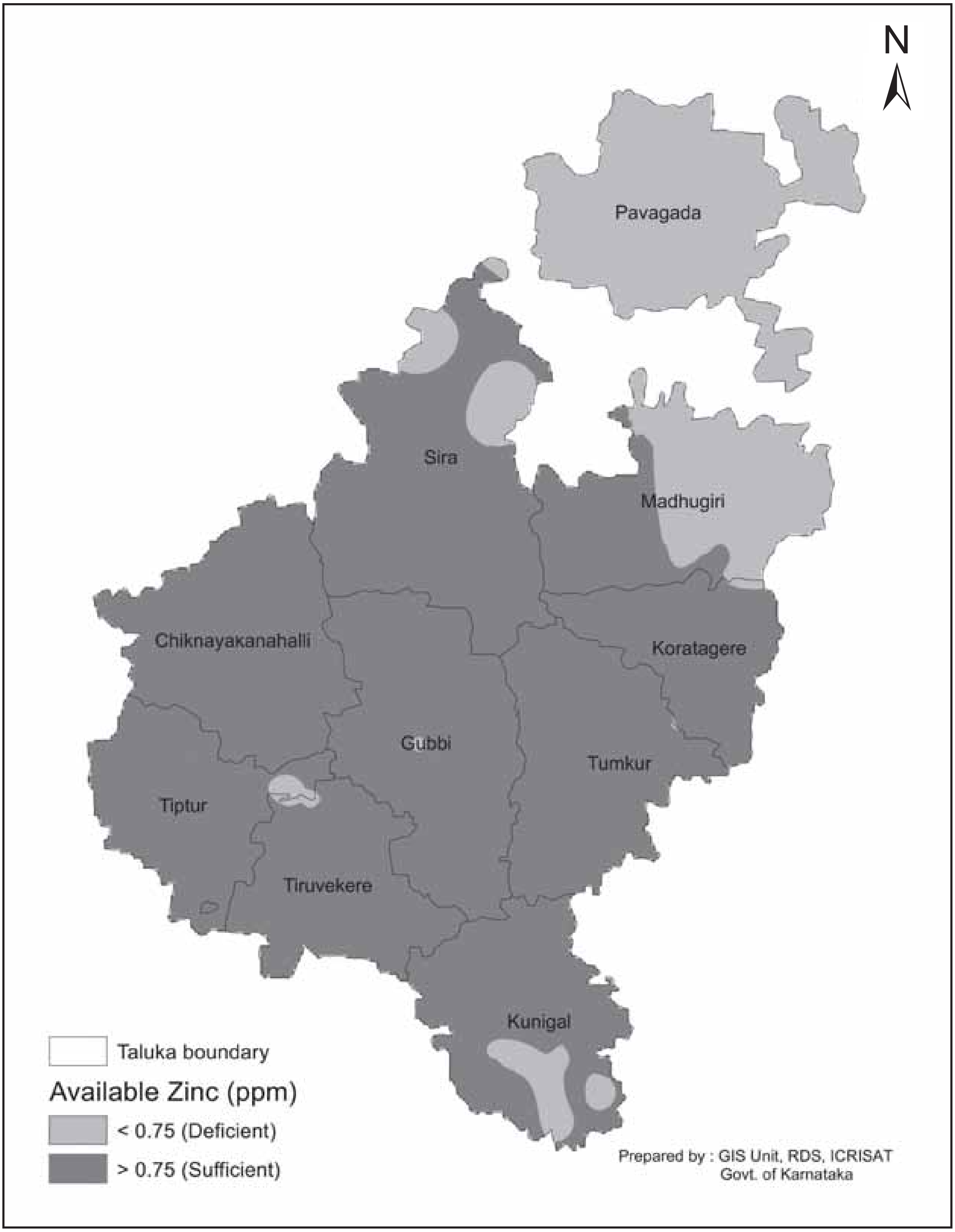


Figure 232. Available zinc status in Tumkur district

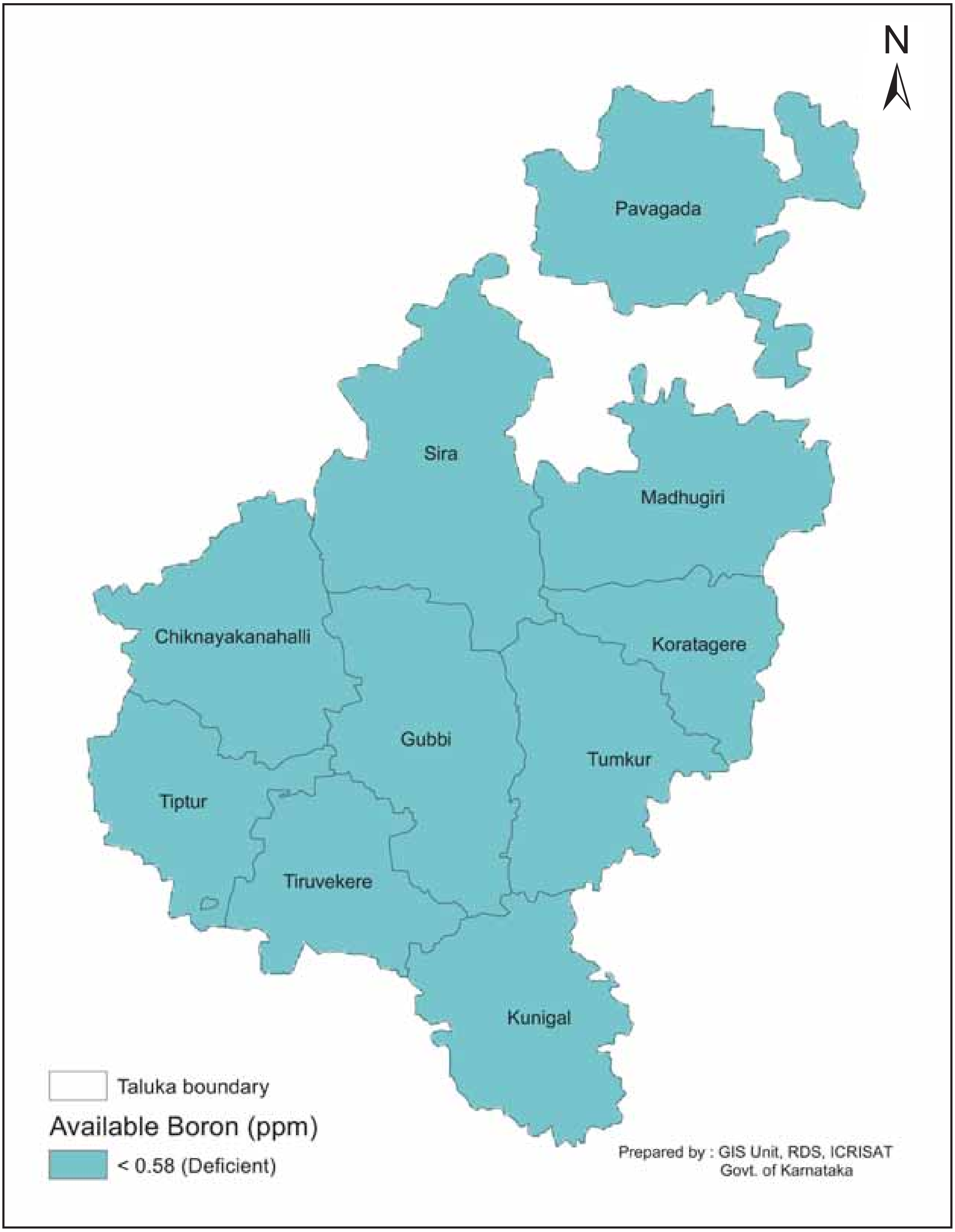


Figure 233. Available boron status in Tumkur district

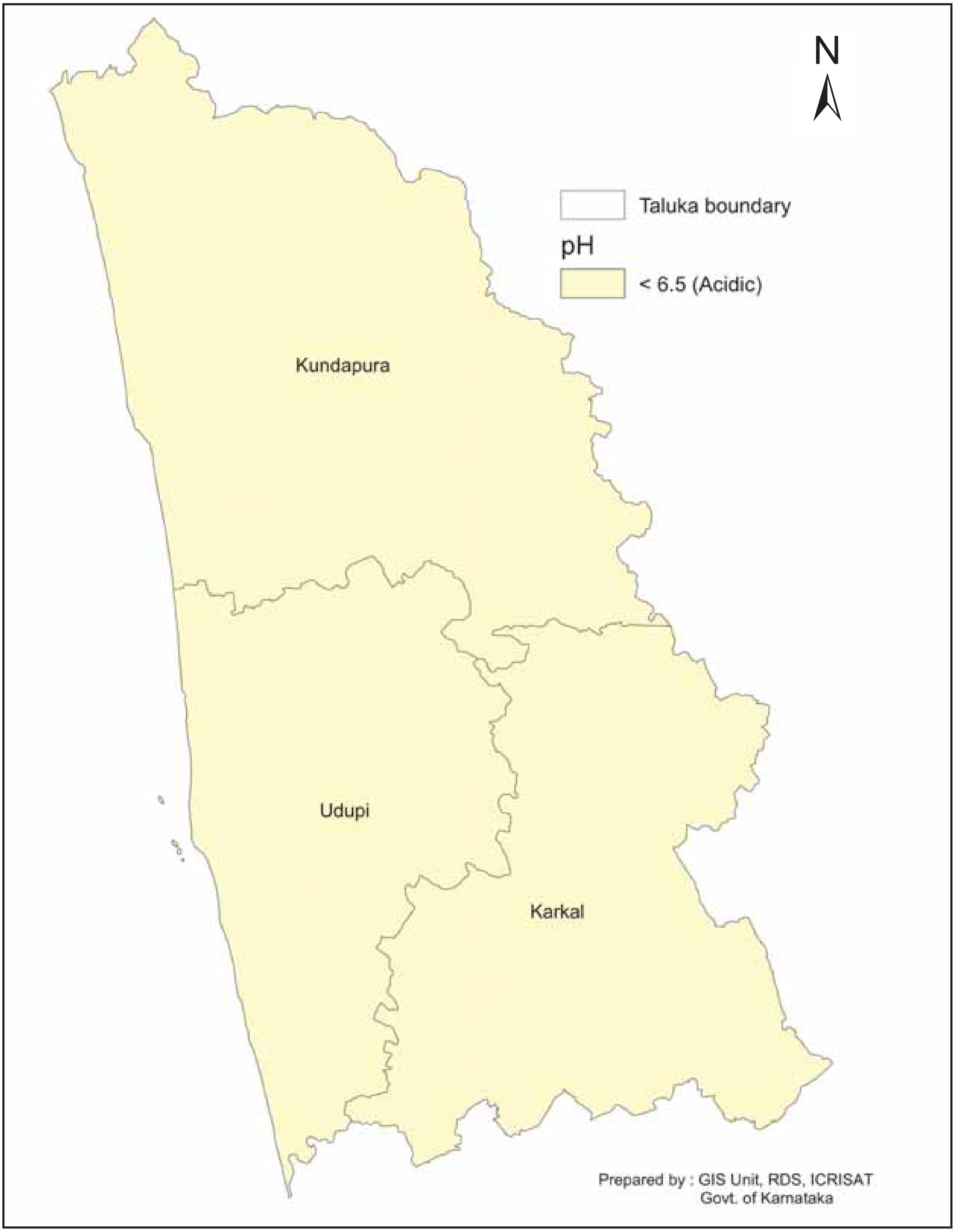


Figure 234. pH status in Udupi district

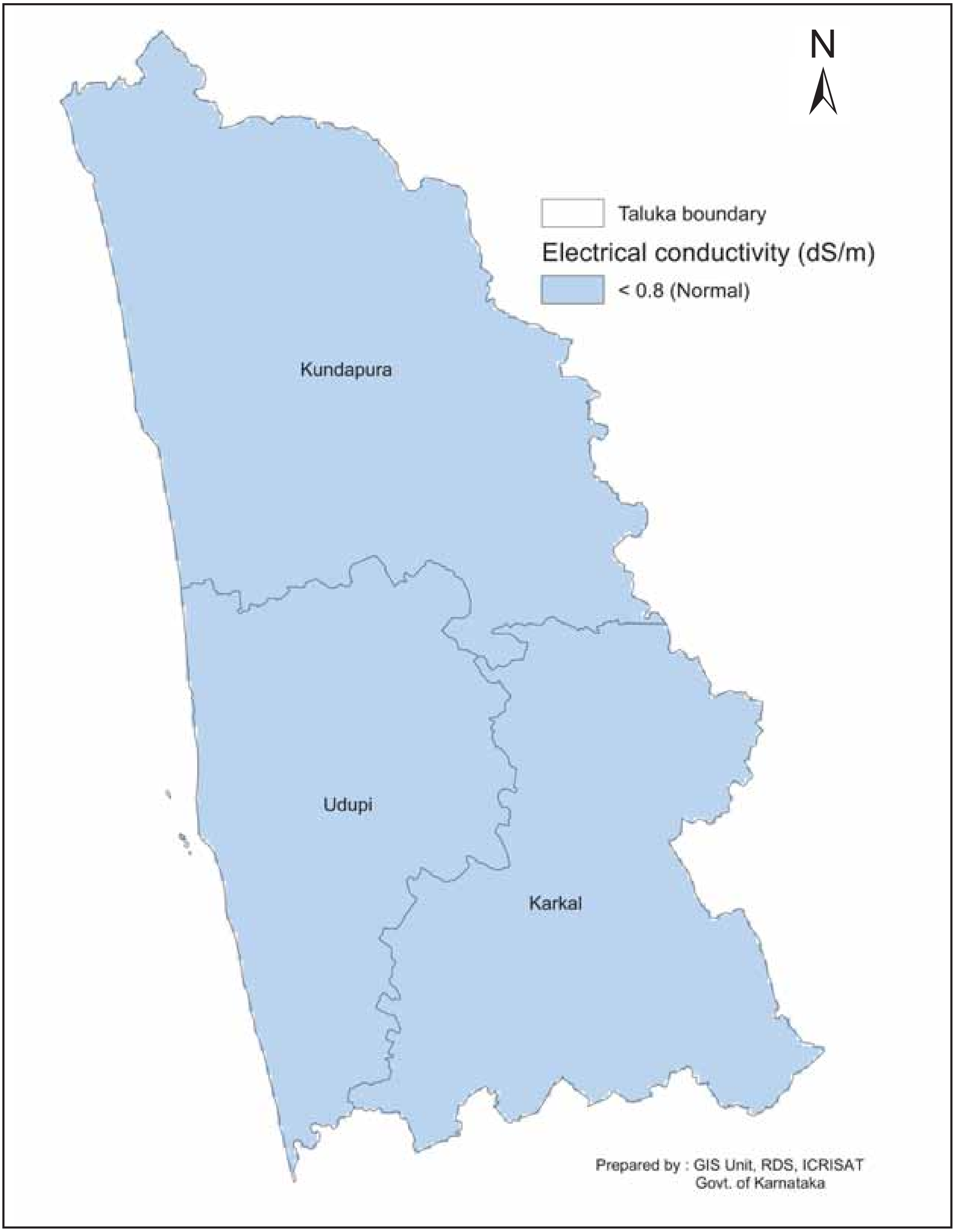


Figure 235. Electrical conductivity status in Udupi district

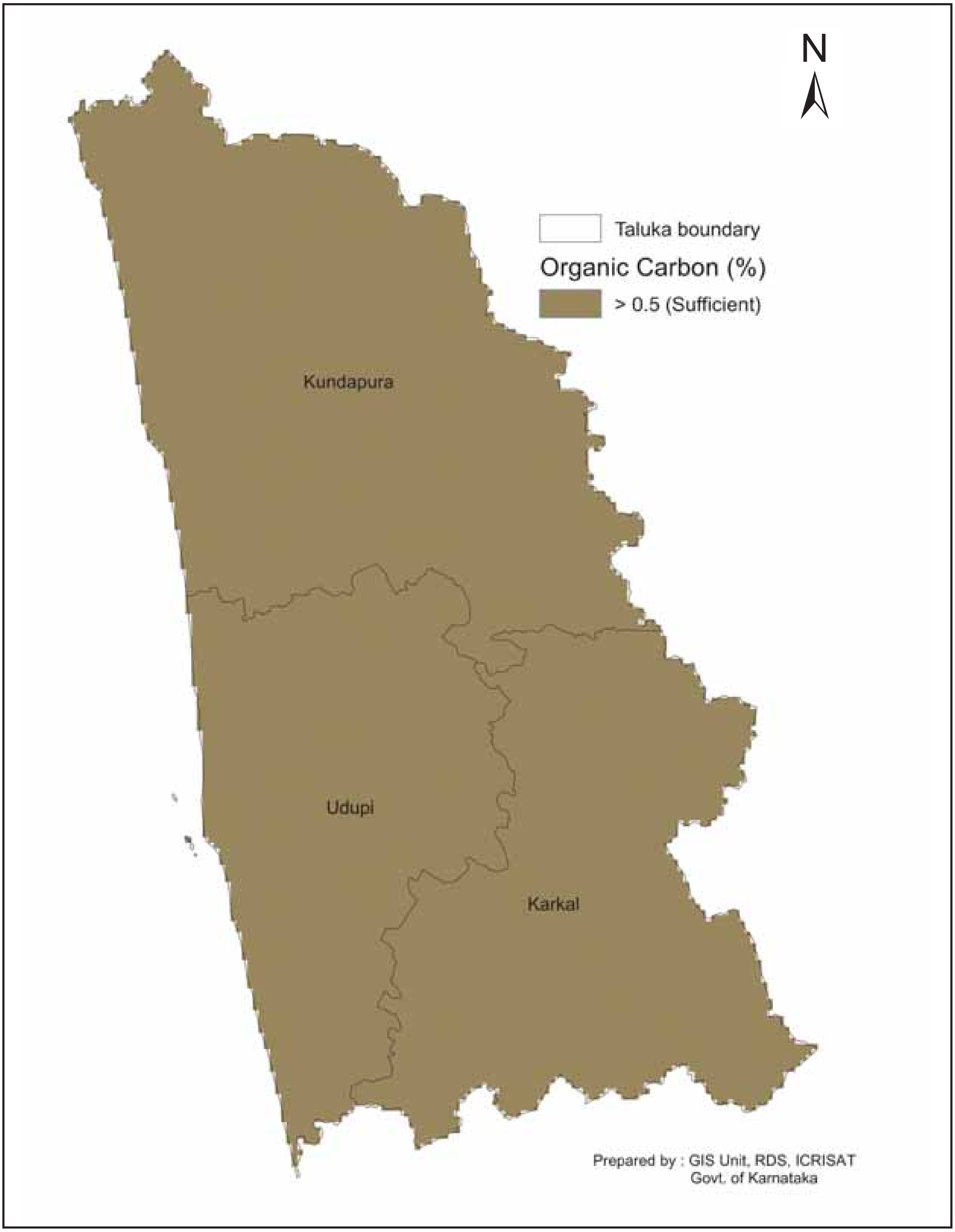


Figure 236. Organic carbon status in Udupi district

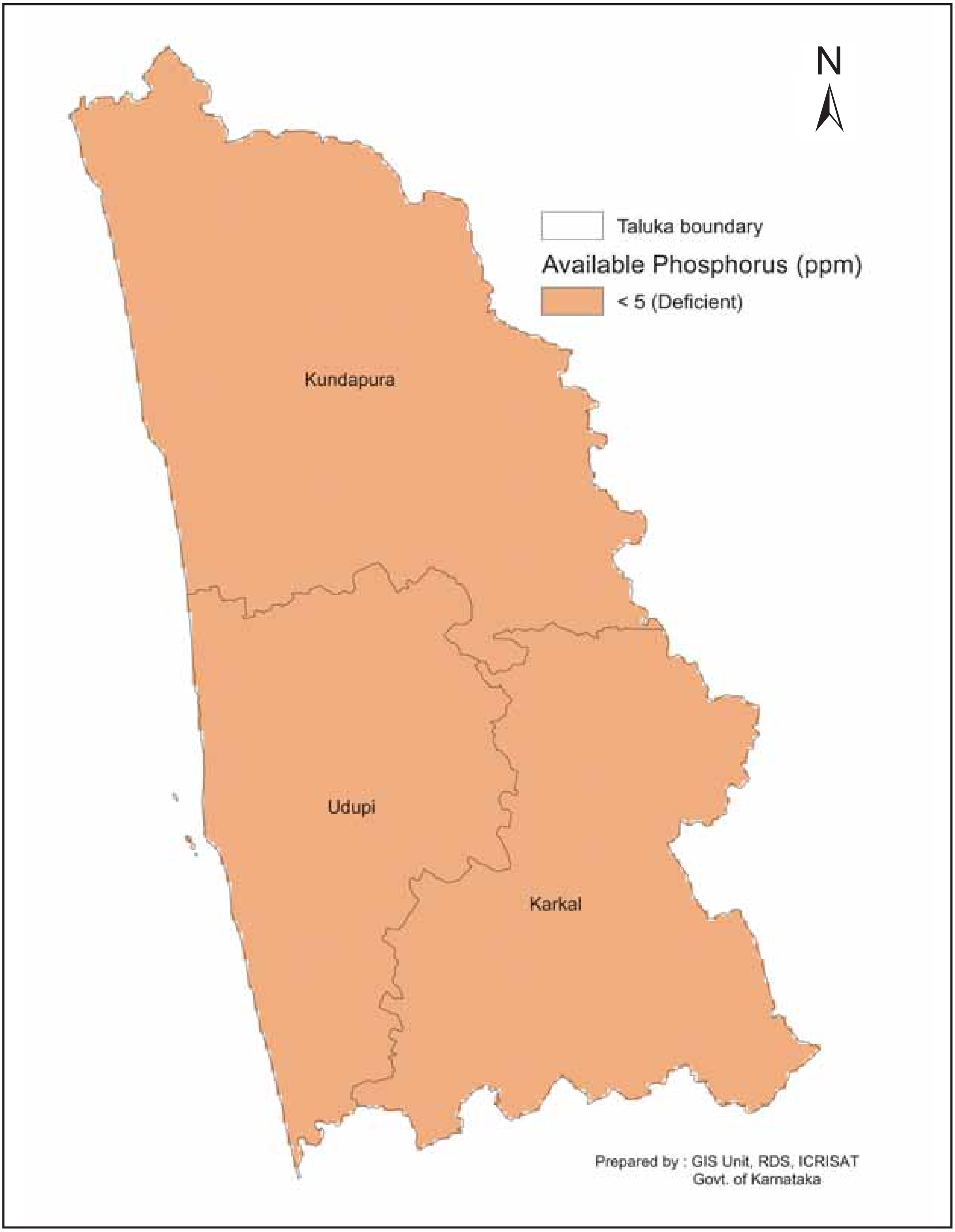


Figure 237. Available phosphorus status in Udupi district

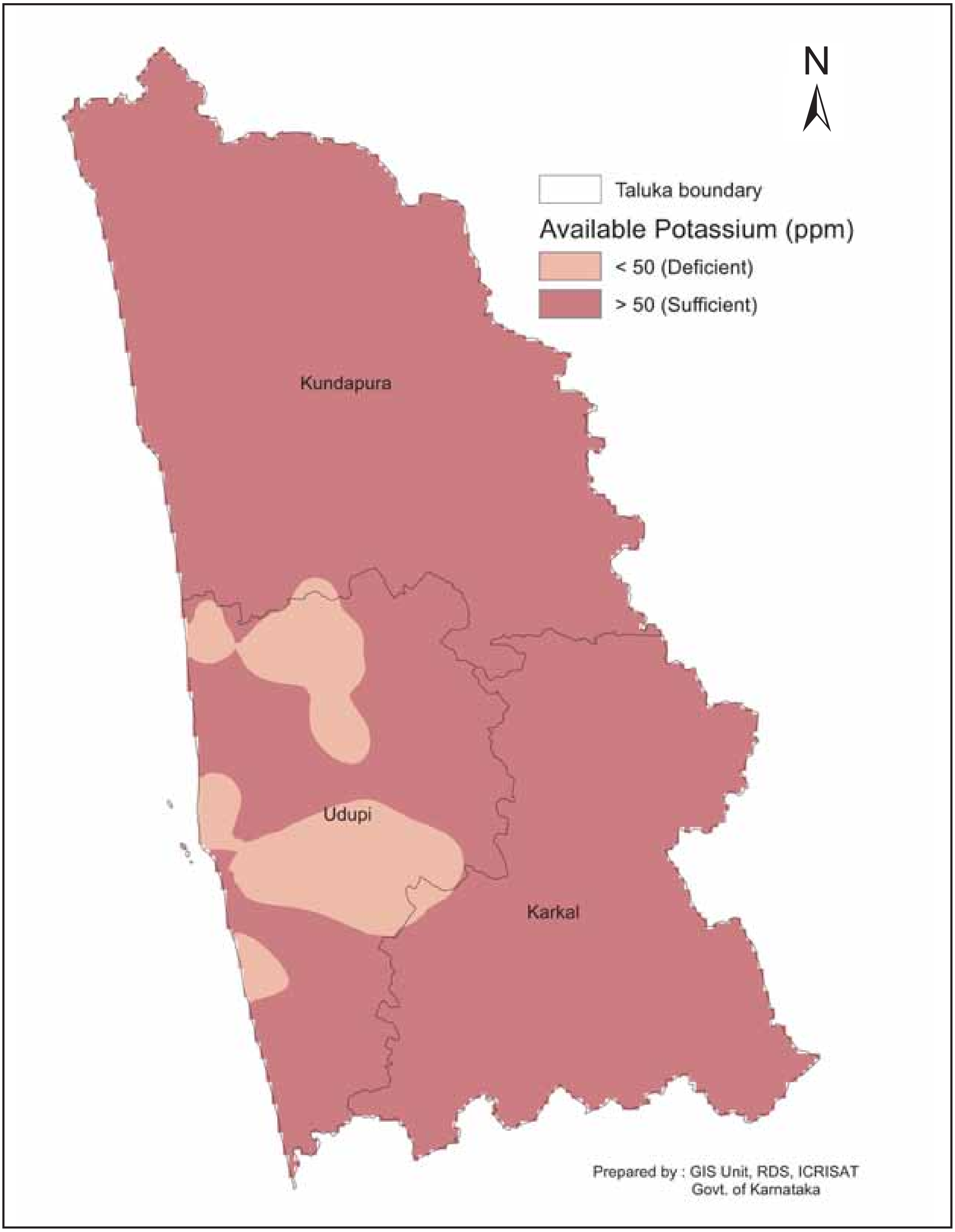


Figure 238. Available potassium status in Udupi district

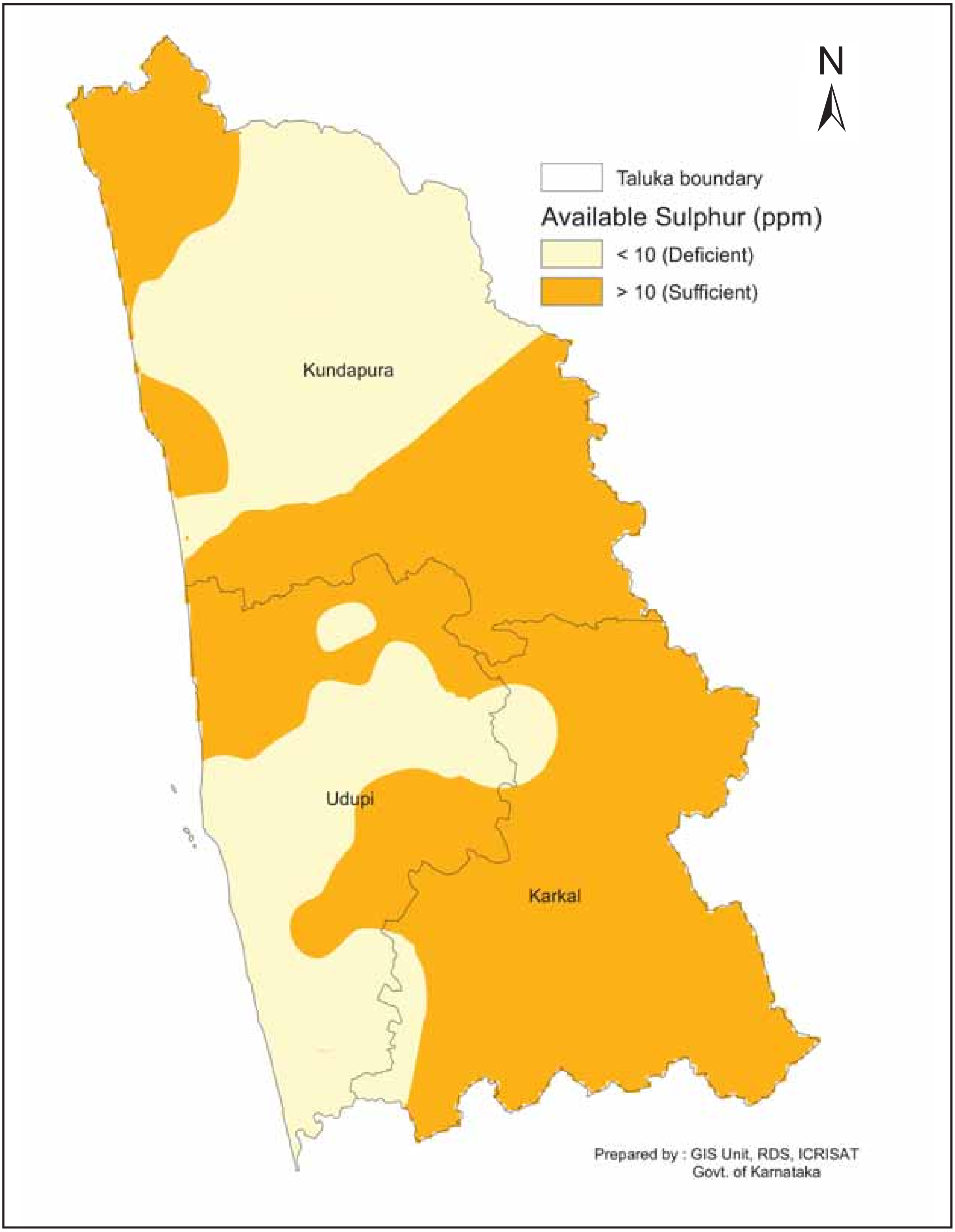


Figure 239. Available sulphur status in Udupi district

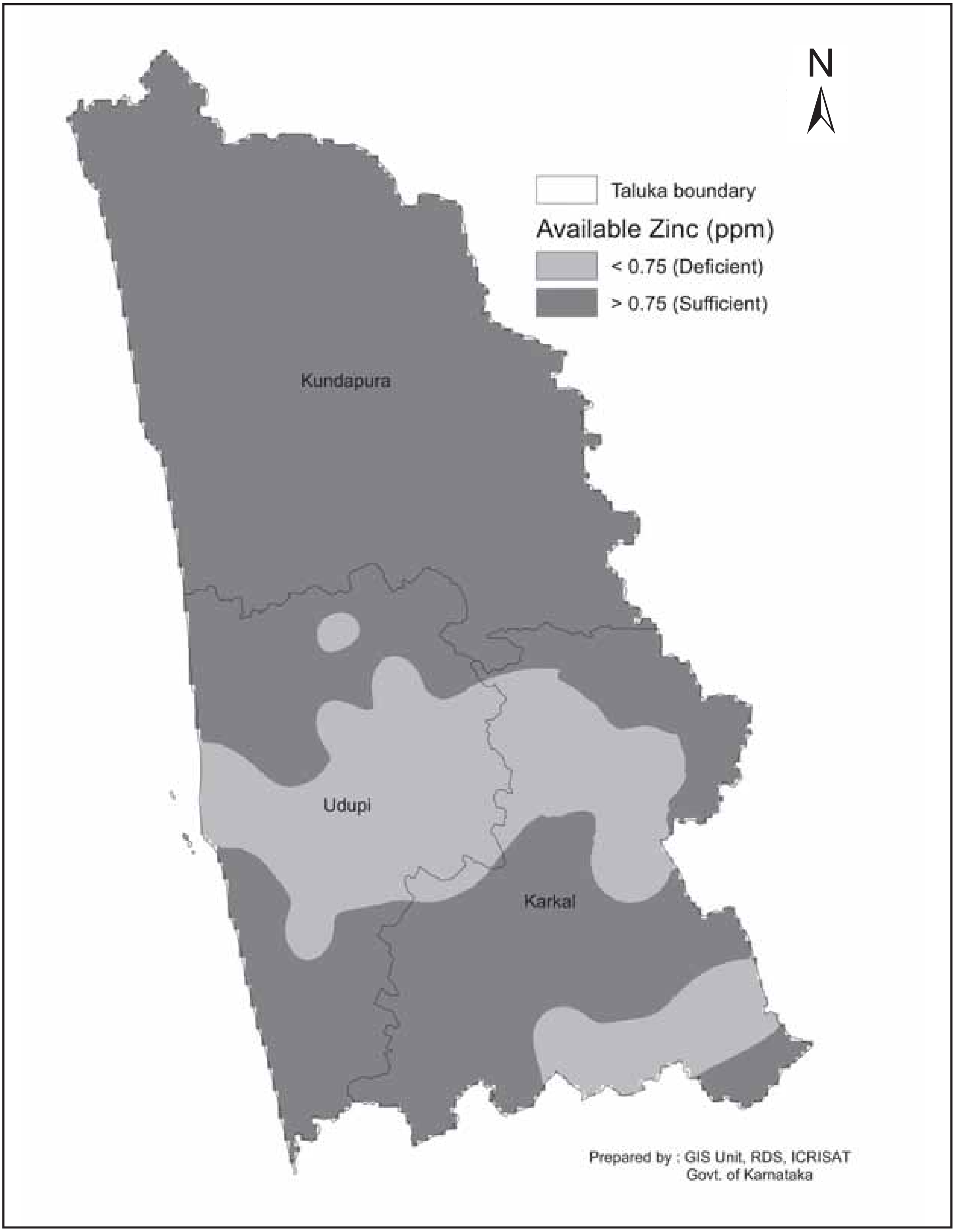


Figure 240. Available zinc status in Udupi district

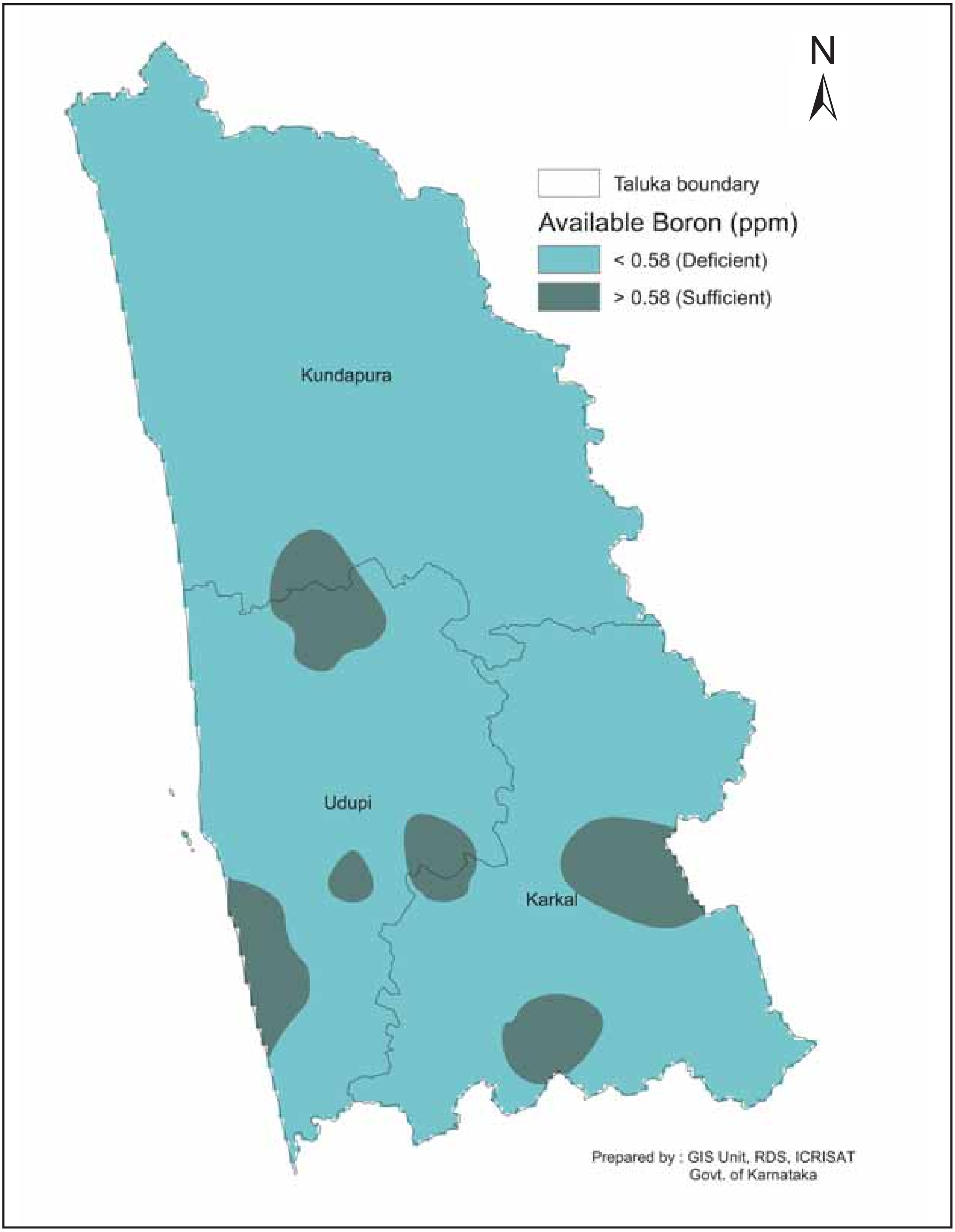


Figure 241. Available boron status in Udupi district

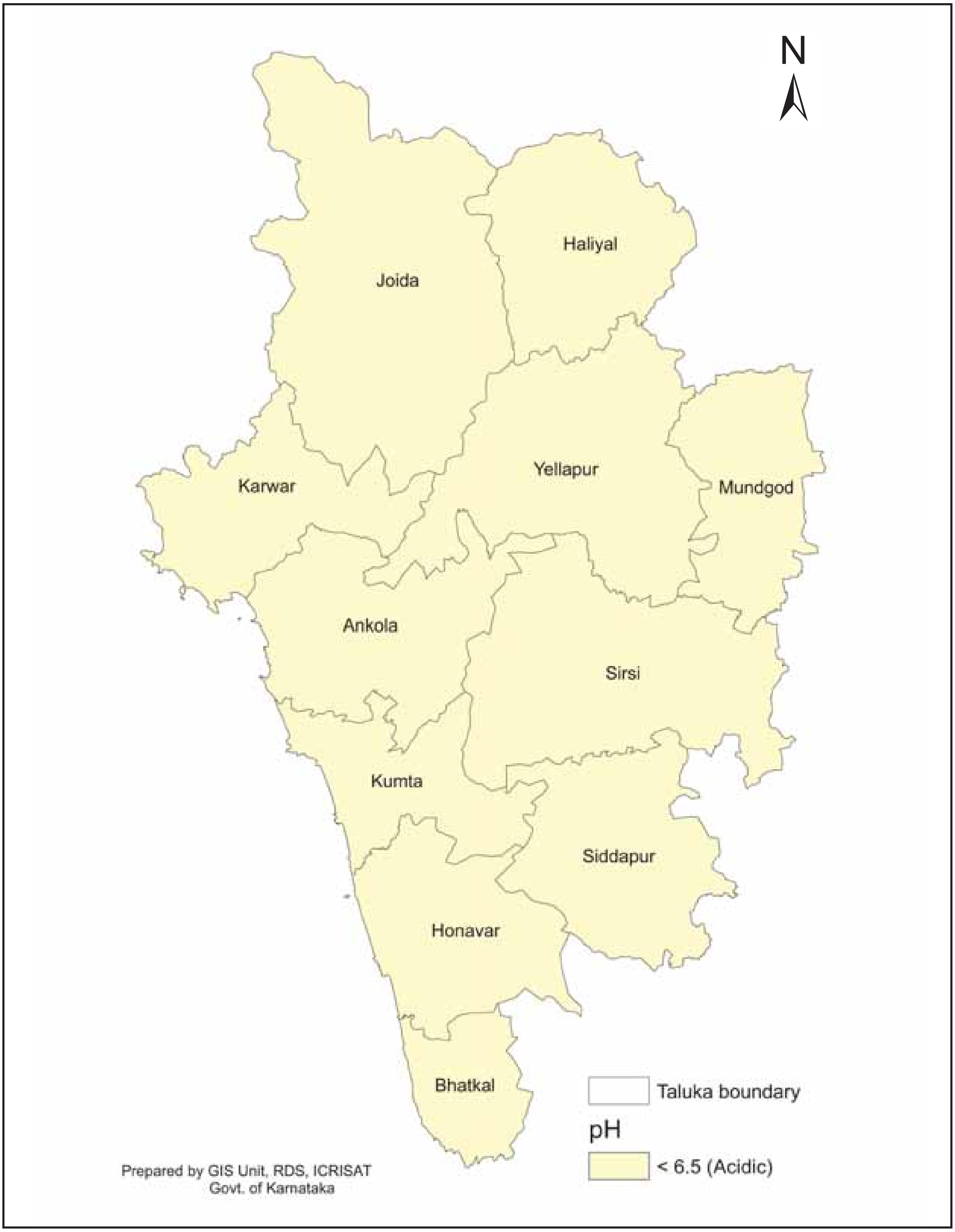


Figure 242. pH status in Uttara Kannada district

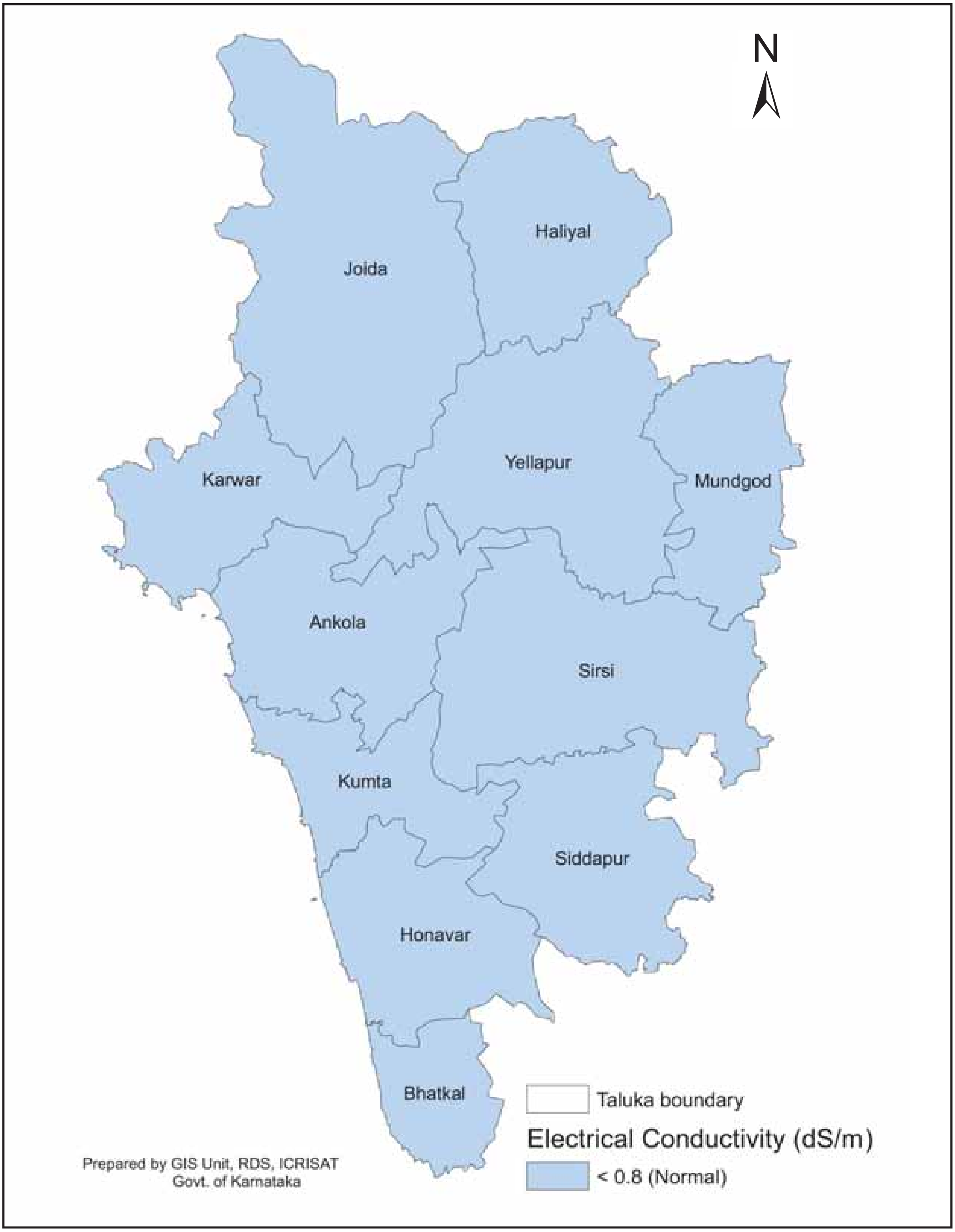


Figure 243. Electrical conductivity status in Uttara Kannada district

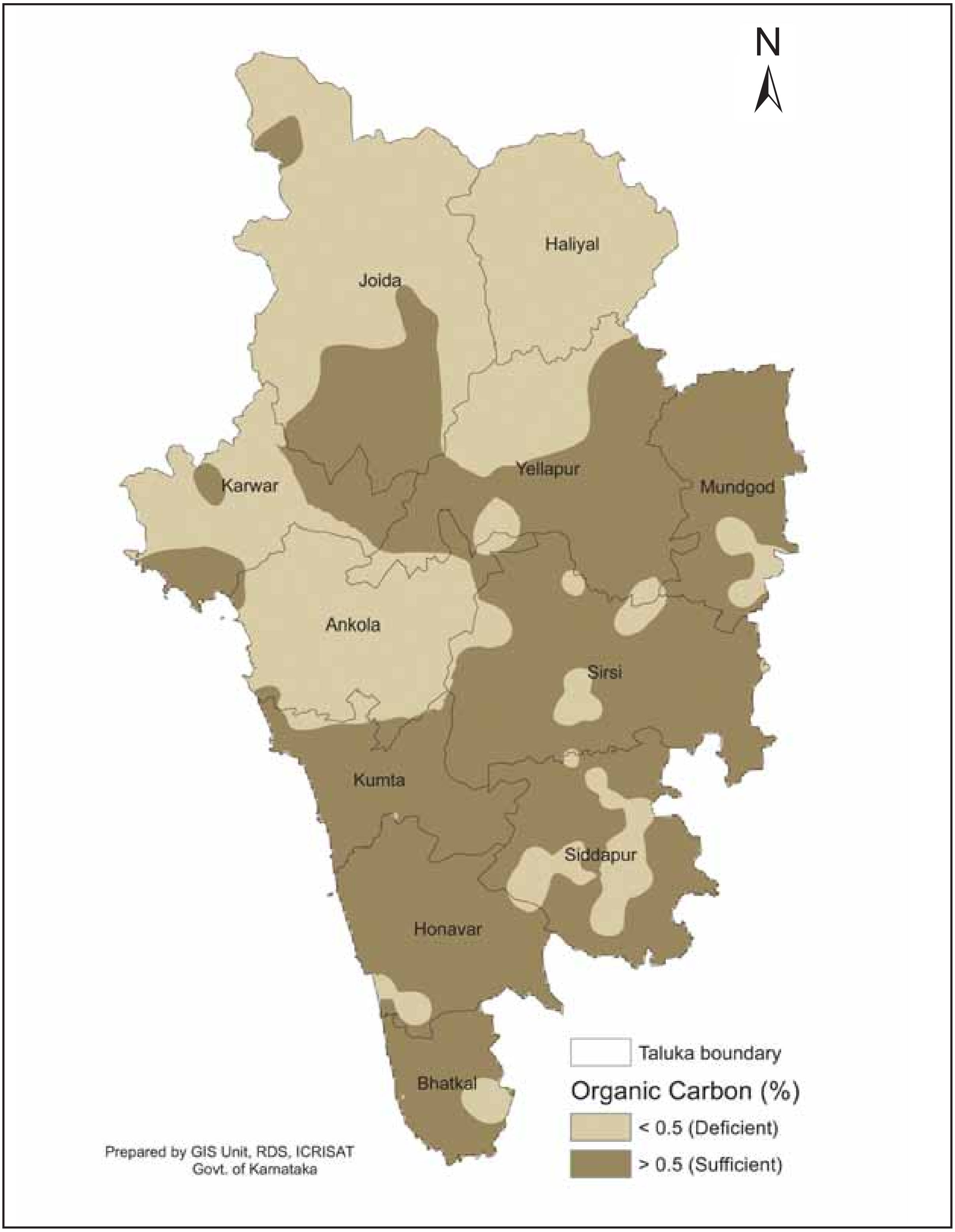


Figure 244. Organic carbon status in Uttara Kannada district

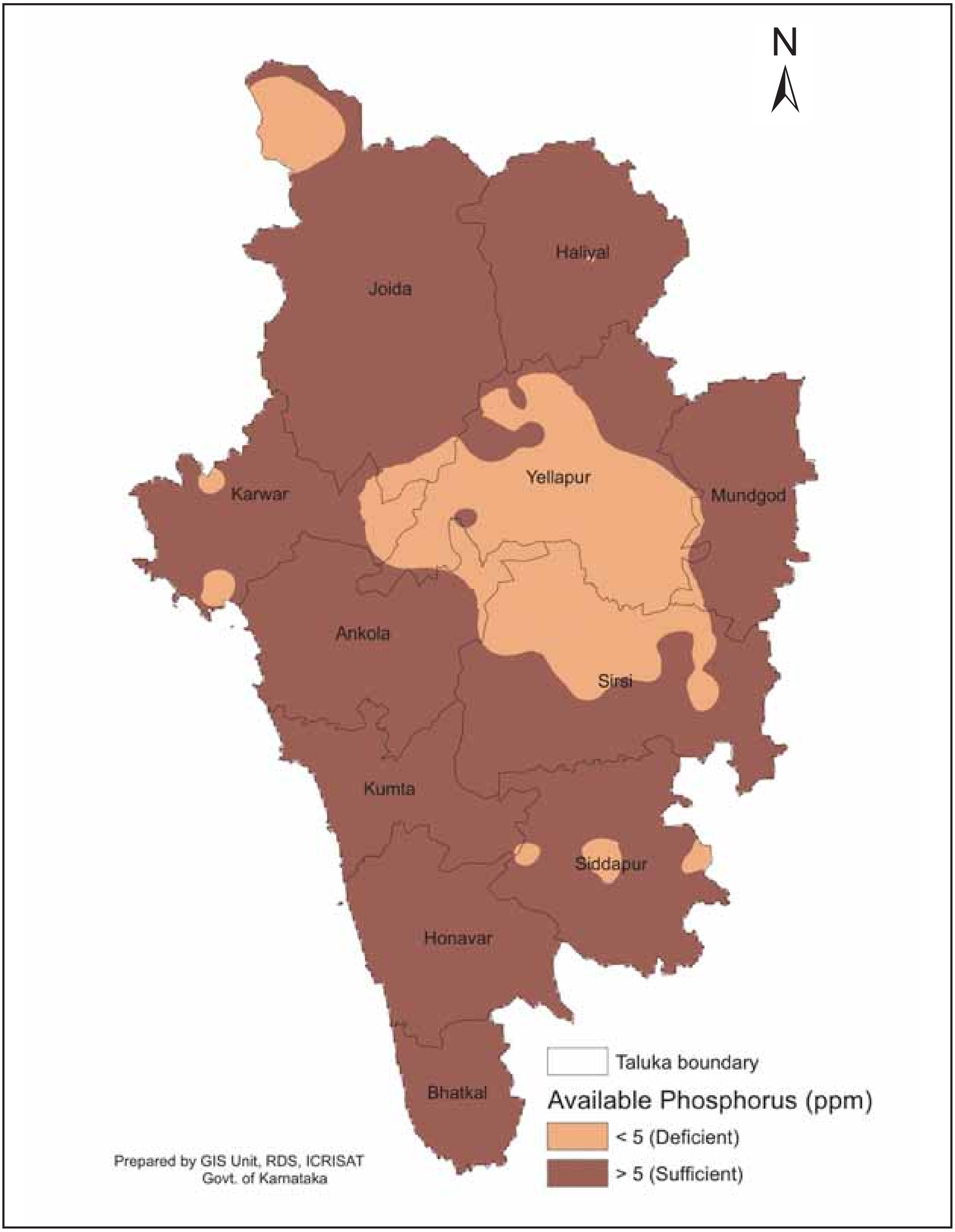


Figure 245. Available phosphorus status in Uttara Kannada district

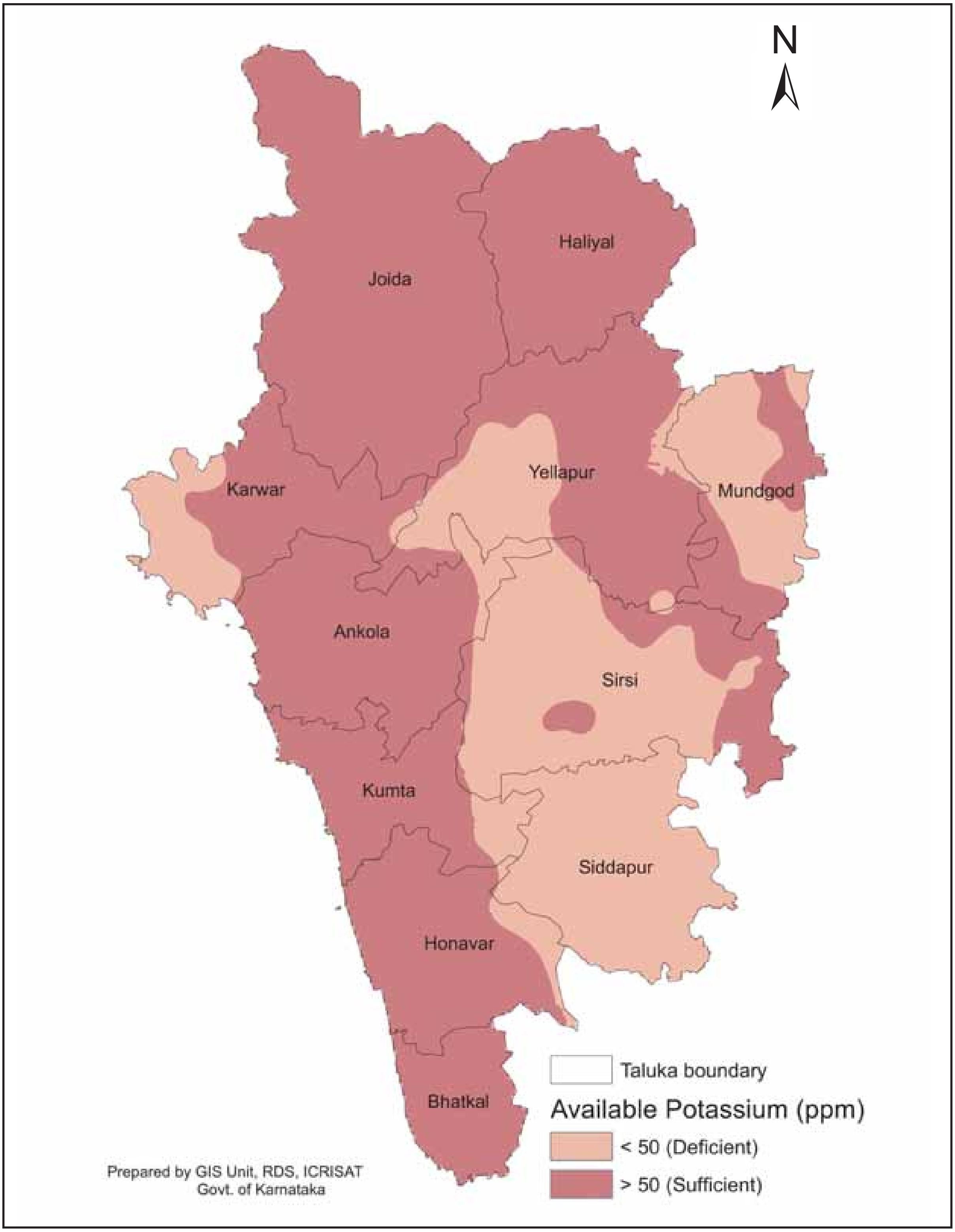


Figure 246. Available potassium status in Uttara Kannada district

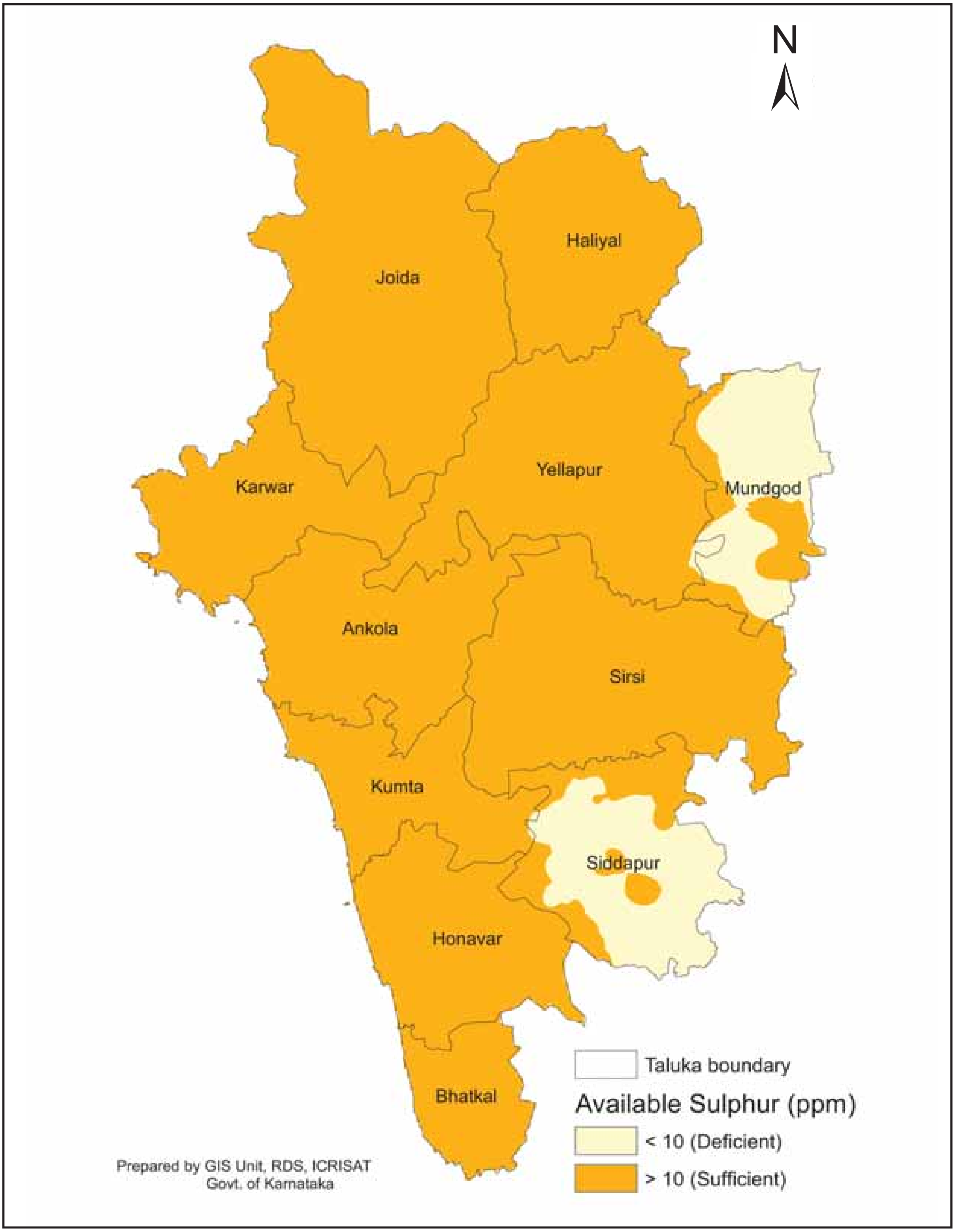


Figure 247. Available sulphur status in Uttara Kannada district

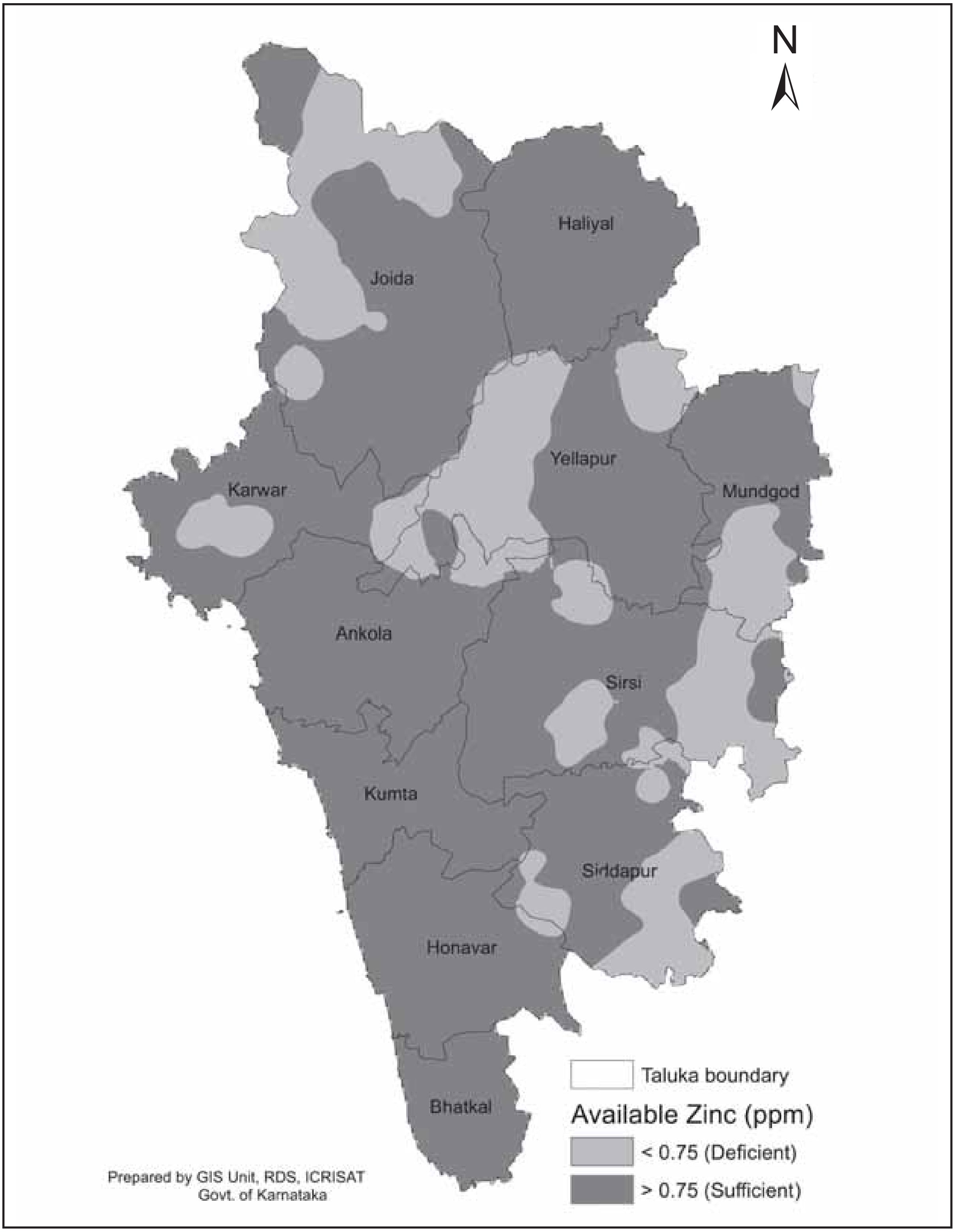


Figure 248. Available zinc status in Uttara Kannada district

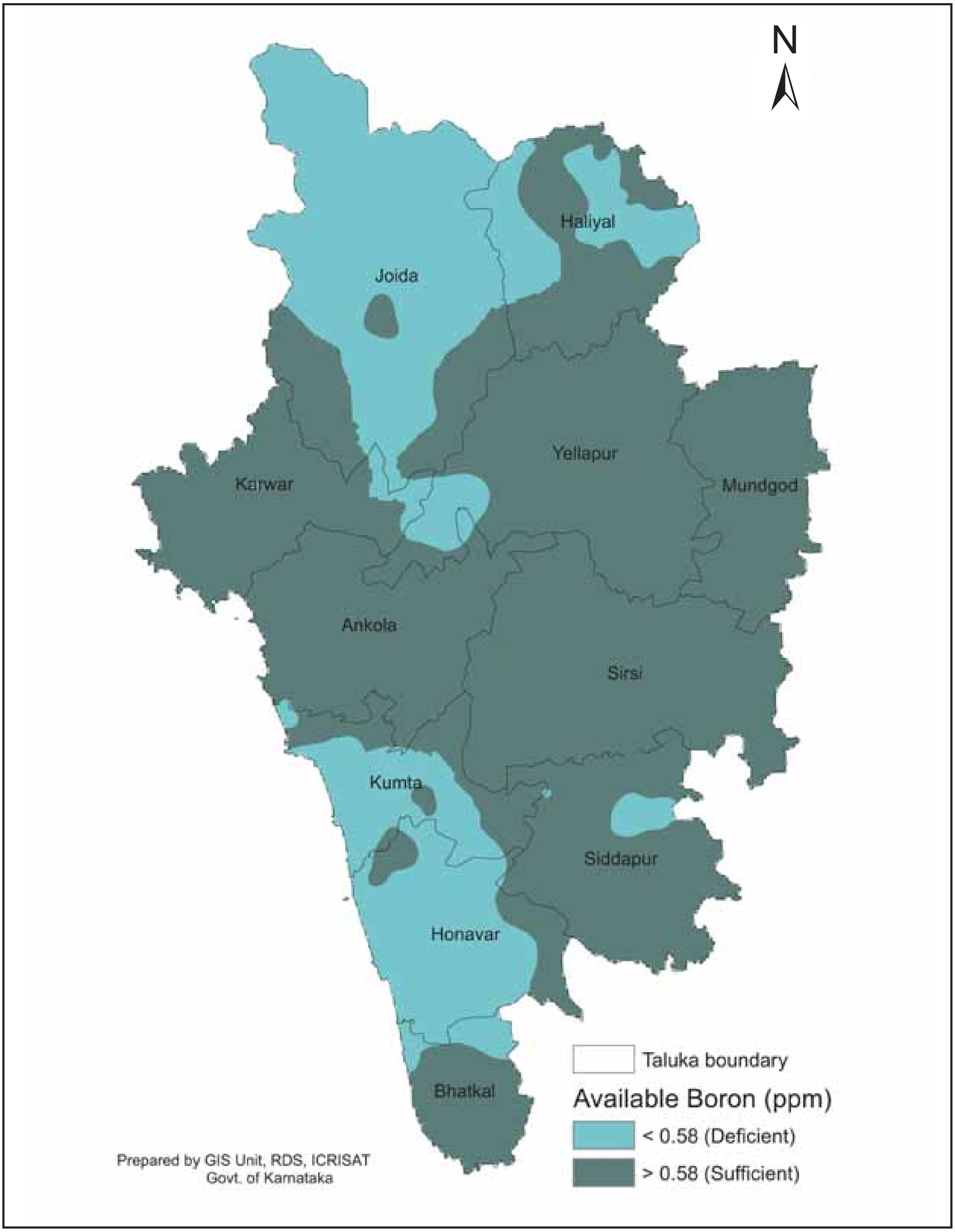


Figure 249. Available boron status in Uttara Kannada district

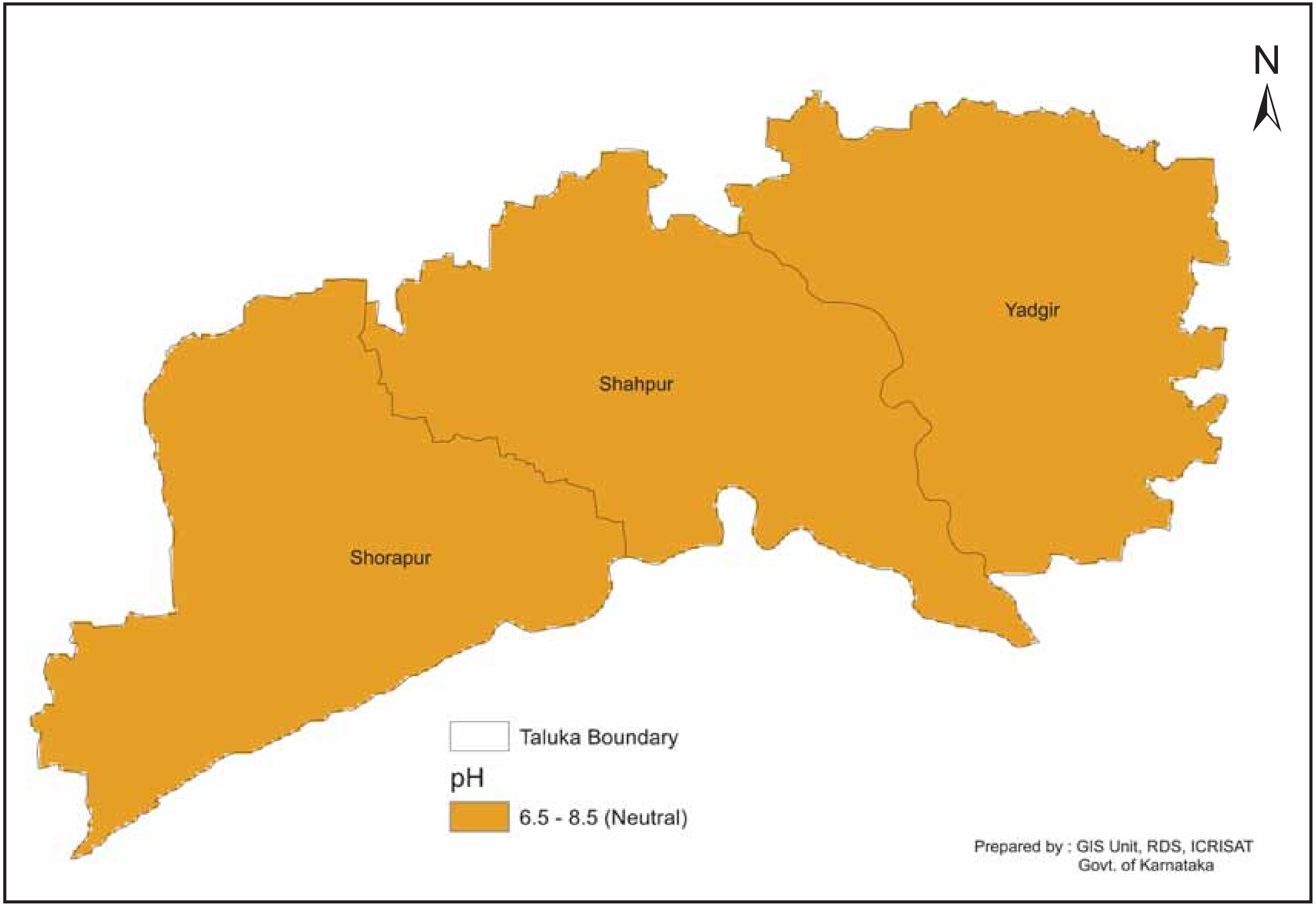


Figure 250. pH status in Yadgir district

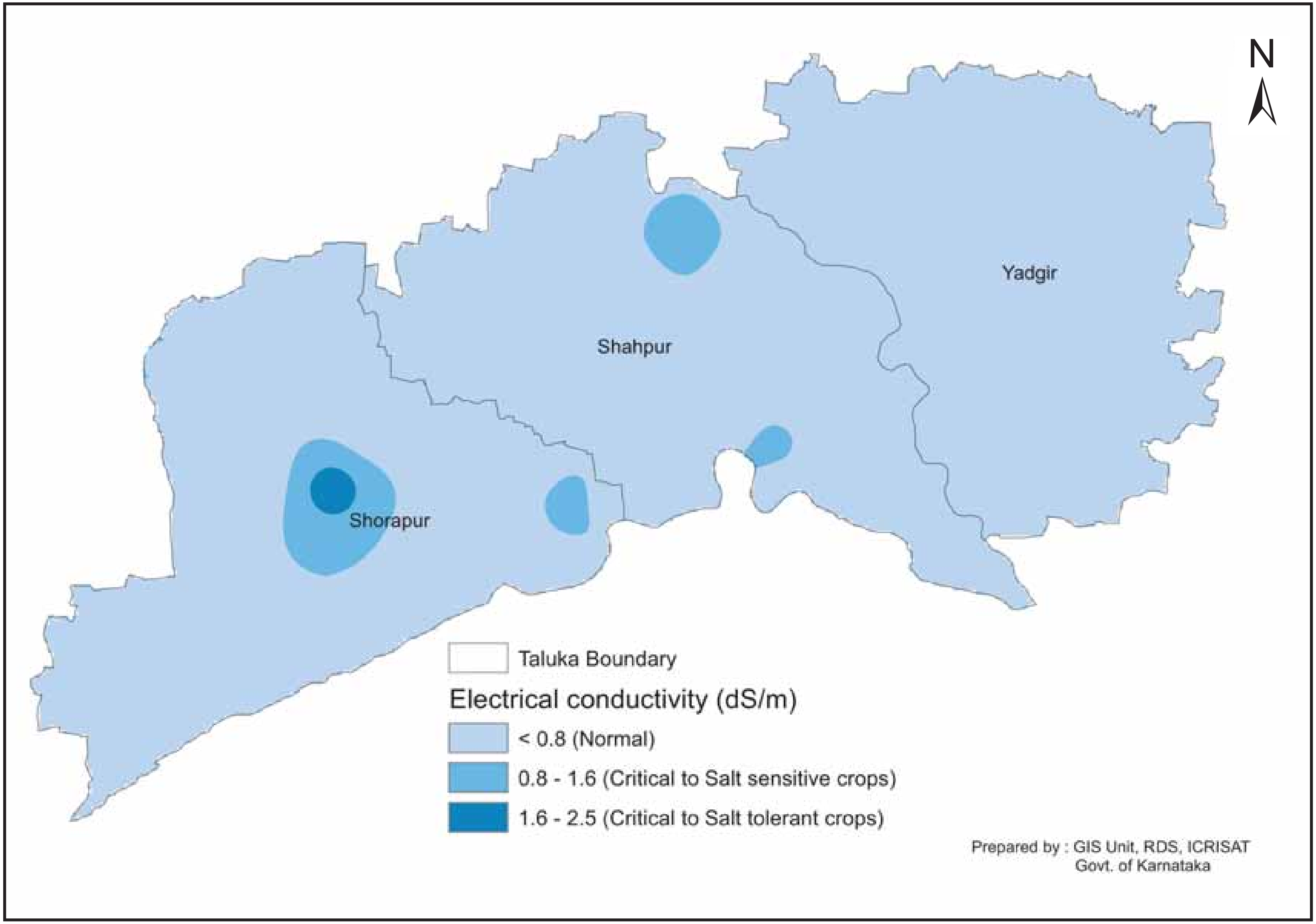


Figure 251. Electrical conductivity status in Yadgir district

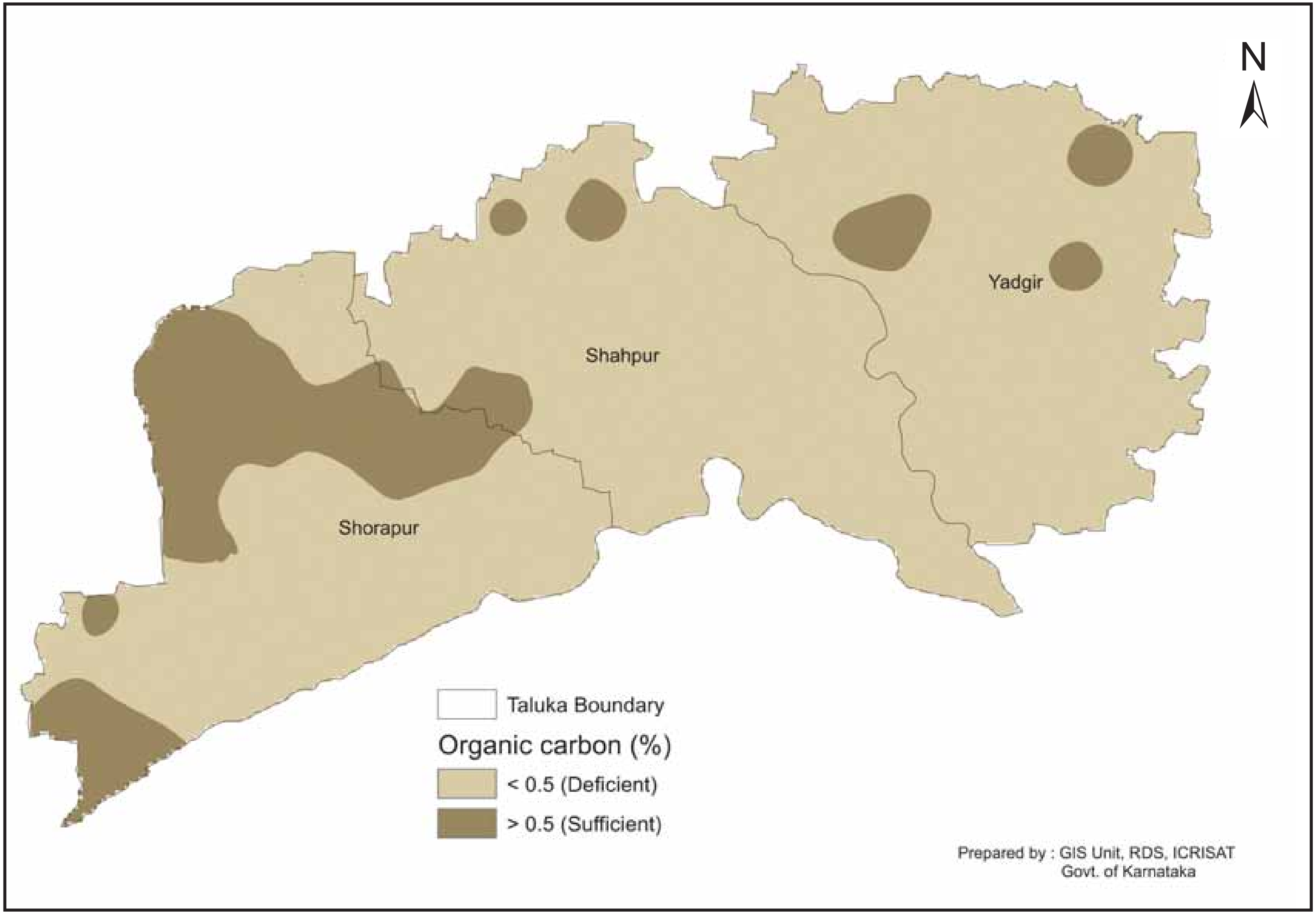


Figure 252. Organic carbon status in Yadgir district

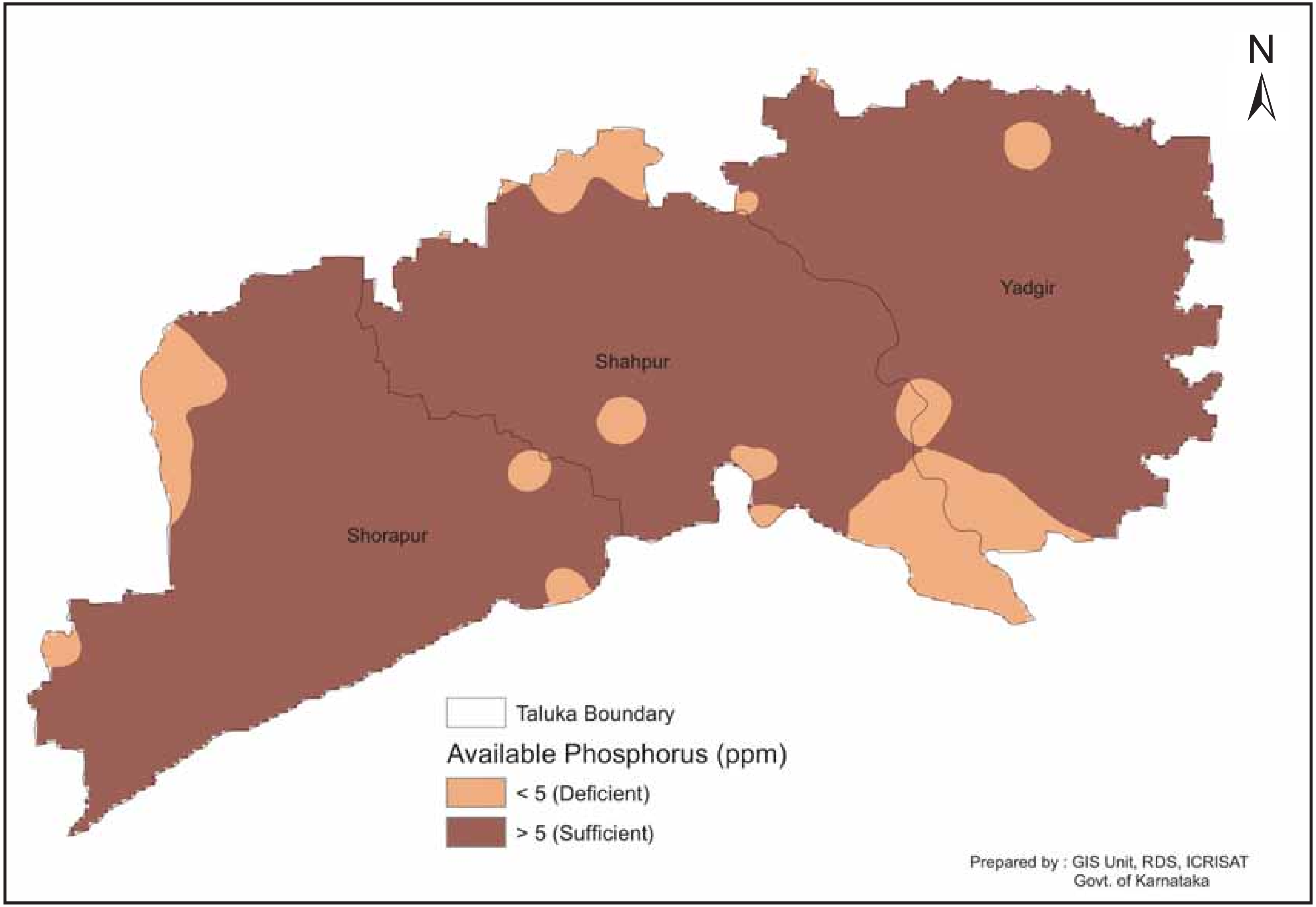


Figure 253. Available phosphorus status in Yadgir district

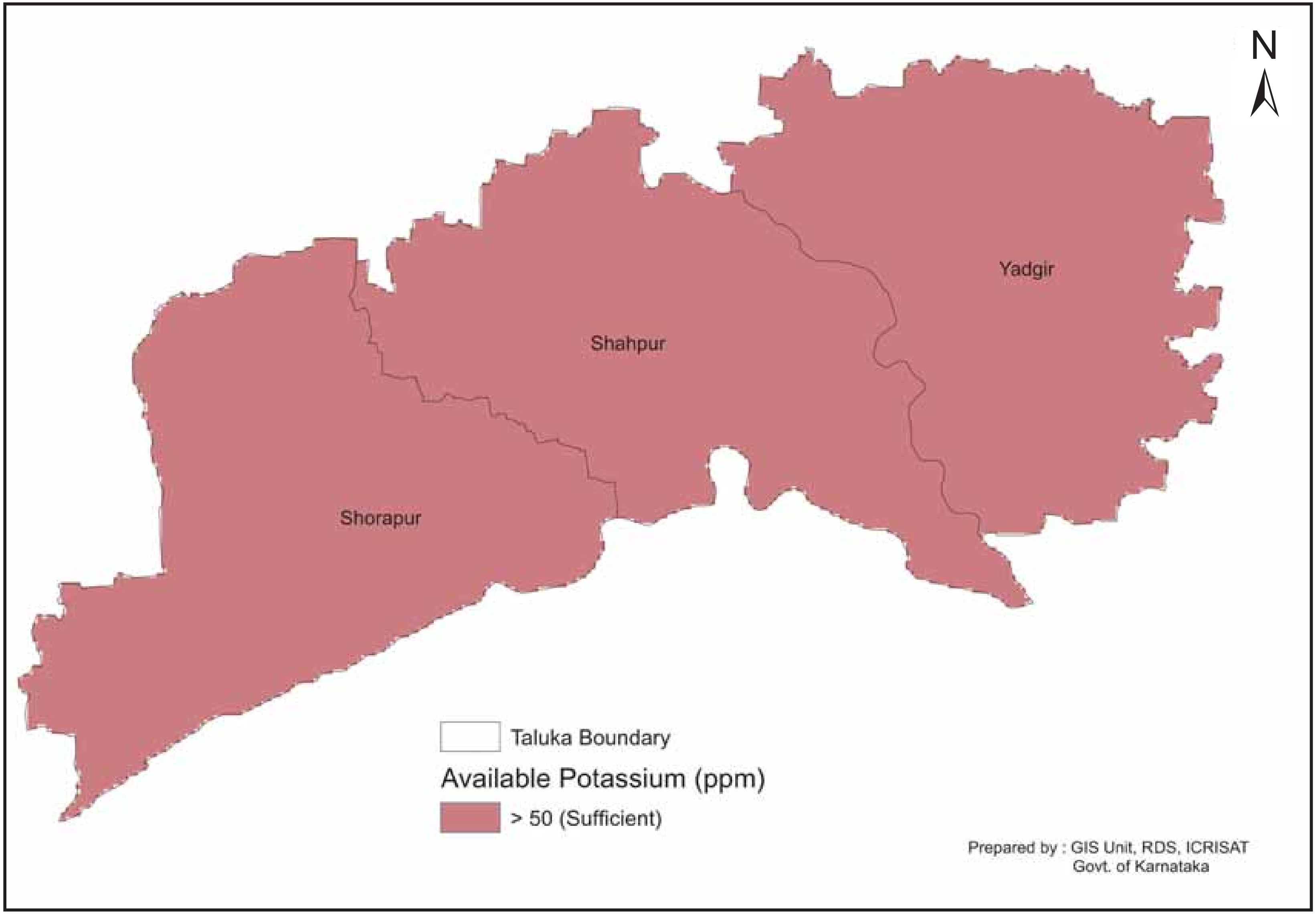


Figure 254. Available potassium status in Yadgir district

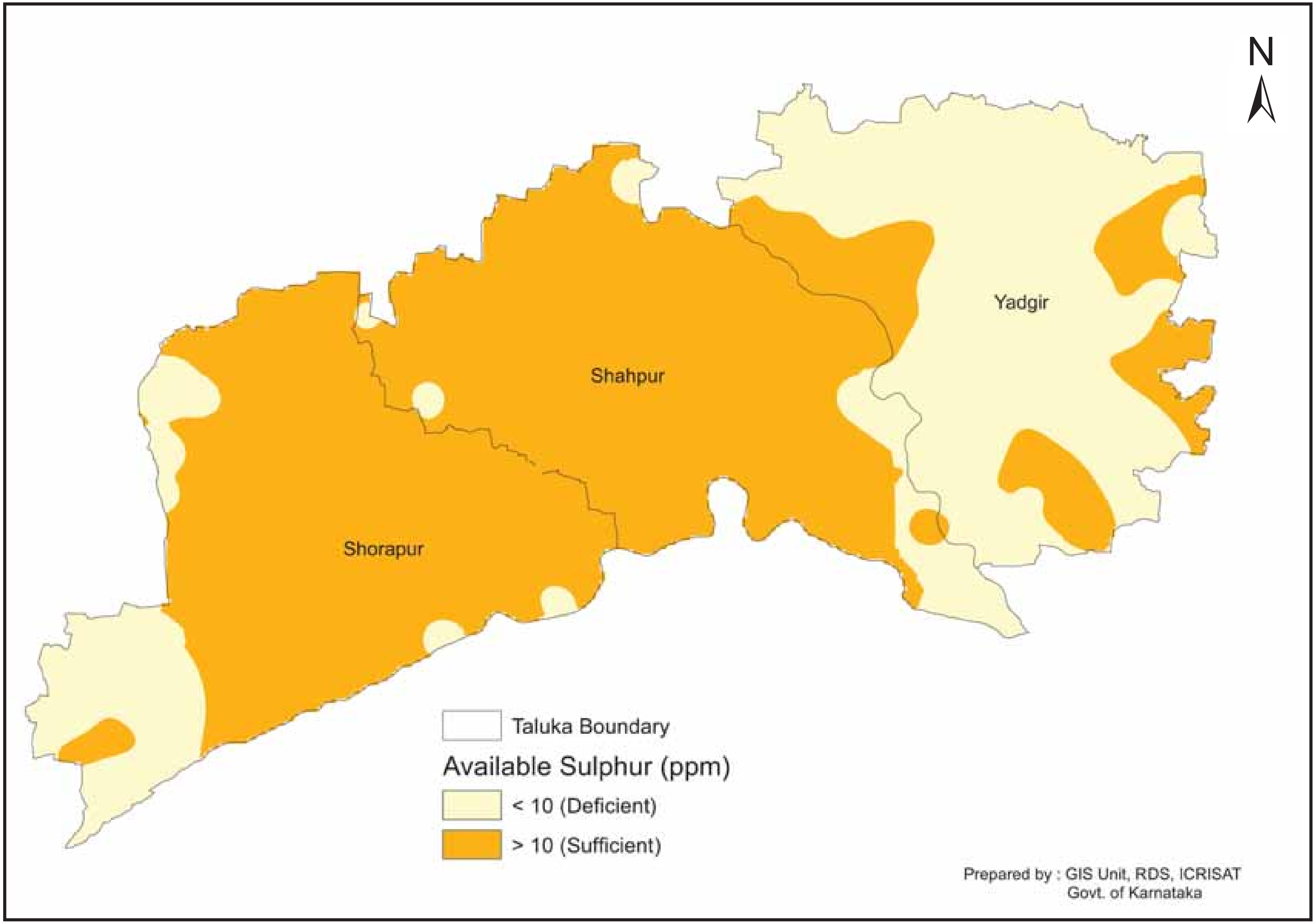


Figure 255. Available sulphur status in Yadgir district

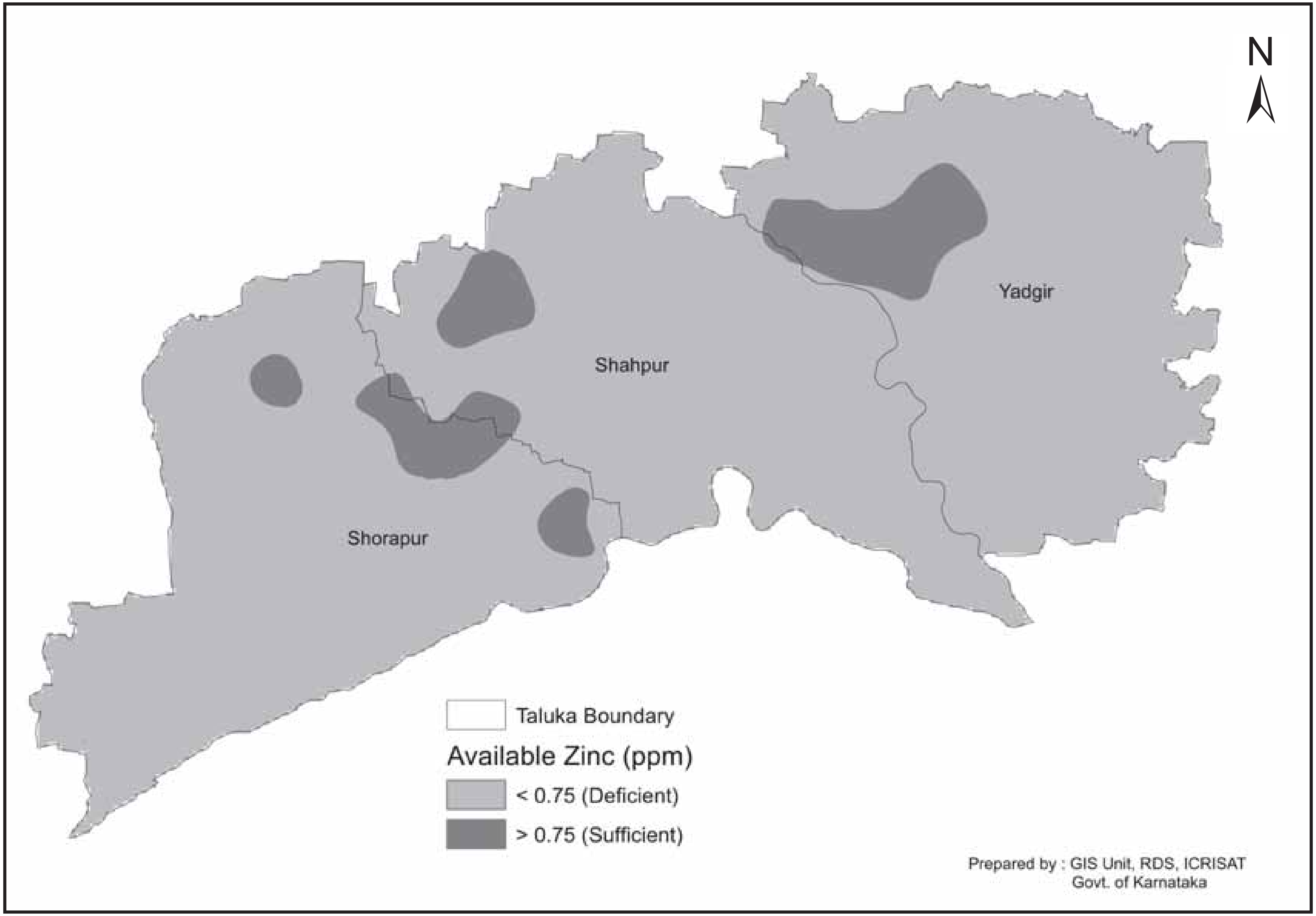


Figure 256. Available zinc status in Yadgir district

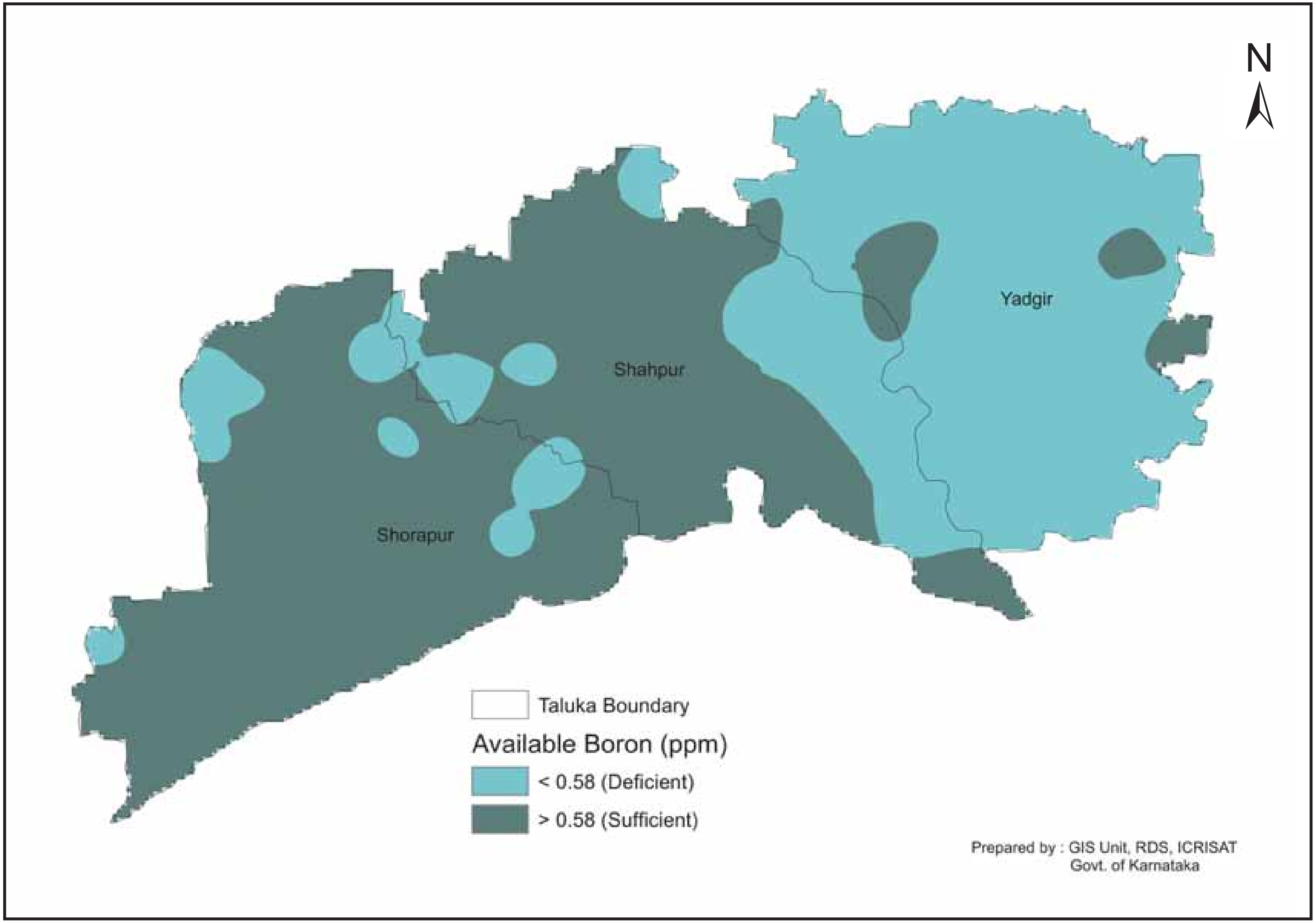


Figure 257. Available boron status in Yadgir district

Appendix: Chemical characteristics of Karnataka soils

Table 1. Chemical characteristics of soil samples collected from farmers' fields in Bagalkot district, Karnataka. The values in parenthesis is number of fields.

District	Taluk	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Bagalkot	Badami (580)	Range	6.3--8.8	0.15--0.89	0.18--1.19	0.6--6.2	17--74	4.1--37.2	0.51--3.65	0.13--7.45
		Mean	7.5	0.32	0.53	2.6	43	11.5	0.79	0.68
		% Deficient fields			49	98	67	57	64	73
	Bagalkot (360)	Range	6.3--8.9	0.13--1.52	0.20--1.17	0.6--6.2	18--74	4.2--38.6	0.51--6.18	0.12--12.78
		Mean	8.0	0.37	0.61	2.1	62	11.3	0.80	0.85
		% Deficient fields			38	95	25	59	63	62
	Bilagi (240)	Range	6.3--8.3	0.12--1.29	0.23--1.19	0.6--6.2	17--74	4.2--39.2	0.50--10.69	0.21--7.58
		Mean	7.5	0.33	0.63	2.3	64	12.4	1.09	0.65
		% Deficient fields			34	96	19	56	51	68
	Hungund (660)	Range	6.8--8.7	0.11--1.99	0.19--1.18	0.6--6.2	18--74	4.2--39.9	0.50--9.56	0.18--12.65
		Mean	8.1	0.34	0.63	2.6	65	10.7	0.88	0.70
		% Deficient fields			35	96	13	68	61	70
	Jamkhandi (280)	Range	6.3--8.7	0.11--1.60	0.21--1.23	0.6--6.2	33--74	4.1--36.4	0.50--5.43	0.16--5.68
		Mean	7.5	0.36	0.70	1.5	71	12.6	1.21	0.70
		% Deficient fields			26	98	5	54	34	69
	Mudhol (320)	Range	6.7--8.7	0.18--1.60	0.26--1.21	0.6--6.1	30--74	4.2--39.4	0.50--4.56	0.12--8.55
		Mean	7.9	0.38	0.73	2.2	66	12.9	0.98	0.60
		% Deficient fields			19	96	18	52	40	71
	Bagalkot District (2440)	Range	6.3--8.9	0.11--1.99	0.18--1.23	0.6--6.2	17--74	4.1--39.9	0.50--10.69	0.12--12.78
		Mean	7.8	0.35	0.62	2.3	60	11.7	0.92	0.70
		% Deficient fields			36	97	28	59	55	69

Table 2. Chemical characteristics of soil samples collected from farmers' fields in Bengaluru Urban district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Bengaluru Urban	Anekal (900)	Range	4.5--8.2	0.02--1.74	0.10--3.00	1.0--204.4	2--397	3.6--99.4	0.05--4.56	0.06--6.86
		Mean	6.6	0.22	0.42	40.9	124	19.5	1.12	0.72
		% Deficient fields			71	13	14	4	42	48
	Bengaluru East (240)	Range	6.6--8.0	0.03--1.30	0.22--2.30	5.4--256.9	17--402	0.8--335.0	0.18--5.47	0.04--0.80
		Mean	7.3	0.24	0.73	76.8	100	79.5	2.29	0.34
		% Deficient fields			18	0	20	8	11	91
	Bengaluru North (920)	Range	4.4--8.7	0.02--1.57	0.07--1.03	1.0--147.6	6--433	4.9--81.5	0.03--5.71	0.05--3.16
		Mean	6.5	0.15	0.39	37.5	141	18.0	1.19	0.72
		% Deficient fields			70	12	11	3	45	49
	Bengaluru South (620)	Range	5.1--8.7	0.02--2.20	0.03--2.84	0.7--351.5	5--580	1.8--270.0	0.07--5.79	0.02--0.92
		Mean	7.0	0.20	0.63	41.0	111	41.0	1.33	0.33
		% Deficient fields			35	5	18	13	29	82
	Bengaluru Urban District (2680)	Range	4.4--8.7	0.02--2.20	0.03--3.00	0.7--351.5	2--580	0.8--335.0	0.03--5.79	0.02--6.86
		Mean	6.7	0.19	0.49	43.0	125	29.3	1.30	0.60
		% Deficient fields			58	10	14	6	37	60

Table 3. Chemical characteristics of soil samples collected from farmers' fields in Belgaum district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Belgaum	Athani (460)	Range	7.0--8.5	0.26--2.70	0.32--1.33	0.1--9.3	0--96	22.3--410.0	0.06--2.77	0.02--2.84
		Mean	7.7	0.55	0.61	2.3	55	188.4	0.72	0.61
		% Deficient fields			27	90	41	0	55	73
	Bailahongal (460)	Range	5.4--8.1	0.04--1.76	0.30--2.07	0.0--15.3	16--74	0.3--460.0	0.03--3.90	0.02--3.29
		Mean	7.0	0.39	0.65	2.3	41	141.2	0.62	0.75
		% Deficient fields			27	94	76	3	78	66
	Belgaum (460)	Range	4.8--7.6	0.23--2.30	0.20--1.72	0.1--9.3	7--87	0.8--371.0	0.07--3.96	0.02--2.95
		Mean	6.2	0.45	0.69	2.3	44	160.1	1.03	0.71
		% Deficient fields			14	92	62	2	34	68
	Chikodi (460)	Range	6.6--8.5	0.26--5.11	0.27--2.05	0.1--6.6	9--89	5.4--322.0	0.01--3.44	0.02--2.90
		Mean	7.6	0.59	0.57	1.9	46	146.0	0.51	0.46
		% Deficient fields			39	98	67	1	81	85
	Gokak (460)	Range	4.7--8.9	0.17--3.54	0.02--1.54	0.1--8.8	37--124	1.4--435.0	0.02--5.54	0.03--2.88
		Mean	7.6	0.59	0.64	1.8	57	198.2	0.66	0.57
		% Deficient fields			25	97	38	1	72	74
	Hukkeri (440)	Range	6.0--8.2	0.10--1.68	0.02--2.42	0.1--8.8	25--131	0.2--318.0	0.03--3.08	0.01--2.58
		Mean	7.5	0.42	0.67	2.1	56	137.9	0.80	0.50
		% Deficient fields			27	95	47	3	52	77
	Khanapur (460)	Range	4.7--7.2	0.17--1.12	0.38--2.31	0.3--9.2	0--92	0.4--369.0	0.21--3.16	0.01--2.99
		Mean	5.9	0.30	0.78	2.6	44	141.0	0.94	0.81
		% Deficient fields			9	89	68	2	44	54
	Raybag (440)	Range	7.3--8.9	0.12--1.80	0.02--1.44	0.0--7.1	15--124	1.6--306.0	0.03--3.10	0.01--2.99
		Mean	8.1	0.30	0.48	1.7	44	117.2	0.37	0.47
		% Deficient fields			60	98	73	2	93	85
	Ramadurg (460)	Range	6.2--8.3	0.14--2.20	0.03--2.62	0.1--9.5	9--169	3.9--408.0	0.02--3.48	0.01--2.86
		Mean	7.4	0.40	0.67	1.9	66	160.0	0.59	0.57
		% Deficient fields			26	95	38	2	74	78
	Saundatti (460)	Range	6.5--8.7	0.20--2.75	0.19--2.26	0.1--8.2	31--124	8.0--280.0	0.10--1.58	0.02--2.90
		Mean	7.8	0.37	0.64	1.9	71	129.9	0.38	0.48
		% Deficient fields			32	97	13	0	97	81
	Belgaum District (4560)	Range	4.7--8.9	0.04--5.11	0.02--2.62	0.0--15.3	0--169	0.2--460.0	0.02--3.48	0.01--3.29
		Mean	7.3	0.44	0.64	2.1	52	152.2	0.66	0.59
		% Deficient fields			29	95	52	2	68	74

Table 4. Chemical characteristics of soil samples collected from farmers' fields in Bellary district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Bellary	Bellary (400)	Range	6.3--8.9	0.10--2.25	0.24--0.98	0.6--6.2	17--74	4.2--41.4	0.56--13.81	0.14--10.36
		Mean	7.7	0.41	0.62	2.7	58	11.8	1.23	0.98
		% Deficient fields			33	92	28	61	21	41
	Hagaribommana-halli (220)	Range	6.4--8.4	0.11--1.65	0.24--1.24	0.6--6.2	17--74	4.3--40.7	0.56--5.78	0.12--8.06
		Mean	7.3	0.36	0.61	3.2	60	12.8	1.13	1.52
		% Deficient fields			34	87	20	51	19	29
	Hospet (280)	Range	6.2--8.4	0.12--2.25	0.28--1.24	0.7--6.2	16--74	4.3--39.5	0.56--8.65	0.15--18.02
		Mean	7.3	0.37	0.65	2.9	53	10.8	1.29	0.91
		% Deficient fields			31	91	41	69	19	41
	Hoovina Hadagalli (220)	Range	6.2--8.6	0.15--2.08	0.24--1.24	0.6--6.2	21--74	4.1--36.6	0.53--12.44	0.16--7.86
		Mean	7.1	0.33	0.60	3.0	54	9.6	1.12	1.09
		% Deficient fields			35	82	33	72	19	32
	Kudligi (360)	Range	6.2--9.0	0.10--1.74	0.26--1.24	0.6--6.1	17--74	4.2--40.4	0.54--7.05	0.15--7.86
		Mean	7.2	0.26	0.59	2.7	50	9.5	1.21	1.09
		% Deficient fields			40	95	46	72	17	40
	Sanduru (300)	Range	6.2--8.3	0.13--2.25	0.20--0.98	0.6--6.2	17--74	4.1--38.5	0.55--13.81	0.16--12.03
		Mean	7.2	0.47	0.70	2.9	54	8.5	1.71	1.27
		% Deficient fields			17	93	32	89	19	30
	Siruguppa (320)	Range	6.4--8.9	0.10--2.25	0.26--1.24	0.6--6.2	17--74	4.1--40.4	0.52--12.30	0.13--18.02
		Mean	7.7	0.60	0.61	3.1	56	14.7	1.18	1.64
		% Deficient fields			37	89	31	52	20	35
	Bellary District (2100)	Range	6.2--9.0	0.10--2.25	0.20--1.24	0.6--6.2	16--74	4.1--41.4	0.52--13.81	0.12--18.02
		Mean	7.4	0.40	0.63	2.9	55	11.1	1.27	1.20
		% Deficient fields			32	90	33	67	19	36

Table 5. Chemical characteristics of soil samples collected from farmers' fields in Bengaluru Rural district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Bengaluru Rural	Devanahalli (874)	Range	4.4--8.4	0.02--5.12	0.11--1.31	0.0--150.7	16--1,414	0.5--170.5	0.16--8.12	0.06--5.12
		Mean	6.1	0.24	0.49	19.4	128	5.1	1.64	0.39
		% Deficient fields			52	13	16	95	35	79
	Doddaballapura (1175)	Range	4.2--8.9	0.01--9.96	0.08--1.50	0.0--543.8	13--963	0.9--2,299.1	0.16--6.76	0.06--1.21
		Mean	6.4	0.28	0.42	19.6	93	8.3	1.21	0.35
		% Deficient fields			73	24	24	91	35	82
	Hoskote (1237)	Range	4.6--8.8	0.02--3.20	0.01--1.17	0.0--165.6	9--1,133	1.1--95.0	0.00--235.00	0.02--2.81
		Mean	6.6	0.29	0.39	19.0	89	7.7	2.00	0.37
		% Deficient fields			79	19	28	82	14	79
	Nelamangala (1162)	Range	4.3--9.5	0.01--4.79	0.03--1.02	0.0--189.5	11--630	1.1--62.2	0.14--7.64	0.08--4.79
		Mean	6.1	0.28	0.38	14.4	96	5.7	1.15	0.37
		% Deficient fields			81	27	22	94	35	77
	Bengaluru Rural District (4448)	Range	4.2--9.5	0.01--9.96	0.01--1.50	0.0--543.8	9--1,414	0.5--2,299.1	0.00--235.00	0.02--5.12
		Mean	6.3	0.28	0.41	18.0	100	6.8	1.50	0.37
		% Deficient fields			73	21	23	90	29	79

Table 6. Chemical characteristics of soil samples collected from farmers' fields in Bidar district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Bidar	Aurad (600)	Range	5.8--8.7	0.05--1.38	0.19--1.50	1.4--46.6	25--2,297	1.1--28.3	0.18--5.92	0.10--3.18
		Mean	7.7	0.22	0.52	6.8	220	5.8	0.57	0.44
		% Deficient fields			56	54	1	89	84	86
	Basavakalyan (438)	Range	5.7--8.5	0.03--4.04	0.24--1.35	1.4--71.4	38--922	1.5--181.3	0.22--18.00	0.12--2.92
		Mean	7.6	0.30	0.63	10.4	214	9.7	1.11	0.60
		% Deficient fields			30	26	1	81	36	58
	Bhalki (539)	Range	5.9--9.5	0.07--1.23	0.18--1.11	0.7--64.0	42--1,563	1.1--73.1	0.16--5.50	0.10--1.56
		Mean	7.9	0.27	0.50	6.0	245	8.4	0.58	0.51
		% Deficient fields			57	64	0	71	81	66
	Bidar (479)	Range	5.5--8.6	0.03--3.75	0.12--1.31	1.2--114.5	18--665	1.0--49.7	0.20--10.22	0.14--2.72
		Mean	7.4	0.20	0.67	10.9	183	6.0	1.22	0.58
		% Deficient fields			26	41	0	93	44	60
	Homnabad (319)	Range	5.6--8.6	0.03--2.52	0.21--1.98	0.6--118.6	29--991	1.2--42.4	0.22--10.20	0.12--6.18
		Mean	7.2	0.20	0.73	8.8	150	7.0	0.95	0.68
		% Deficient fields			18	49	1	81	52	45
	Bidar District (2375)	Range	5.5--9.5	0.03--4.04	0.12--1.98	0.6--118.6	18--2,297	1.0--181.3	0.16--18.00	0.10--6.18
		Mean	7.6	0.24	0.59	8.4	208	7.3	0.85	0.55
		% Deficient fields			40	48	1	83	62	66

Table 7. Chemical characteristics of soil samples collected from farmers' fields in Bijapur district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Bijapur	Bagewadi (480)	Range	7.1--9.1	0.06--2.61	0.05--0.95	0.4--38.1	31--859	1.1--156.7	0.18--10.40	0.14--9.04
		Mean	8.3	0.25	0.41	4.2	226	6.4	0.56	0.92
		% Deficient fields			71	79	3	89	85	39
	Bijapur (479)	Range	6.7--9.4	0.07--78.00	0.02--1.15	0.5--35.9	24--1,841	0.9--4,647.4	0.15--3.66	0.12--5.42
		Mean	8.5	0.53	0.37	3.8	192	34.3	0.49	0.95
		% Deficient fields			77	80	3	72	92	35
	Indi (480)	Range	6.1--9.4	0.05--9.71	0.09--1.09	0.1--32.8	25--2,613	1.5--2,629.6	0.20--4.00	0.12--16.54
		Mean	8.2	0.48	0.42	3.0	189	48.4	0.51	1.07
		% Deficient fields			68	85	8	69	86	48
	Muddebihal (734)	Range	6.8--9.4	0.06--18.50	0.11--1.50	0.6--45.6	43--1,716	1.0--1,030.7	0.16--5.52	0.12--8.12
		Mean	8.2	0.33	0.44	4.4	208	10.5	0.47	0.82
		% Deficient fields			72	76	0	89	91	48
	Sindagi (618)	Range	7.3--9.0	0.08--8.90	0.06--1.04	0.1--91.9	26--800	1.1--4,213.8	0.12--7.72	0.02--18.22
		Mean	8.2	0.42	0.43	3.5	226	28.6	0.49	0.94
		% Deficient fields			65	86	3	66	90	44
	Bijapur District (2791)	Range	6.1--9.4	0.05--78.00	0.02--1.50	0.1--91.9	24--2,613	0.9--4,647.4	0.12--10.40	0.02--18.22
		Mean	8.3	0.40	0.42	3.8	209	24.4	0.50	0.93
		% Deficient fields			70	81	3	77	89	43

Table 8. Chemical characteristics of soil samples collected from farmers' fields in Chamarajanagar district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Chamarajanagar	Chamarajanagar (676)	Range	5.2--9.5	0.02--8.00	0.07--1.85	0.2--99.1	20--766	0.5--91.1	0.18--6.28	0.02--3.80
		Mean	7.9	0.34	0.39	9.1	181	7.2	0.77	0.57
		% Deficient fields			82	44	4	86	63	66
	Gundlupet (560)	Range	5.4--9.1	0.04--2.70	0.04--1.37	1.0--101.6	34--734	0.8--54.3	0.14--6.40	0.02--3.36
		Mean	7.7	0.27	0.41	9.4	219	5.4	0.65	0.64
		% Deficient fields			77	35	2	90	72	52
	Kollegal (318)	Range	5.1--9.7	0.02--1.86	0.05--1.49	0.4--121.6	25--737	0.4--119.4	0.18--4.84	0.08--1.82
		Mean	7.3	0.27	0.45	12.6	164	6.5	0.82	0.51
		% Deficient fields			67	29	6	85	64	67
	Yalanduru (86)	Range	5.6--9.1	0.03--1.42	0.19--0.95	1.2--44.9	39--531	0.4--26.2	0.28--2.32	0.08--1.50
		Mean	7.5	0.18	0.46	11.7	139	4.4	0.65	0.45
		% Deficient fields			64	24	3	92	81	74
	Chamarajanagar District (1640)	Range	5.1--9.7	0.02--8.00	0.04--1.85	0.2--121.6	20--766	0.4--119.4	0.14--6.40	0.02--3.80
		Mean	7.7	0.29	0.41	10.0	188	6.3	0.73	0.58
		% Deficient fields			76	37	4	87	67	62

Table 9. Chemical characteristics of soil samples collected from farmers' fields in Chikaballapur district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Chikaballapur	Bagepalli (344)	Range	5.4--9.0	0.02--1.47	0.07--1.36	0.2--90.4	11--653	1.4--36.5	0.16--2.66	0.06--1.32
		Mean	7.3	0.11	0.32	5.8	79	6.2	0.64	0.29
		% Deficient fields			87	64	37	86	71	89
	Chikaballapur (476)	Range	4.5--9.9	0.02--14.70	0.13--1.42	0.2--430.8	9--1,650	1.5--131.2	0.16--21.50	0.08--1.68
		Mean	6.4	0.22	0.42	35.7	109	9.1	2.22	0.41
		% Deficient fields			74	14	36	74	34	77
	Chintamani (352)	Range	4.8--8.9	0.01--2.00	0.10--1.09	0.2--90.0	9--1,438	1.3--401.0	0.12--4.90	0.06--1.56
		Mean	6.9	0.14	0.34	13.1	90	7.9	0.85	0.34
		% Deficient fields			87	45	34	86	55	86
	Gauribidanur (305)	Range	5.4--8.4	0.01--1.89	0.16--1.03	0.2--82.0	26--528	1.4--98.9	0.20--3.78	0.08--1.14
		Mean	7.4	0.18	0.46	15.0	132	8.9	0.77	0.44
		% Deficient fields			64	30	10	78	54	76
	Gudibande (352)	Range	5.1--9.0	0.01--6.10	0.08--1.13	0.2--137.0	9--538	0.5--164.5	0.06--6.61	0.06--1.38
		Mean	6.8	0.15	0.36	11.1	73	8.7	0.72	0.31
		% Deficient fields			83	52	45	79	70	88
	Sidlaghatta (428)	Range	4.7--8.5	0.01--16.62	0.15--1.25	0.2--162.0	4--791	1.2--470.0	0.14--10.00	0.06--1.98
		Mean	6.8	0.29	0.43	19.8	87	12.8	1.23	0.48
		% Deficient fields			75	28	36	75	38	69
	Chikaballapur District (2257)	Range	4.5--9.9	0.01--16.62	0.07--1.42	0.2--430.8	4--1,650	0.5--470.0	0.06--21.50	0.06--1.98
		Mean	6.9	0.19	0.39	18.0	95	9.1	1.15	0.38
		% Deficient fields			78	37	34	80	52	80

Table 10. Chemical characteristics of soil samples collected from farmers' fields in Chikamagalur district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Chikamagalur	Chikamagalur (880)	Range	4.1--9.3	0.01--1.89	0.02--2.45	1.3--129.2	5--296	1.0--221.0	0.04--6.75	0.02--15.36
		Mean	6.4	0.14	0.64	19.4	114	29.3	0.72	0.75
		% Deficient fields			44	16	18	19	71	48
	Kadur (1140)	Range	4.9--9.8	0.01--1.88	0.01--1.81	1.0--110.7	3--304	1.0--449.0	0.01--1.94	0.02--5.62
		Mean	7.3	0.14	0.35	20.7	99	25.6	0.39	0.84
		% Deficient fields			84	6	27	25	93	42
	Koppa (320)	Range	2.9--7.1	0.02--1.36	0.02--2.17	1.0--46.1	5--83	2.0--2,425.0	0.13--4.40	0.02--8.02
		Mean	5.3	0.11	0.94	10.6	26	132.8	0.92	0.68
		% Deficient fields			5	26	94	41	53	71
	Mudigere (560)	Range	4.9--7.8	0.01--1.55	0.51--2.10	1.0--77.7	1--223	1.0--335.0	0.08--5.32	0.02--55.44
		Mean	5.5	0.16	1.03	14.1	43	27.5	0.97	5.46
		% Deficient fields			0	2	78	42	45	22
	Narasimharajapura (220)	Range	4.5--7.8	0.02--0.40	0.05--1.93	1.0--32.5	1--219	2.0--80.0	0.01--2.41	0.02--8.02
		Mean	5.3	0.10	0.60	7.8	33	15.5	0.55	0.46
		% Deficient fields			35	58	80	31	76	76
	Sringeri (200)	Range	4.9--6.5	0.02--0.26	0.30--2.10	0.5--39.8	1--78	1.0--78.0	0.05--0.97	0.02--4.58
		Mean	5.5	0.06	0.96	4.1	19	4.9	0.37	0.46
		% Deficient fields			11	75	91	87	96	76
	Tarikere (820)	Range	4.4--9.8	0.01--1.35	0.04--2.37	1.0--86.4	3--301	1.0--189.0	0.01--3.26	0.02--20.40
		Mean	7.0	0.13	0.51	22.6	102	17.0	0.38	1.17
		% Deficient fields			63	6	30	40	88	27
	Chikamagalur District (4140)	Range	2.9--9.8	0.01--1.89	0.01--2.45	0.5--129.2	1--304	1.0--2,425.0	0.01--6.75	0.02--55.44
		Mean	6.5	0.13	0.62	17.6	82	31.7	0.59	1.46
		% Deficient fields			48	15	44	34	77	43

Table 11. Chemical characteristics of soil samples collected from farmers' fields in Chitradurga district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Chitradurga	Challakere (200)	Range	5.2--9.2	0.03--1.30	0.07--1.36	0.2--49.4	12--653	1.6--35.6	0.22--2.28	0.06--2.70
		Mean	7.5	0.23	0.42	10.2	131	6.2	0.57	0.63
		% Deficient fields			70	34	22	86	83	64
	Chitradurga (347)	Range	5.1--10.1	0.02--4.11	0.03--1.23	0.2--52.5	19--853	1.1--108.1	0.08--7.80	0.08--6.94
		Mean	8.0	0.27	0.44	5.9	144	8.0	0.70	0.82
		% Deficient fields			70	60	11	84	74	60
	Hiriyur (245)	Range	5.9--9.6	0.03--1.62	0.13--1.31	0.2--480.0	20--1,663	1.3--39.0	0.12--2.14	0.10--3.60
		Mean	7.9	0.22	0.40	7.0	144	6.2	0.59	0.63
		% Deficient fields			78	65	12	87	77	59
	Holalkere (225)	Range	4.7--9.3	0.01--2.80	0.07--0.98	0.2--63.8	17--1,953	1.4--32.9	0.20--20.00	0.06--1.74
		Mean	7.3	0.20	0.39	6.4	133	5.0	0.67	0.48
		% Deficient fields			80	56	29	92	80	66
	Hosadurga (213)	Range	5.2--9.4	0.02--3.54	0.07--1.08	0.2--23.0	18--472	1.2--193.2	0.16--8.40	0.04--3.21
		Mean	7.7	0.24	0.38	4.7	148	9.1	0.58	0.52
		% Deficient fields			78	64	14	90	84	74
	Molakalmuru (259)	Range	5.2--9.9	0.03--1.76	0.10--0.99	0.2--106.0	19--559	0.8--291.8	0.20--40.50	0.06--4.00
		Mean	7.9	0.22	0.36	8.2	120	9.1	0.71	0.57
		% Deficient fields			81	44	6	81	85	63
	Chitradurga District (1489)	Range	4.7--10.1	0.01--4.11	0.03--1.36	0.2--480.0	12--1,953	0.8--291.8	0.08--40.50	0.04--6.94
		Mean	7.8	0.23	0.40	7.0	137	7.3	0.64	0.63
		% Deficient fields			76	54	15	86	80	64

Table 12. Chemical characteristics of soil samples collected from farmers' fields in Dakshina Kannada district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Dakshina Kannada	Belthangady (320)	Range	4.9--7.3	0.01--0.98	0.31--2.39	0.1--153.0	3--279	0.1--353.7	0.00--5.07	0.01--12.80
		Mean	5.6	0.08	1.31	13.1	44	27.0	0.62	1.48
		% Deficient fields			0	17	73	38	74	37
	Bantwal (319)	Range	4.8--7.5	0.00--0.86	0.04--2.29	0.2--38.8	8--233	0.5--600.3	0.00--6.48	0.01--22.08
		Mean	5.6	0.10	1.11	8.1	42	36.2	0.92	0.99
		% Deficient fields			3	42	73	18	61	52
	Mangalore (359)	Range	4.2--8.3	0.02--3.75	0.25--2.88	0.2--364.2	7--336	0.0--613.6	0.04--8.94	0.01--17.22
		Mean	5.4	0.12	1.21	21.6	60	45.1	1.12	2.74
		% Deficient fields			3	13	54	23	51	17
	Puttur (260)	Range	4.8--7.4	0.01--0.42	0.37--3.63	0.2--33.6	8--249	1.4--543.4	0.02--7.44	0.01--18.42
		Mean	5.4	0.06	1.27	6.0	38	50.4	0.74	1.52
		% Deficient fields			2	53	88	5	65	61
	Sulya (160)	Range	4.8--6.9	0.02--0.81	0.24--3.57	0.2--54.9	1--210	0.3--195.7	0.06--7.56	0.03--19.88
		Mean	5.6	0.07	1.49	11.2	43	32.2	0.70	1.20
		% Deficient fields			3	20	69	14	81	73
	Dakshina Kannada District (1418)	Range	4.8--8.3	0.01--1.38	0.04--3.63	0.1--364.2	1--336	0.0--613.6	0.00--8.94	0.01--22.08
		Mean	5.5	0.09	1.26	12.6	46	38.5	0.84	1.66
		% Deficient fields			2	29	71	21	65	44

Table 13. Chemical characteristics of soil samples collected from farmers' fields in Davanagere district, Karnataka.
The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Davanagere	Channagiri (563)	Range	4.4--8.6	0.01--3.10	0.04--1.33	0.2--72.8	19--470	1.5--99.7	0.12--4.72	0.02--2.60
		Mean	6.7	0.25	0.55	18.9	125	13.4	0.93	0.58
		% Deficient fields			50	22	13	66	59	59
	Davanagere (623)	Range	4.6--8.6	0.02--1.38	0.13--1.48	0.2--95.4	16--344	1.7--86.9	0.08--3.94	0.12--1.70
		Mean	6.9	0.19	0.48	15.7	104	7.8	0.70	0.50
		% Deficient fields			62	22	8	84	71	71
	Harapanahalli (440)	Range	4.8--9.9	0.02--2.50	0.05--1.50	0.2--79.4	19--429	1.3--89.8	0.10--4.72	0.06--2.80
		Mean	7.4	0.28	0.43	10.5	111	8.8	0.50	0.53
		% Deficient fields			68	41	11	81	87	69
	Harihara (319)	Range	4.2--8.9	0.05--6.74	0.15--2.70	0.4--65.4	35--465	1.4--98.9	0.14--4.80	0.06--3.00
		Mean	7.3	0.39	0.60	15.7	126	23.0	1.06	0.72
		% Deficient fields			39	31	3	39	59	31
	Honnali (466)	Range	4.5--8.7	0.02--3.95	0.14--1.38	0.2--79.2	30--480	1.4--88.7	0.14--4.62	0.02--1.28
		Mean	6.7	0.20	0.57	16.2	102	11.7	0.78	0.47
		% Deficient fields			41	15	8	70	61	74
	Jagalur (557)	Range	4.6--9.0	0.02--0.40	0.09--0.90	0.2--35.8	11--285	0.9--9.7	0.04--0.80	0.10--1.66
		Mean	7.3	0.10	0.35	7.0	86	3.0	0.30	0.49
		% Deficient fields			84	50	23	100	100	67
	Davanagere District (2968)	Range	4.2--9.9	0.01--6.74	0.04--2.70	0.2--95.4	11--480	0.9--99.7	0.04--4.80	0.02--3.00
		Mean	7.0	0.22	0.49	14.0	108	10.4	0.69	0.54
		% Deficient fields			59	30	12	76	74	64

Table 14. Chemical characteristics of soil samples collected from farmers' fields in Dharwad district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Dharwad	Dharwad (270)	Range	5.1--8.9	0.04--1.55	0.30--1.99	0.2--207.0	39--2,044	2.5--118.2	0.28--4.58	0.18--2.58
		Mean	6.9	0.24	0.84	15.9	193	11.8	1.12	0.70
		% Deficient fields			6	34	1	65	27	47
	Hublli (320)	Range	5.3--9.1	0.04--1.87	0.21--1.47	0.2--80.0	36--2,344	1.4--715.0	0.28--24.30	0.10--12.48
		Mean	7.4	0.25	0.67	7.2	180	10.7	1.12	0.84
		% Deficient fields			18	56	4	83	36	50
	Kalghatgi (159)	Range	5.3--8.6	0.04--1.91	0.30--1.33	0.4--75.2	55--1,800	1.8--129.0	0.36--5.60	0.16--1.22
		Mean	6.7	0.21	0.75	9.6	204	11.7	1.23	0.48
		% Deficient fields			15	52	0	62	15	72
	Kundgol (200)	Range	6.3--9.3	0.03--1.17	0.27--0.91	0.2--75.8	46--603	2.5--70.2	0.32--4.10	0.36--5.16
		Mean	8.1	0.22	0.48	8.1	243	6.0	0.73	0.91
		% Deficient fields			63	55	1	94	69	12
	Navalagund (180)	Range	5.6--9.2	0.07--1.08	0.17--0.84	0.2--30.6	86--1,781	2.3--61.0	0.24--3.28	0.26--3.54
		Mean	8.3	0.30	0.44	4.3	321	6.9	0.59	1.14
		% Deficient fields			71	74	0	89	80	6
	Dharwad District (1129)	Range	5.1--9.3	0.03--1.91	0.17--1.99	0.2--207.0	36--2,344	1.4--715.0	0.24--24.30	0.10--12.48
		Mean	7.4	0.24	0.65	9.3	220	9.7	0.98	0.82
		% Deficient fields			31	53	1	79	44	39

Table 15. Chemical characteristics of soil samples collected from farmers' fields in Gadag district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Gadag	Gadag (256)	Range	6.0--9.4	0.05--5.53	0.08--1.01	0.0--32.8	34--621	1.0--49.3	0.06--2.42	0.10--9.62
		Mean	8.3	0.25	0.40	4.6	183	4.8	0.42	0.99
		% Deficient fields			74	68	1	93	91	32
	Mundargi (236)	Range	5.1--9.3	0.04--4.55	0.06--1.41	0.2--65.6	27--1,145	1.2--44.8	0.16--1.94	0.10--9.08
		Mean	8.1	0.30	0.52	5.4	128	6.6	0.44	0.75
		% Deficient fields			59	69	8	85	89	48
	Nargund (119)	Range	7.7--8.9	0.13--1.63	0.14--0.73	1.0--42.8	146--638	2.5--47.9	0.16--4.92	0.28--3.16
		Mean	8.4	0.38	0.45	5.8	289	15.2	0.46	1.22
		% Deficient fields			71	50	0	55	92	3
	Ron (339)	Range	6.4--9.6	0.08--1.52	0.04--0.82	0.0--82.8	51--810	0.8--121.9	0.12--7.98	0.10--6.98
		Mean	8.3	0.26	0.28	5.6	193	6.8	0.40	0.85
		% Deficient fields			92	70	0	87	94	30
	Shirhatti (320)	Range	5.8--9.1	0.04--2.52	0.13--1.37	0.2--34.4	35--917	0.4--223.3	0.10--2.40	0.10--3.82
		Mean	8.1	0.24	0.44	5.2	183	6.7	0.40	0.77
		% Deficient fields			70	62	2	88	94	43
	Gadag District (1270)	Range	5.1--9.6	0.04--5.53	0.04--1.41	0.0--82.8	27--1,145	0.4--223.3	0.06--7.98	0.10--9.62
		Mean	8.2	0.27	0.41	5.3	185	7.1	0.42	0.88
		% Deficient fields			75	65	2	85	92	34

Table 16. Chemical characteristics of soil samples collected from farmers' fields in Gulbarga district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Gulbarga	Aland (518)	Range	6.1--8.8	0.06--1.04	0.20--1.03	0.7--21.6	41--1,166	1.6--30.8	0.26--3.20	0.07--1.20
		Mean	7.9	0.20	0.52	4.7	294	6.3	0.73	0.29
		% Deficient fields			48	68	0	89	70	91
	Afzalpur (358)	Range	6.9--8.7	0.09--2.78	0.10--0.82	0.2--70.8	59--1,494	1.7--171.5	0.22--2.80	0.09--3.32
		Mean	8.1	0.26	0.45	5.9	341	9.3	0.55	0.62
		% Deficient fields			61	72	0	74	89	64
	Chincholi (580)	Range	4.9--8.6	0.05--1.08	0.09--2.50	0.5--88.7	19--1,722	0.9--38.3	0.10--5.18	0.10--2.04
		Mean	7.5	0.19	0.58	7.8	222	5.4	0.65	0.46
		% Deficient fields			52	55	3	92	78	74
	Chitapur (516)	Range	7.0--9.0	0.08--2.81	0.12--1.28	1.0--41.6	61--1,166	0.4--335.6	0.20--2.88	0.10--2.98
		Mean	8.1	0.31	0.44	6.9	251	14.1	0.53	0.61
		% Deficient fields			77	46	0	84	88	71
	Gulbarga (598)	Range	6.2--9.0	0.10--2.37	0.18--1.36	0.7--36.6	54--1,284	2.0--60.5	0.24--1.78	0.14--2.94
		Mean	8.1	0.28	0.51	4.6	268	7.3	0.50	0.53
		% Deficient fields			51	73	0	87	87	69
	Jevargi (592)	Range	7.4--9.8	0.08--34.50	0.04--1.05	0.4--36.0	48--1,172	1.7--12,647.9	0.12--1.44	0.02--24.90
		Mean	8.3	0.88	0.47	3.6	277	132.0	0.37	1.32
		% Deficient fields			59	83	0	65	97	46
	Sedam (478)	Range	6.1--9.7	0.09--1.05	0.11--1.06	1.4--54.0	54--803	1.0--55.4	0.10--1.28	0.10--4.16
		Mean	8.1	0.18	0.41	7.0	231	5.6	0.40	0.49
		% Deficient fields			76	49	0	92	96	82
	Gulbarga District (3640)	Range	4.9--9.8	0.05--34.50	0.04--2.50	0.2--88.7	19--1,722	0.4--12,647.9	0.10--5.18	0.02--24.90
		Mean	8.0	0.34	0.49	5.7	266	28.1	0.53	0.63
		% Deficient fields			60	64	1	83	86	71

Table 17. Chemical characteristics of soil samples collected from farmers' fields in Hassan district, Karnataka. The values in parenthesis is number of fields

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Hassan	Alur (966)	Range	4.6--7.9	0.10--2.70	0.15--4.86	1.2--129.9	13--405	1.0--69.7	0.26--8.40	0.10--1.80
		Mean	5.8	0.37	0.71	24.3	107	7.0	1.23	0.33
		% Deficient fields			23	25	18	87	36	93
	Arkalgud (1358)	Range	4.5--8.2	0.03--1.83	0.14--2.26	0.7--363.0	17--1,394	0.5--515.1	0.10--13.40	0.02--4.08
		Mean	6.2	0.30	0.63	23.4	119	13.1	0.97	0.36
		% Deficient fields			30	18	8	68	48	89
	Arsikere (1436)	Range	4.5--9.5	0.02--1.40	0.01--26.00	1.3--97.4	37--1,116	0.5--97.2	0.06--9.00	0.06--2.20
		Mean	7.2	0.16	0.40	12.7	128	5.2	0.70	0.32
		% Deficient fields			80	23	11	93	66	91
	Belur (1692)	Range	4.1--9.2	0.02--2.58	0.09--5.47	0.2--169.4	9--967	0.2--203.8	0.10--13.96	0.02--2.78
		Mean	5.9	0.17	0.65	17.9	106	9.6	1.07	0.30
		% Deficient fields			33	25	35	79	50	89
	Channaraya pattana (1490)	Range	4.7--9.7	0.03--1.70	0.02--1.32	0.2--92.4	16--670	0.9--94.2	0.08--8.54	0.04--2.00
		Mean	6.8	0.19	0.38	11.6	135	7.8	0.69	0.30
		% Deficient fields			80	36	9	82	71	93
	Hassan (1474)	Range	3.9--8.1	0.03--2.15	0.04--1.38	0.4--116.7	15--822	1.3--57.5	0.20--10.40	0.04--2.48
		Mean	5.9	0.15	0.51	26.4	127	6.5	1.24	0.30
		% Deficient fields			50	910	88	35	96	
	Holenarsipur (958)	Range	4.9--9.4	0.10--3.60	0.11--2.26	1.2--137.9	13--714	1.0--84.6	0.14--8.20	0.10--1.66
		Mean	6.6	0.38	0.51	22.3	108	10.1	0.91	0.33
		% Deficient fields			57	19	19	74	55	88
	Sakleshpur (900)	Range	4.8--6.9	0.10--0.90	0.11--5.71	0.7--88.6	15--484	1.0--34.5	0.10--41.90	0.10--2.22
		Mean	5.7	0.34	1.04	19.8	75	7.6	2.72	0.37
		% Deficient fields			15	28	41	79	30	83
	Hassan District (10274)	Range	3.9--9.7	0.03--3.60	0.04--5.71	0.2--363.0	9--1,394	0.2--515.1	0.06--41.90	0.02--4.08
		Mean	6.3	0.24	0.58	19.4	116	8.4	1.12	0.32
		% Deficient fields			48	23	18	82	50	91

Table 18. Chemical characteristics of soil samples collected from farmers' fields in Haveri district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Haveri	Byadgi (200)	Range	5.4--8.9	0.04--1.01	0.19--1.38	0.4--79.0	25--750	2.1--55.3	0.34--4.80	0.18--2.40
		Mean	7.5	0.16	0.52	14.2	121	7.7	0.86	0.67
		% Deficient fields			53	25	7	79	54	48
	Hangal (136)	Range	5.4--8.3	0.05--0.67	0.21--1.36	0.5--143.0	38--641	1.3--33.9	0.38--2.78	0.10--1.26
		Mean	7.0	0.18	0.58	35.7	133	7.1	0.94	0.46
		% Deficient fields			41	15	7	81	38	68
	Haveri (241)	Range	5.5--9.3	0.03--1.38	0.22--0.94	0.2--46.0	31--1,228	2.0--60.7	0.24--2.32	0.16--3.28
		Mean	7.5	0.15	0.53	8.6	114	7.6	0.71	0.64
		% Deficient fields			41	41	4	85	64	56
	Hirekerur (180)	Range	5.6--8.7	0.04--0.67	0.16--1.97	0.2--78.0	51--413	1.9--31.7	0.42--34.10	0.14--1.96
		Mean	8.0	0.15	0.46	10.5	161	5.2	1.11	0.82
		% Deficient fields			70	46	0	94	48	22
	Ranibennur (219)	Range	6.0--10.5	0.03--1.92	0.08--1.33	0.1--126.0	36--3,750	0.3--55.6	0.20--3.56	0.08--8.44
		Mean	8.2	0.23	0.48	8.0	128	8.4	0.79	0.78
		% Deficient fields			65	57	8	80	65	45
	Savanur (371)	Range	5.4--9.3	0.04--2.34	0.14--1.01	0.2--53.2	33--1,072	1.8--120.3	0.28--2.80	0.18--4.38
		Mean	8.1	0.20	0.44	7.0	147	6.1	0.63	0.85
		% Deficient fields			74	53	4	89	81	33
	Shiggaon(185)	Range	5.1--8.5	0.03--0.76	0.19--3.60	0.2--123.0	29--1,203	2.2--45.0	0.30--3.68	0.16--1.14
		Mean	6.7	0.16	0.64	16.6	124	7.6	0.86	0.53
		% Deficient fields			25	37	4	81	44	64
	Haveri District (1532)	Range	5.1--10.5	0.03--2.34	0.08--3.60	0.1--143.0	25--3,750	0.3--120.3	0.20--34.10	0.08--8.44
		Mean	7.7	0.18	0.51	12.4	133	7.0	0.81	0.71
		% Deficient fields			55	42	5	85	60	46

Table 19. Chemical characteristics of soil samples collected from farmers' fields in Kodagu district, Karnataka.
The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Kodagu	Madikeri (260)	Range	4.5--7.1	0.01--2.06	0.50--1.26	1.5--15.5	5--223	1.1--154.4	0.05--31.74	0.03--11.00
		Mean	5.5	0.07	1.20	5.8	40	10.0	3.97	1.17
		% Deficient fields			0	69	80	84	16	29
	Somvarpet (520)	Range	4.0--7.8	0.01--0.69	0.28--1.26	1.2--15.5	0--184	1.1--206.5	0.03--37.30	0.03--11.75
		Mean	5.7	0.10	1.16	9.8	76	13.1	3.37	1.19
		% Deficient fields			0	36	45	74	38	30
	Virajpet (380)	Range	4.6--7.1	0.01--0.43	0.45--1.26	1.2--15.5	0--184	1.1--163.0	0.05--32.00	0.03--11.50
		Mean	5.4	0.05	1.11	3.9	31	14.0	5.29	1.25
		% Deficient fields			0	85	90	68	11	25
	Kodagu District (1160)	Range	4.0--7.8	0.01--2.06	0.28--1.26	1.2--15.5	0--223	1.1--206.5	0.03--37.30	0.03--11.75
		Mean	5.6	0.07	1.15	7.0	53	12.7	4.13	1.21
		% Deficient fields			0	59	68	74	24	28

Table 20. Chemical characteristics of soil samples collected from farmers' fields in Kolar district, Karnataka. The values in parenthesis is number of fields

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Kolar	Bangarapet (507)	Range	4.9--10.2	0.02--13.00	0.11--0.85	0.2--107.0	11--525	1.2--104.0	0.22--4.60	0.06--1.82
		Mean	7.1	0.16	0.38	13.5	73	7.3	1.04	0.38
		% Deficient fields			81	35	38	87	31	82
	Kolar (425)	Range	4.6--8.6	0.02--1.51	0.14--1.16	0.1--139.0	10--469	1.0--80.5	0.14--5.40	0.04--1.04
		Mean	6.9	0.12	0.38	19.0	94	5.6	1.33	0.33
		% Deficient fields			82	34	27	90	31	90
	Malur (500)	Range	4.9--8.4	0.02--2.96	0.04--1.14	1.4--182.0	12--722	1.7--141.2	0.28--14.40	0.08--1.18
		Mean	7.2	0.24	0.42	37.3	112	11.7	1.95	0.41
		% Deficient fields			70	3	24	68	14	79
	Mulbagal (345)	Range	4.8--9.1	0.02--3.00	0.07--1.07	0.0--110.0	11--1,144	0.8--60.6	0.14--5.34	0.06--1.48
		Mean	6.9	0.15	0.35	13.7	79	5.2	1.09	0.28
		% Deficient fields			86	46	42	89	48	93
	Srinivaspur (384)	Range	5.0--9.3	0.02--0.83	0.05--1.50	0.2--109.0	9--484	0.7--28.4	0.18--5.48	0.04--1.74
		Mean	6.8	0.11	0.35	14.7	70	3.8	1.00	0.28
		% Deficient fields			86	46	43	95	46	95
	Kolar District (2161)	Range	4.6--10.2	0.02--13.00	0.04--1.50	0.0--182.0	9--1,144	0.7--141.2	0.14--14.40	0.04--1.82
		Mean	7.0	0.16	0.38	20.3	87	7.0	1.31	0.34
		% Deficient fields			81	31	34	85	32	87

Table 21. Chemical characteristics of soil samples collected from farmers' fields in Koppal district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Koppal	Gangawati (600)	Range	5.6--9.8	0.01--3.20	0.04--2.90	0.7--214.6	27--535	0.3--1,482.5	0.06--20.09	0.01--1.26
		Mean	8.0	0.32	0.44	23.2	151	54.9	1.31	0.30
		% Deficient fields			71	3	2	19	43	86
	Koppal (600)	Range	5.2--9.4	0.04--2.01	0.03--1.32	0.0--203.0	33--587	0.3--1,325.0	0.05--7.77	0.01--2.42
		Mean	7.5	0.21	0.42	20.0	141	182.6	0.70	0.28
		% Deficient fields			64	11	3	18	64	89
	Kushtagi (700)	Range	5.9--9.5	0.04--5.70	0.03--1.54	0.5--152.0	24--708	0.3--1,477.5	0.01--4.80	0.00--2.50
		Mean	8.0	0.27	0.52	20.8	155	62.0	0.89	0.28
		% Deficient fields			54	5	3	22	50	87
	Yelbarga (599)	Range	5.3--9.3	0.02--1.30	0.03--1.40	0.6--108.5	30--328	0.5--797.5	0.01--3.10	0.01--2.98
		Mean	7.4	0.22	0.41	14.4	140	33.7	0.45	0.34
		% Deficient fields			74	9	2	30	83	86
	Koppal District (2499)	Range	5.2--9.8	0.01--5.70	0.03--2.90	0.0--214.6	24--708	0.3--1,482.5	0.01--20.09	0.00--2.98
		Mean	7.7	0.26	0.45	19.6	147	82.5	0.84	0.30
		% Deficient fields			65	7	2	22	59	87

Table 22. Chemical characteristics of soil samples collected from farmers' fields in Mandya district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Mandya	Krishnarajpet (1179)	Range	4.3--8.6	0.01--1.80	0.01--1.26	1.5--27.2	10--164	1.0--272.0	0.01--4.75	0.02--3.50
		Mean	6.8	0.29	0.56	13.5	102	42.0	0.49	0.61
		% Deficient fields			47	17	13	32	82	63
	Maddur (620)	Range	4.6--8.6	0.01--2.87	0.03--1.26	1.5--27.2	34--164	1.1--277.2	0.02--3.63	0.01--3.98
		Mean	6.5	0.38	0.57	14.9	102	45.7	0.88	0.55
	% Deficient fields				42	9	4	18	42	67
	Malavalli (680)	Range	4.5--8.7	0.05--1.02	0.01--1.26	1.5--24.3	34--164	1.1--278.3	0.01--2.32	0.03--2.88
		Mean	6.7	0.32	0.51	10.4	101	52.2	0.55	0.49
		% Deficient fields			45	27	8	20	77	70
	Mandya (700)	Range	5.2--8.9	0.01--3.10	0.03--1.26	1.5--26.5	42--164	1.1--260.9	0.01--3.07	0.03--3.00
		Mean	7.0	0.48	0.56	14.7	109	41.1	0.55	0.65
		% Deficient fields			44	12	1	21	79	63
	Nagamangala (1380)	Range	4.8--8.9	0.02--2.89	0.03--1.26	1.8--27.0	7--164	1.1--278.3	0.01--4.86	0.03--3.88
		Mean	6.6	0.49	0.64	18.7	102	44.9	0.75	0.64
		% Deficient fields			40	6	4	32	62	63
	Pandavapura (560)	Range	4.5--8.7	0.10--2.88	0.03--1.21	1.5--26.5	34--164	1.1--269.6	0.01--2.19	0.03--3.10
		Mean	6.9	0.45	0.58	15.9	104	36.5	0.55	0.57
		% Deficient fields			49	15	3	32	74	66
	Shriranga-pattana (360)	Range	5.2--8.9	0.02--2.90	0.05--1.24	1.5--26.5	30--164	1.1--201.1	0.01--2.06	0.03--2.45
		Mean	6.8	0.23	0.77	15.1	106	34.6	0.49	0.59
		% Deficient fields			19	19	6	27	87	69
	Mandya District (5479)	Range	4.5--8.9	0.01--3.10	0.01--1.26	1.5--27.2	7--164	1.0--278.3	0.01--4.86	0.01--3.98
		Mean	6.8	0.39	0.59	15.1	103	43.3	0.62	0.60
		% Deficient fields			43	14	6	27	71	65

Table 23. Chemical characteristics of soil samples collected from farmers' fields in Mysore district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Mysore	Heggada-devana Kote (980)	Range	3.2--8.2	0.01--3.20	0.12--1.26	0.4--15.7	9--168	0.9--798.1	0.03--11.16	0.03--2.88
		Mean	6.7	0.20	0.52	8.6	130	59.4	1.14	0.63
		% Deficient fields			52	37	3	16	51	63
	Hunsur (760)	Range	5.2--8.3	0.05--2.60	0.09--1.26	0.4--15.7	33--168	0.9--699.6	0.02--11.45	0.03--2.73
		Mean	6.7	0.21	0.46	8.8	133	57.4	2.33	0.77
		% Deficient fields			66	31	1	7	17	47
	Krishnaraja-nagar (620)	Range	5.1--9.3	0.02--2.69	0.09--1.26	0.8--15.7	33--168	0.9--561.8	0.02--15.00	0.03--14.73
		Mean	7.2	0.26	0.51	11.8	137	48.8	3.88	0.79
		% Deficient fields			58	13	1	26	5	52
	Mysore (540)	Range	4.7--8.2	0.03--1.17	0.03--1.26	0.4--15.7	3--168	0.9--1,459.8	0.17--19.40	0.03--2.58
		Mean	6.9	0.13	0.43	9.3	106	78.3	1.80	0.46
		% Deficient fields			68	29	7	19	21	74
	Nanjangud (700)	Range	5.6--8.8	0.01--2.00	0.06--1.26	0.4--15.7	5--168	0.9--570.5	0.02--17.69	0.03--2.73
		Mean	7.3	0.14	0.41	9.6	130	47.7	2.04	0.56
		% Deficient fields			76	25	3	7	25	68
	Piriyapatna (780)	Range	4.1--8.8	0.01--1.25	0.06--1.17	1.2--15.7	9--168	0.9--724.7	0.01--19.80	0.03--6.58
		Mean	6.2	0.11	0.40	14.5	141	80.3	2.71	0.66
		% Deficient fields			75	3	0	4	24	61
	T. Narsipur (480)	Range	5.0--8.2	0.04--0.90	0.06--1.05	0.4--15.7	14--168	0.9--697.5	0.02--5.76	0.03--2.78
		Mean	6.4	0.21	0.24	7.2	115	41.1	1.19	0.92
		% Deficient fields			98	41	5	13	24	53
	Mysore District (4860)	Range	3.2--9.3	0.01--3.20	0.03--1.26	0.4--15.7	3--168	0.9--1,459.8	0.01--19.80	0.03--14.73
		Mean	6.8	0.18	0.43	10.1	129	59.7	2.13	0.68
		% Deficient fields			69	25	3	13	26	60

Table 24. Chemical characteristics of soil samples collected from farmers' fields in Raichur district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Raichur	Devadurga (769)	Range	6.0--9.4	0.02--12.60	0.10--1.50	0.3--75.6	24--975	1.2--2,920.0	0.12--8.24	0.08--13.98
		Mean	8.3	0.35	0.34	6.9	173	20.4	0.51	0.82
		% Deficient fields			88	58	5	74	87	52
	Lingsugur (710)	Range	5.4--9.8	0.04--4.02	0.05--1.48	0.1--57.4	30--1,339	1.2--1,861.7	0.14--4.66	0.00--6.22
		Mean	8.3	0.29	0.46	7.1	196	16.4	0.56	0.73
		% Deficient fields			65	51	2	80	86	47
	Manvi (689)	Range	6.5--9.5	0.03--4.70	0.11--1.20	0.2--59.8	39--966	0.8--6,045.0	0.12--8.20	0.12--9.08
		Mean	8.4	0.36	0.38	9.3	209	34.3	0.67	1.09
		% Deficient fields			81	52	0	68	77	26
	Raichur (517)	Range	4.8--9.7	0.02--35.50	0.03--1.60	0.0--109.2	13--1,344	1.0--2,631.1	0.14--2.66	0.04--3.44
		Mean	7.8	0.44	0.37	9.4	178	35.2	0.56	0.68
		% Deficient fields			79	43	16	68	82	62
	Sindhanur (658)	Range	6.0--9.5	0.08--56.90	0.08--1.06	0.0--169.6	39--1,797	1.4--49,083.7	0.12--15.24	0.16--34.34
		Mean	8.4	1.62	0.55	23.5	251	795.2	1.00	2.51
		% Deficient fields			41	32	0	27	59	10
	Raichur District (3343)	Range	4.8--9.8	0.02--56.90	0.03--1.60	0.0--169.6	13--1,797	0.8--49,083.7	0.12--15.24	0.00--34.34
		Mean	8.2	0.60	0.42	11.1	202	177.2	0.66	1.17
		% Deficient fields			71	48	4	64	79	39

Table 25. Chemical characteristics of soil samples collected from farmers' fields in Ramanagara district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Rama-nagara	Channapatna (640)	Range	4.0--8.5	0.05--1.60	0.03--2.18	2.3--201.5	24--591	0.3--730.0	0.01--6.47	0.01--1.24
		Mean	6.7	0.21	0.56	30.2	122	74.6	1.38	0.36
		% Deficient fields			51	0	13	21	38	84
	Kanakapura (920)	Range	4.9--8.5	0.01--1.65	0.03--1.75	0.5--178.0	6--631	0.3--1,950.0	0.13--6.36	0.01--1.01
		Mean	6.4	0.12	0.38	17.3	97	173.8	0.87	0.27
		% Deficient fields			74	13	10	13	54	89
	Magadi (888)	Range	3.9--8.5	0.01--17.00	0.02--27.00	0.7--378.2	3--607	0.5--2,675.0	0.01--9.52	0.01--20.68
		Mean	6.1	0.18	0.35	29.4	100	224.2	0.99	0.41
		% Deficient fields			78	2	20	10	53	89
	Ramanagara (620)	Range	3.2--8.4	0.03--1.71	0.03--1.32	0.6--168.0	9--584	0.3--2,377.5	0.10--5.79	0.01--1.08
		Mean	6.4	0.13	0.37	26.5	100	209.0	1.08	0.25
		% Deficient fields			73	3	17	7	43	90
	Ramanagara District (3068)	Range	3.2--8.4	0.03--1.71	0.03--3.00	0.5--378.2	3--631	0.3--2,675.0	0.01--9.52	0.01--20.68
		Mean	6.4	0.16	0.41	25.4	104	175.0	1.05	0.32
		% Deficient fields			70	5	15	13	48	88

Table 26. Chemical characteristics of soil samples collected from farmers' fields in Shimoga district, Karnataka.
The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Shimoga	Bhadravati (600)	Range	4.3--7.0	0.01--1.65	0.09--1.30	1.1--85.9	7--175	1.4--57.1	0.11--20.00	0.02--2.78
		Mean	5.9	0.10	0.61	12.8	133	17.8	1.05	0.76
		% Deficient fields			36	22	14	25	37	39
	Hosanagara (820)	Range	4.0--7.0	0.02--0.55	0.19--2.20	1.4--34.4	9--175	1.5--81.5	0.07--4.77	0.09--3.96
		Mean	5.3	0.11	0.69	6.6	70	15.2	0.90	0.77
		% Deficient fields			20	51	57	41	47	45
	Sagar (960)	Range	4.1--7.8	0.01--2.30	0.13--2.30	1.1--90.5	7--175	1.8--65.4	0.10--6.30	0.06--4.16
		Mean	5.3	0.16	0.79	7.8	71	14.4	1.06	0.87
		% Deficient fields			16	46	60	40	37	48
	Shikaripura (720)	Range	4.1--8.2	0.01--2.32	0.28--3.00	1.4--71.5	14--175	0.5--77.4	0.08--4.26	0.03--3.00
		Mean	6.2	0.19	0.77	7.5	109	14.2	1.13	0.79
		% Deficient fields			15	46	19	32	30	40
	Shimoga (860)	Range	4.3--7.1	0.01--2.25	0.07--2.60	0.7--85.9	2--175	4.5--93.8	0.18--4.10	0.01--3.10
		Mean	5.9	0.14	0.57	11.9	99	19.9	1.06	0.68
		% Deficient fields			46	18	20	27	33	43
	Sorab (1180)	Range	3.8--7.0	0.01--0.60	0.14--3.15	1.1--68.8	4--175	0.9--61.2	0.09--8.81	0.02--31.76
		Mean	5.6	0.13	0.78	10.9	69	15.3	0.97	0.94
		% Deficient fields			18	31	58	30	34	42
	Thirthahalli (1000)	Range	4.2--6.9	0.01--0.75	0.15--1.60	0.7--46.8	4--175	0.6--99.5	0.09--3.76	0.71--0.71
		Mean	5.1	0.07	0.71	4.7	41	14.7	1.07	0.71
		% Deficient fields			16	67	70	39	35	0
	Shimoga District (6140)	Range	3.8--8.2	0.01--2.32	0.07--3.15	0.7--90.5	2--175	0.5--99.5	0.07--20.00	0.01--31.76
		Mean	5.6	0.13	0.71	8.8	80	15.8	1.03	0.80
		% Deficient fields			23	41	46	34	36	36

Table 27. Chemical characteristics of soil samples collected from farmers' fields in Tumkur district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Tumkur	Chikanayakan halli (322)	Range	4.3--10.0	0.02--14.00	0.09--2.08	0.2--33.2	16--339	0.1--128.4	0.18--3.14	0.05--1.12
		Mean	6.8	0.18	0.37	4.0	83	5.6	0.85	0.32
		% Deficient fields			81	76	31	92	52	92
	Gubbi (284)	Range	4.1--8.9	0.02--0.98	0.10--1.18	0.2--43.4	17--1,193	0.6--33.4	0.16--5.44	0.03--0.98
		Mean	6.2	0.12	0.37	5.3	92	5.5	0.92	0.29
		% Deficient fields			81	63	35	94	49	94
	Koratagere (263)	Range	4.4--8.6	0.02--0.50	0.12--0.88	0.2--36.6	16--674	1.3--29.9	0.14--17.26	0.08--0.84
		Mean	6.3	0.11	0.38	5.6	73	5.4	1.21	0.29
		% Deficient fields			78	65	51	92	36	94
	Kunigal (506)	Range	4.3--8.7	0.02--1.17	0.04--1.85	0.1--64.6	11--1,470	1.2--97.1	0.20--4.62	0.06--3.60
		Mean	6.1	0.12	0.39	5.9	93	6.1	0.82	0.29
		% Deficient fields			79	60	36	88	52	97
	Madhugiri (411)	Range	2.8--8.8	0.02--1.11	0.09--1.24	0.2--65.0	18--790	1.2--52.8	0.16--5.18	0.06--1.08
		Mean	6.9	0.12	0.39	5.4	93	5.1	0.86	0.33
		% Deficient fields			77	68	27	93	54	91
	Pavagada (134)	Range	6.0--9.6	0.03--1.70	0.11--0.83	0.1--34.6	19--425	0.8--59.6	0.16--1.28	0.10--0.98
		Mean	7.9	0.21	0.30	4.3	94	5.4	0.56	0.34
		% Deficient fields			94	70	21	89	84	87
	Sira (179)	Range	5.2--9.5	0.01--0.46	0.10--0.80	0.2--204.0	18--303	1.2--24.3	0.20--5.32	0.08--1.02
		Mean	7.2	0.10	0.38	6.2	112	3.5	0.87	0.39
		% Deficient fields			83	67	10	98	43	87
	Tiptur (240)	Range	4.8--9.3	0.03--1.48	0.12--1.14	0.2--100.4	21--740	1.0--108.4	0.24--3.08	0.08--1.31
		Mean	6.9	0.16	0.45	10.0	126	4.9	0.91	0.42
		% Deficient fields			65	47	18	94	39	83
	Tumkur (498)	Range	4.2--8.5	0.02--1.00	0.09--1.40	0.2--103.4	17--736	0.5--53.6	0.14--8.00	0.06--1.14
		Mean	6.2	0.11	0.38	7.5	84	5.5	0.93	0.32
		% Deficient fields			81	60	44	95	49	90
	Turuvekere (204)	Range	4.8--8.7	0.02--2.65	0.12--1.26	0.2--27.4	13--1,095	1.9--64.7	0.20--3.28	0.14--1.06
		Mean	7.1	0.15	0.51	2.9	80	6.7	0.86	0.38
		% Deficient fields			48	86	43	89	54	91
	Tumkur District (3041)	Range	2.8--10.0	0.01--14.00	0.04--2.08	0.1--204.0	11--1,470	0.1--128.4	0.14--17.26	0.03--3.60
		Mean	6.6	0.13	0.39	5.9	92	5.5	0.89	0.33
		% Deficient fields			77	65	34	92	50	91

Table 28. Chemical characteristics of soil samples collected from farmers' fields in Udupi district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Udupi	Karkal (180)	Range	5.5--6.8	0.10--0.47	0.42--0.96	1.5--12.8	36--155	3.3--22.2	0.12--4.18	0.13--2.59
		Mean	6.1	0.20	0.83	4.4	81	11.0	0.80	0.52
		% Deficient fields			4	69	8	51	62	66
	Kundapura (400)	Range	5.4--6.9	0.11--0.49	0.36--0.98	1.5--14.2	34--169	3.1--25.5	0.17--3.72	0.11--2.11
		Mean	5.9	0.25	0.80	3.7	86	10.0	1.10	0.45
		% Deficient fields			6	82	3	57	36	72
	Udupi (420)	Range	5.5--7.0	0.12--0.59	0.39--0.99	1.6--10.9	20--130	3.2--24.3	0.23--3.43	0.14--3.55
		Mean	6.1	0.29	0.81	3.3	51	10.2	0.85	0.57
		% Deficient fields			2	94	74	53	60	67
	Udupi District (1000)	Range	5.4--7.0	0.10--0.59	0.36--0.99	1.5--14.2	20--169	3.1--25.5	0.12--4.18	0.11--3.55
		Mean	6.0	0.26	0.81	3.6	71	10.3	0.94	0.52
		% Deficient fields			4	85	34	54	51	69

Table 29. Chemical characteristics of soil samples collected from farmers' fields in Uttara Kannada district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Uttara Kannada	Ankola (320)	Range	3.7--8.3	0.01--3.30	0.12--1.26	0.2--36.9	33--184	0.6--470.0	0.07--8.12	0.10--16.90
		Mean	5.2	0.25	0.36	9.9	103	142.6	1.16	1.42
		% Deficient fields			84	13	13	3	49	44
	Bhatkal (240)	Range	3.4--7.3	0.01--1.62	0.10--1.82	2.3--47.1	28--184	2.4--364.0	0.02--8.10	0.10--2.80
		Mean	5.5	0.12	0.66	7.6	73	175.9	1.27	0.65
		% Deficient fields			30	28	23	1	42	49
	Haliyal (440)	Range	3.5--8.3	0.01--1.08	0.12--0.86	2.6--15.5	1--184	2.7--299.0	0.13--26.40	0.10--6.50
		Mean	6.2	0.14	0.35	7.9	105	149.8	1.33	0.58
		% Deficient fields			88	26	2	0	44	58
	Honnavar (360)	Range	2.1--6.9	0.01--2.10	0.10--1.26	1.9--15.5	28--184	2.8--372.0	0.12--10.20	0.10--2.00
		Mean	5.2	0.11	0.60	6.5	73	134.2	1.03	0.51
		% Deficient fields			44	30	22	1	51	68
	Joida (460)	Range	4.8--7.6	0.01--1.07	0.10--9.58	0.6--19.4	0--199	2.8--380.0	0.10--17.40	0.10--1.90
		Mean	6.0	0.10	0.49	7.0	100	159.9	0.94	0.50
		% Deficient fields			55	30	2	1	47	65
	Karwar (200)	Range	3.6--6.5	0.01--4.30	0.20--0.94	0.7--23.9	10--155	0.2--290.0	0.14--4.55	0.10--25.00
		Mean	5.2	0.34	0.52	5.8	48	85.4	0.89	5.52
		% Deficient fields			43	54	54	50	50	33
	Kumta (440)	Range	3.4--8.4	0.01--3.70	0.10--1.62	0.9--39.3	5--184	20.0--299.0	0.04--8.60	0.10--2.00
		Mean	5.2	0.29	0.68	6.0	67	150.7	1.02	0.51
		% Deficient fields			27	35	33	0	49	64
	Mundgod (340)	Range	4.1--7.8	0.01--2.70	0.20--1.26	1.4--31.8	14--155	0.1--26.5	0.08--4.44	0.16--290.00
		Mean	6.1	0.18	0.59	6.3	46	6.5	0.77	45.20
		% Deficient fields			37	38	60	76	62	43
	Siddapur (780)	Range	4.2--7.1	0.01--5.00	0.19--1.26	0.5--28.7	4--83	0.1--26.9	0.11--5.91	0.02--8.32
		Mean	5.3	0.05	0.59	5.7	29	8.8	0.85	1.02
		% Deficient fields			41	47	91	75	51	47
	Sirsi (880)	Range	4.2--7.8	0.01--0.56	0.15--3.98	0.1--35.1	9--184	1.0--170.0	0.03--4.31	0.02--4.54
		Mean	5.4	0.03	0.63	6.4	46	34.3	0.76	1.06
		% Deficient fields			35	50	66	23	63	31
	Yellapur (520)	Range	4.3--7.9	0.01--3.25	0.08--1.84	0.1--23.8	14--184	1.0--73.0	0.11--9.20	0.02--26.95
		Mean	5.6	0.05	0.55	3.9	56	15.0	0.82	0.94
		% Deficient fields			38	74	55	38	63	37
	Uttara Kannada District (4980)	Range	3.5--8.4	0.01--5.00	0.08--9.58	0.1--47.1	0--199	0.1--470.0	0.02--26.40	0.02--290.00
		Mean	5.5	0.12	0.56	6.4	64	81.6	0.95	4.05
		% Deficient fields			46	41	45	28	53	48

Table 30. Chemical characteristics of soil samples collected from farmers' fields in Yadgir district, Karnataka. The values in parenthesis is number of fields.

District	Taluka	Parameter	pH	EC dS/m	OC %	Av P ppm	Av K ppm	Av S ppm	Av Zn ppm	Av B ppm
Yadgir	Shahpur (638)	Range	5.3--9.5	0.03--8.64	0.01--0.81	0.7--97.3	27--781	1.8--2,334.2	0.12--14.80	0.06--6.48
		Mean	8.0	0.36	0.36	9.5	206	38.1	0.38	0.69
		% Deficient fields			85	45	4	68	96	53
	Shorapur (736)	Range	5.5--9.6	0.06--8.78	0.02--1.19	0.0--53.7	37--1,558	0.7--816.8	0.12--8.48	0.12--7.26
		Mean	8.1	0.42	0.48	9.3	253	31.6	0.53	0.83
		% Deficient fields			57	54	0	67	86	46
	Yadgir (608)	Range	5.0--10.0	0.03--2.37	0.01--1.14	0.2--70.6	14--703	0.9--134.5	0.14--5.14	0.02--2.88
		Mean	7.7	0.25	0.35	10.1	144	9.2	0.56	0.44
		% Deficient fields			84	43	12	82	87	78
	Yadgir District (1982)	Range	5.0--10.0	0.03--8.78	0.01--1.19	0.0--97.3	14--1,558	0.9--237.4	0.12--14.80	0.02--4.60
		Mean	7.9	0.35	0.40	9.6	204	26.8	0.49	0.66
		% Deficient fields			74	48	5	72	90	58
Karnataka State	Karnataka State (92904)	Range	3.5--10.0	0.03--8.78	0.01--9.58	0.0--543.8	0--3,750	0.9--237.4	0.00--235.00	0.02--4.60
		Mean	6.8	0.25	0.54	12.5	115	44.4	1.01	0.87
		% Deficient fields			52	41	23	52	55	62

About ICRISAT

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a non-profit, non-political organization that conducts agricultural research for development in Asia and sub-Saharan Africa with a wide array of partners throughout the world. Covering 6.5 million square kilometers of land in 55 countries, the semi-arid tropics have over 2 billion people, and 644 million of these are the poorest of the poor. ICRISAT and its partners help empower these poor people to overcome poverty, hunger, malnutrition and a degraded environment through better and more resilient agriculture.

ICRISAT is headquartered in Hyderabad, Andhra Pradesh, India, with two regional hubs and four country offices in sub-Saharan Africa. It belongs to the Consortium of Centers supported by the Consultative Group on International Agricultural Research (CGIAR).

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