

NATURAL RESOURCES DATA MANAGEMENT SYSTEM (NRDMS)

**MONTHLY ACTIVITY REPORT
April - July 2025**

Submitted by

**District NRDMS Centre
Zilla Panchayat,
Chitradurga**



Submitted to

**Karnataka State Council of
Science and Technology (KSCST)**

**Indian Institute of Science Campus,
Bengaluru - 560012**

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ABBREVIATIONS

KSCST - Karnataka State Council for Science and Technology.

IISc – Indian Institute of Science.

1. Basic Information of the District

- **District Name:** Chitradurga
- **Division:** Bengaluru
- **District Establishment Year:** 2006-2007
- **Headquarters:** Chitradurga City
- **Current CPO (Chief Planning Officer):** Mrs. Gayathri C. S., Chief Planning Officer.
- **Current CEO (Chief Executive Officer), Zil1a Panchayath:** Dr. Akash S, I.A.S., Chief Executive Officer.

2. NRDMS Background of the District

The Natural Resources Data Management System (NRDMS), initiated by the Karnataka State Council for Science and Technology (KSCST), is designed to strengthen decentralized planning, scientific resource management, and evidence-based decision-making at the district and taluk levels. Across Karnataka, NRDMS centres serve as nodal units for creating, updating, and disseminating spatial and non-spatial databases that support governance, sustainable development, and resource utilization. In Chitradurga district, the NRDMS Centre has been actively involved for the past three decades in developing GIS-based maps, thematic datasets, and decision support tools for administrators, researchers, and grassroots institutions like Gram Panchayats, thereby supporting agriculture, water management, forest conservation, renewable energy planning, and infrastructure development. Chitradurga, located 202 km from Bengaluru in the heart of the Deccan Plateau, is historically renowned for its massive stone fort and the legendary Onake Obavva. The district covers 8,436 sq. km and is characterized by semi-arid landscapes, hills, and valleys, with the Vedavati river basin forming its lifeline. It comprises six blocks and 189 Gram Panchayats, with a population of 16,59,456 per the 2011 Census, projected to reach 18,35,140. Agriculture dominates the local economy, where groundnut, maize, ragi, jowar, onion, and millets are major crops, while cotton, sunflower, arecanut, coconut, pomegranate, and papaya are commercial crops. The district has 73,719 hectares of forest (9.56% of the total area) and 4,43,032 hectares of irrigated land. Still, with an average annual rainfall of only 540 mm, it frequently experiences drought, making scientific interventions crucial.

The NRDMS Centre in Chitradurga undertakes multiple initiatives to address these challenges, including cadastral-level GIS mapping of land use, soil, water bodies, forest cover, and infrastructure. Thematic maps are developed for watershed planning, groundwater recharge, and irrigation management. It also supports agriculture by analyzing crop patterns and recommending sustainable diversification strategies for semi-arid zones. In environmental planning, the Centre contributes through forest mapping, afforestation drives, and wasteland reclamation. Additionally, it provides spatial planning inputs for roads, schools, health centres, drinking water supply, and renewable energy projects, while offering GIS-enabled decision support for Panchayats. Alongside this, NRDMS conducts regular GIS application training for officials, engineers, and Panchayat members and organizes awareness programs for citizen participation. These efforts provide scientific inputs for decentralized planning, enhance drought resilience, strengthen sustainable agriculture and forest management, and ultimately enable the district administration to take informed, data-driven decisions for holistic and sustainable development.

3. Geographical Features

- **Location and Boundaries:**

The district is bounded by Tumkur to the south and southeast, Chikkamagaluru to the southwest, Davanagere to the west, Ballari to the north, and the Anantapur district of Andhra Pradesh to the east. Historically, Davanagere was part of Chitradurga before being carved out as a separate district. Administratively divided into six taluks: Chitradurga, Challakere, Hiriyur, Hosadurga, Holalkere, and Molakalmuru. The district has 22 hoblis and 189 Gram Panchayats, covering approximately 1,060 villages. The taluk-wise Gram Panchayat distribution includes Chitradurga (38), Challakere (40), Hiriyur (33), Hosadurga (33), Holalkere (29), and Molakalmuru (16). The district also comprises six administrative blocks, with the Chitradurga City Municipal Council (CMC) serving as the primary urban local body, governing a population of about 1.46 lakh across 35 wards over 29.5 sq. km. This well-structured administrative framework not only ensures effective governance and service delivery across urban, rural, and tribal landscapes but also strengthens agricultural planning and resource management, particularly in alignment with the Vedavathi watershed that shapes the district's socio-economic dynamics.

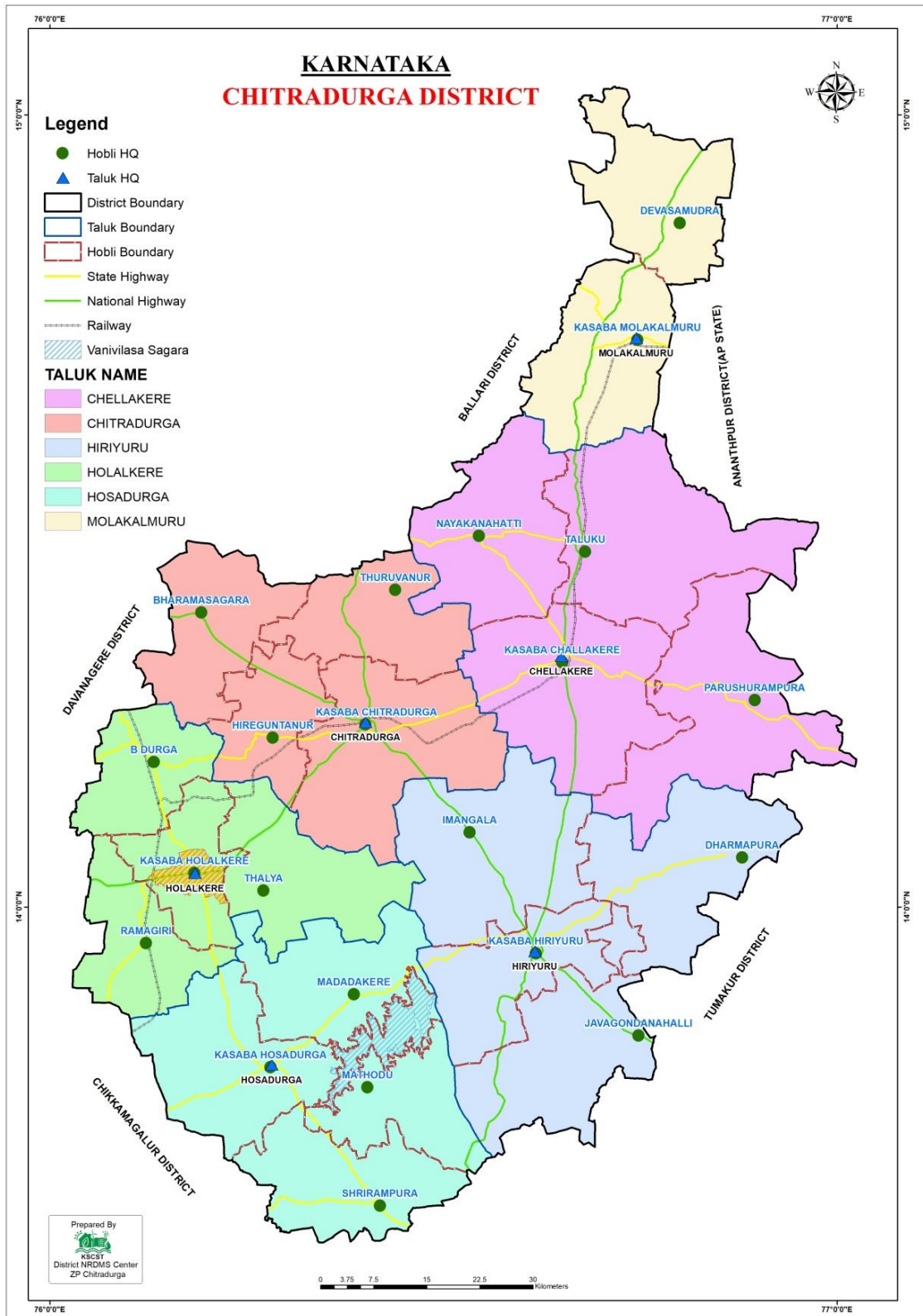


Figure 1. Administrative map of Chitradurga District

Geographical Coordinates:

Latitude: 13° 34' N to 15° 02' N

Longitude: 75° 37' E to 77° 01' E

Topography:

Chitradurga district, located in Karnataka's Deccan Plateau, has a semi-arid terrain of rocky hills, undulating ridges, and fertile valleys. The elevation ranges from 607 m to 1,151 m, with Jogimatti (3,803 ft) as the highest point, giving the district its unique climatic and geographic character. The Vedavathi River (Hagari) and tributaries like Chikka Hagari and Swarnamukhi are the primary water sources, while the larger Tungabhadra River flows outside the district. Chitradurga is also geologically significant for its pillow lava formations at Maradihalli, which are considered a National Geological Monument.

The district's topography supports a mix of rainfed farming and irrigated horticulture, though water scarcity remains a challenge due to low forest cover (9.56%) and average rainfall of 540 mm. Traditional tanks and seasonal rivers are vital in sustaining agriculture and livelihoods. The rugged granite hills also serve as the foundation for the historic Chitradurga Fort, blending natural heritage with cultural identity.

Chitradurga has significant mineral deposits, including gold prospecting at Halekal and Kotemardi (Bedimaradi) and open-cast copper mines at Ingaldhal, making it an essential centre for geological and mining activities

- **Climate:**

Average Rainfall: 540 mm

Temperature Range: 17°C to 38°C

Climatic Zones: The climate in Chitradurga district is quite salubrious, with three seasons. The average temperature of the district is 36°C. The pre-monsoon season starts from January to May. This period can be divided into winter (January to February) and summer (March to May). Winter is characterized by generally clear skies and very little rainfall.

Chitradurga experiences a semi-arid climate as part of Karnataka's Central Dry Zone (Zone IV), with distinct seasonal variations. The district receives an average annual rainfall of approximately 540 mm over 32 rainy days, mainly during the southwest monsoon from

June to October. Combined with shallow and poor soils, this limited and uneven rainfall makes the region susceptible to droughts. Studies indicate that Chitradurga and neighbouring districts such as Tumakuru, Ballari, and Davanagere face an exceptionally high drought hazard index, emphasizing the challenges of sustaining agriculture. These climatic conditions necessitate effective water conservation, adaptive agricultural practices, and resilient infrastructure to mitigate the impacts of the semi-arid environment and support sustainable livelihoods.

- **Natural Resources:**

- Forests and Wildlife: Jogimatti Wildlife Sanctuary (100.48 km²) and Rangayyanadurga Four-Horned Antelope Sanctuary (77.24 km²) protect dry deciduous forests and endangered species.
- Water Bodies: Major reservoirs include Vani Vilasa Sagara (Mari Kanive) on the Vedavathi River and Bhairavanithippa, supporting irrigation and local water needs.
- Minerals: The district has deposits of iron ore (e.g., Nirthadi Reserve Forest) and manganese, with exploration regulated by the Karnataka Forest Department.
- Soil Types: Predominantly black cotton soil suitable for dryland crops, red soil for groundnut and pulses, and shallow, low-fertility soils in semi-arid areas.
- Agriculture & Horticulture: Major crops include ragi, groundnut, maize, onion, and pomegranate; sericulture is significant in Hiriyur taluk with bivoltine silk production.

- **Primary Rivers/Water Sources:**

- Chitradurga district is the place of origin of the river Vedavati. In addition to traditional water harvesting systems and rivers that serve as surface water bodies, several minor irrigation tanks have been constructed to store water for agricultural and allied purposes. The district encompasses 302 lakes, of which the Minor Irrigation Department manages 166, 136 by the Zilla Panchayath, and 267 check dams strategically distributed across the region.”
- Vani Vilasa Sagara (Mari Kanive): Constructed in 1907 across the Vedavathi River in Hosadurga taluk, this is the oldest dam in Karnataka. It irrigates over 100 km² of land and supplies drinking water to several towns, including Chitradurga and Hiriyur.
- In addition to these, the district's groundwater resources are critical. According to the Central Ground Water Board (CGWB), the annual replenishable groundwater

resource is approximately 50,364 hectares, with a net yearly draft of about 50,777 hectares, indicating a critical water management situation.

4. NRDMS Spatial and Non-Spatial Data available in District NRDMS Centre

- SPATIAL DATABASE**

Sector / Subsector	Scale	Source	Survey / Publn. Year	Area covered	Status Code	File Format
1. Natural Resources						
<i>Land</i>						
1. Topography						
Contour Map	5 and 10 Mtr	ASTER DEM		District	CC	Shp
Slope Map	1:50,000	KRSAC		District	CC	Shp
2. Geology – A						
Rock features	1:50,000	KRSAC		District	CC	Shp
Structural features	1:50,000	KRSAC		District	CC	Shp
3. Geology – B						
Rock features					NA	
Structural features					NA	
4. Mineral Resources	1:50,000	KRSAC		District	CC	Shp
5. Geomorphology	1:50,000	KRSAC		District	CC	Shp
6. Land use	1:50,000	KRSAC		District	CC	Shp
7. Waste Lands	1:50,000	KRSAC		District	CC	Shp
8. Soils	1:50,000	NBSS & LUP		District	CC	Shp
9. Forest & Wildlife						
Forest type	1:50,000	KFD		District	CC	Shp
Forest Density	1:50,000	KFD		District	CC	Shp
Forest Category	1:50,000	KFD		District	CC	Shp
Forest admin.	1:50,000	KFD		District	CC	Shp
Wild Life						
<i>Water</i>						
1. Groundwater						
Groundwater Prospectus	1:50,000	KRSAC		District	CC	Shp
Hydro chemistry					NA	

Groundwater budget					NA	
2. Surface water						
Drainage	1:50,000	KSRSAC		District	CC	Shp
Surface water bodies	1:50,000	SOI & KSRSAC				
3. Climate						
Telemetric Rain Gauge Station	1:50,000	KSNDMS		District	CC	Shp

Sector / Subsector	Scale	Source	Survey / Publn. Year	Area covered	Status Code	File Format
2. Demography						
Population						
Tehsil boundary	1:50,000	SOI		District	CC	Shp
District boundary	1:50,000	SOI		District	CC	Shp
Current popln. distbn.	1:50,000	SOI		District	CC	Shp
Literacy						
Levels of education						
Occupation						
Village boundary	1:50,000	SOI		District	CC	Shp
Employment						
District scenario					NA	
Employment exchange					NA	
Assets & Expenditure					NA	
Migration					NA	
Destitutes					NA	

3. Socio-Economy							File Format
Industry						NA	
Developmental activity						NA	

4. Agro Economy							
Land Utilisation							
Private Land						NA	
Common property						NA	
Land Ownership Pattern							
General scenario						NA	
Farmer's holdings						NA	
Principal crops						NA	
Irrigation							
<i>Minor irrigation</i>							
Canals	1:50,000	DLR & SS KSRSA C		District	CC	Shp	
Tube wells				District	NA		
Dug wells				District	NA		
Tanks	1:50,000	DLR & SS KSRSA C		District	CC	Shp	
Lift irrigation		DLR & SS		District	NA		
<i>Major irrigation</i>							
Reservoirs	1:50,000	DLR & SS KSRSA C		District	CC	Shp	
Anicuts					NA		
Agricultural implements					NA		
Animal husbandry	1:50,000	AHVS				Shp	
Pisciculture					NA		
Plantation							

Sector / Subsector	Scale	Source	Survey / Publn. Year	Area covered	Status Code	File Format
5. Infrastructure						

Communications						
Post offices	1:50,000	DLR & SS		District	CC	Shp
Telecommunication	1:50,000	DLR & SS		District	CC	Shp
Drinking water		DLR & SS			CC	Shp
Educational facilities	1:50,000	DDPI		District	CC	Shp
Electricity					NA	
Financial institutions					NA	
Markets					NA	
Health	1:50,000	DHO		District	CC	Shp
NGO's		DLR & SS			CC	Shp
Tourism	1:50,000	KSTDC		District	CC	Shp
Transport	1:50,000	PWD & SOI		District	CC	Shp
6. Miscellaneous						
District map with taluks	1:50,000	SOI		District	CC	Shp
District & taluk boundaries	1:50,000	SOI		District	CC	Shp
District map with hoblies	1:50,000	DLR & SS		District	CC	Shp
Village boundary with settlement	1:50,000	SOI/KSR AC		District	CC	Shp
Police station details	1:50,000	SP		District	CC	Shp
Details on Assembly constituencies	1:50,000	DC		District	CC	Shp
Gram Panchayats & Zilla Panchayats, their jurisdiction for all taluks	1:50,000	DC		District	CC	Shp

Additional Data

Cadastral Boundary	1:7780	SSLR & KRSRAC	District	CC	.Shp
Agro Climate	1:50000	NBSS & LUP	District	CC	.Shp

5. NRDMS Centre Activities (April 2025 — July 2025)

- The NRDMS Centre, Chitradurga, has actively engaged in groundwater monitoring, GIS mapping, and resource management, supporting district administration, Zilla Panchayat, and MGNREGA/FES programs. Key objectives include enhancing water availability, stream rejuvenation, and sustainable resource planning using advanced technologies and community-driven solutions.
- Prepared Depth to Water Level maps for Pre-Monsoon, Monsoon, and Post-Monsoon 2024 across Chitradurga.
- Compiled borewell data and taluk/district boundary maps for MGNREGA and FES projects.
- Analyzed flow-affected areas and inflow into Vani Vilasa Sagara Reservoir, identifying obstructions like siltation, sand deposition, encroachments, and stream bank erosion.
- Applied Drone & LIDAR mapping, IoT-enabled monitoring, and GIS-based encroachment detection.
- Recommended eco-friendly interventions: vetiver plantation, desilting, recharge structures, and community clean-up drives.
- Developed comprehensive spatial datasets: land use/land cover, forest, village, contour, drainage, water bodies, settlement, and transportation maps.
- Conducted settlement-to-mining distance analysis for Holalkere taluk, supporting hazard mitigation.
- Prepared district and taluk administration maps for technical and planning purposes.
- Organized and coordinated one-day GIS workshops for district officials in collaboration with KSCST Bangalore.
- Participated in Virtual Consultations (VCs) on climate change, GIS, and IPR.
- Collected and analyzed active mine data from the Mines and Geology Department.
- Maintained monthly progress reports, attendance records, and technical documentation.
- Updated IDSF Google Forms, filed reports, and supported day-to-day office and technical work.

- Scientific basis for groundwater and stream restoration, enhancing inflow into reservoirs.
- Supported sustainable agriculture, climate resilience, and infrastructure planning.
- Strengthened the decision-making capacity of district officials through data-driven insights.

6. Training Programmers Attended

- Attended the Workshop on Intellectual Property Rights (IPR) at JMIT Engineering College, Chitradurga, on 21/04/2025.
- Attended the One-Day State-Level Workshop on “Geospatial Applications for District-Level Planning” organized by the Karnataka State Council for Science and Technology (KSCST), Indian Institute of Science, Bengaluru, and the Rural Development & Panchayat Raj Department, Government of Karnataka on 28/04/2025.
- Participated in the Workshop on Environmental Changes conducted by EMPRI at Zilla Panchayath, Chitradurga, on 14/05/2025.
- I attended the Golden Jubilee Celebration of the Karnataka State Council for Science and Technology (KSCST). As part of the celebrations, the council is organizing a webinar on “Climate Change and Sustainable Development” scheduled for Wednesday, 16th July 2025.
- During the Social Work Camp – 2025 held at Ramadurga, Challakere, Chitradurga, I delivered a special lecture as a resource person on "Role of Communities in Groundwater Conservation", organized by the Department of Social Work, PG Centre, Ramanagara, Bangalore University. on 18/07/2025

7. Training Imparted to Line Departments

8. Science Outreach Activities

9. Conclusion

- **Summary of Activities and Key Findings:**

From April 2025 to July 2025, the NRDMS Centre, Chitradurga, carried out comprehensive activities including groundwater monitoring, seasonal depth-to-water level mapping, GIS mapping, and analysis of flow-affected areas and borewells. Advanced technologies such as LIDAR mapping, IoT-enabled monitoring, and GIS-based encroachment detection

enhanced planning and resource management. The Centre implemented eco-friendly interventions like vetiver plantations, desilting, and recharge structures, while preparing detailed spatial datasets and technical maps to support district officials and MGNREGA/FES programs. Training sessions and science outreach activities also engaged staff, line departments, and over 100 community members, raising awareness on sustainable groundwater conservation. These initiatives strengthened data-driven decision-making, improved water availability, enhanced climate resilience, and fostered community participation in natural resource management across Chitradurga district.

- **Commitment to Improve NRDIS Activities:**

- The NRDMS Centre, Chitradurga, is dedicated to strengthening its role in groundwater monitoring, GIS mapping, resource management, and community engagement in the forthcoming period.
- The Centre aims to enhance seasonal groundwater data collection frequency and accuracy by leveraging real-time updates through IoT-enabled sensors and remote sensing technologies.
- Efforts will also focus on expanding and refining comprehensive spatial datasets, including land use/land cover, watershed boundaries, forest cover, water bodies, and settlement patterns, to support effective planning and informed decision-making for district and taluk administration.
- Restoration of flow-affected streams and reservoirs will be prioritized, addressing obstructions through desilting, recharge structures and check dams, and eco-restoration initiatives using native vegetation.
- Furthermore, the Centre will intensify community engagement through awareness campaigns, interactive workshops, and targeted training programs for local people, line departments, and school students, highlighting sustainable groundwater and watershed management practices.
- Our area will be expanded to GIS applications, hydrological modelling, climate resilience, and disaster management, equipping authorities with actionable, data-driven insights. Strengthened collaboration with research institutions, state and central government agencies, and local stakeholders will enable the adoption of advanced technologies such as Drone/LIDAR mapping, GIS analytics, and IoT-based monitoring.
- By integrating enhanced monitoring, innovative technology, and active community participation, the NRDMS Centre aims to ensure improved water availability, climate resilience, sustainable agriculture, and long-term resource planning across Chitradurga district.

10. Annexures

District Maps:

The Depth to Water Level (DWL) in Chitradurga district shows pronounced seasonal variability, reflecting its semi-arid climate and rainfall patterns. During the pre-monsoon period (March–May 2024), groundwater levels ranged from 0 to 80 meters below ground level (mbgl), indicating maximum drawdown due to dry conditions and intensive agricultural water use. With the monsoon rains (June–September 2024), DWL reduced to 0 to 70 mbgl, reflecting partial aquifer recovery and localized recharge in areas with favourable soil infiltration and proximity to streams (Figure 1). By the post-monsoon period (October–December 2024), groundwater levels stabilized to 0 to 55 mbgl, showing effective recharge from cumulative rainfall and runoff into tanks, streams, and minor reservoirs (Figures 2, 3 and 4). These trends align with previous hydrological studies and reports from Chitradurga, highlighting shallow to moderately deep groundwater zones and rapid seasonal fluctuations. The compiled DWL maps provide a critical scientific foundation for sustainable groundwater management, enabling optimized irrigation planning and targeted recharge interventions. These observations underscore the district's vulnerability to drought and the importance of strategic resource planning to ensure long-term water security.

The NRDMS Centre conducted a detailed study of flow-affected areas across Chitradurga district, focusing on key villages in Hosadurga and Holalkere taluks (Figures 1, 2, and 3), to examine declining water inflow into the Vani Vilasa Sagara Reservoir and identify critical obstructions such as silt accumulation, sand deposition, encroachments, and stream bank erosion. Advanced technologies, including Drone and LIDAR mapping, IoT-enabled water flow monitoring, and GIS-based encroachment detection, were employed to generate accurate, data-driven insights and prepare detailed spatial datasets and stream order maps. Clear roles and responsibilities were defined for local institutions, including the NRDMS Centre and Zilla Panchayat, to ensure coordinated implementation, restore natural stream flow, and enhance groundwater recharge. These integrated measures aim to improve water availability, strengthen climate resilience, promote sustainable water management, and provide a long-term roadmap for environmental sustainability in the district (Figures 5 and 6).

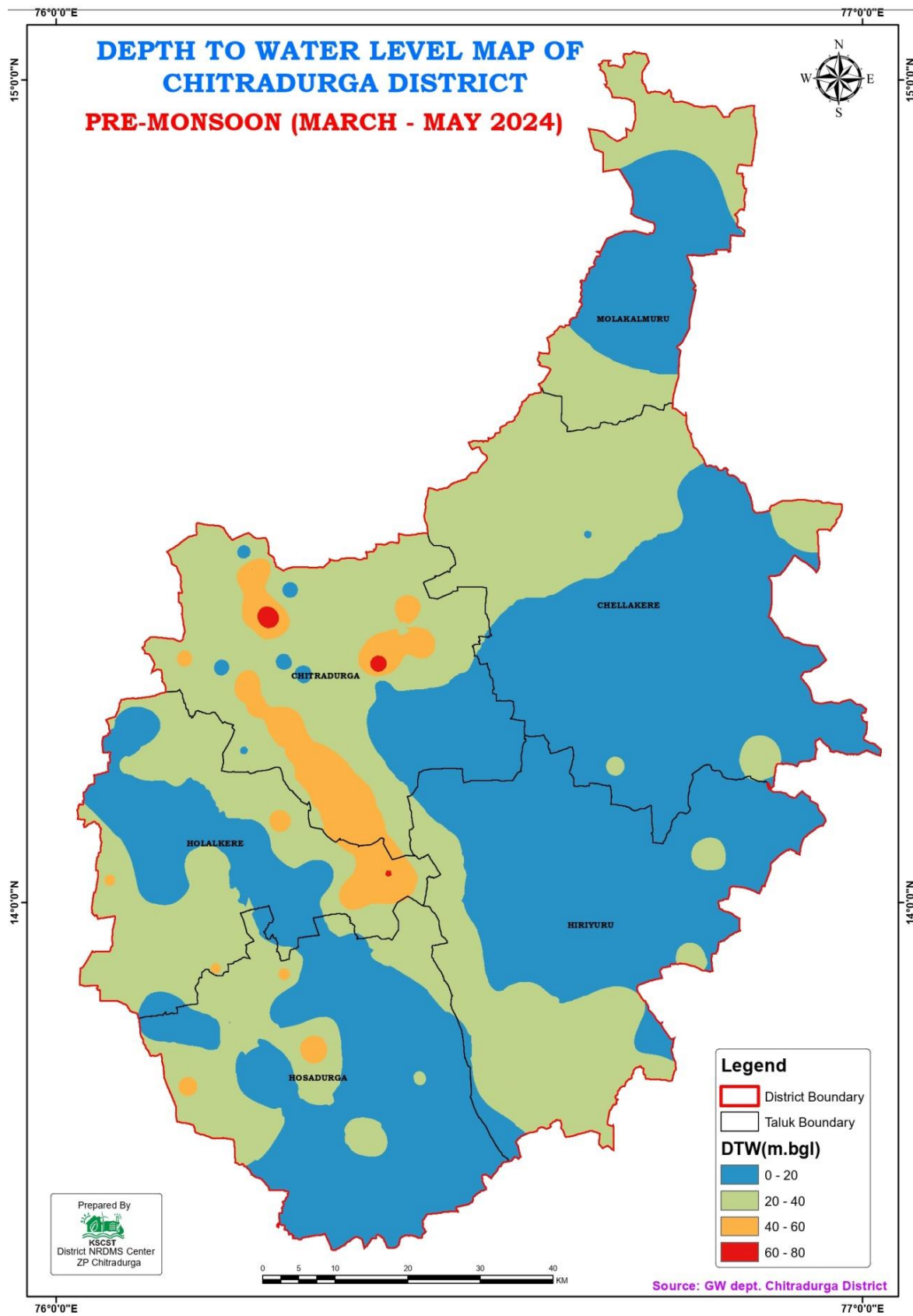


Figure 2. Depth to water Level of Chitradurga District (March- May 2024)

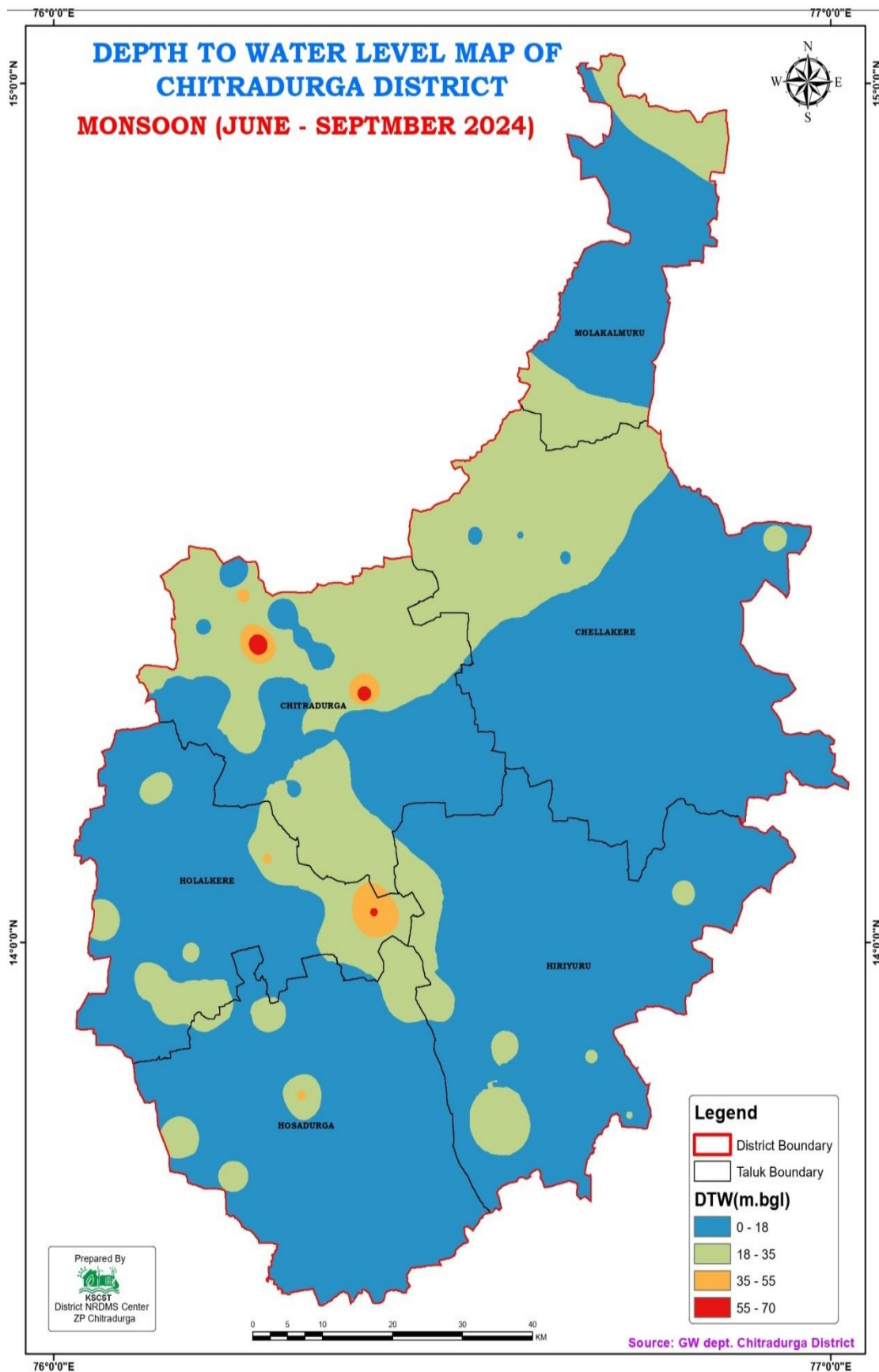


Figure 3. Depth to water Level of Chitradurga District (June to September 2024)

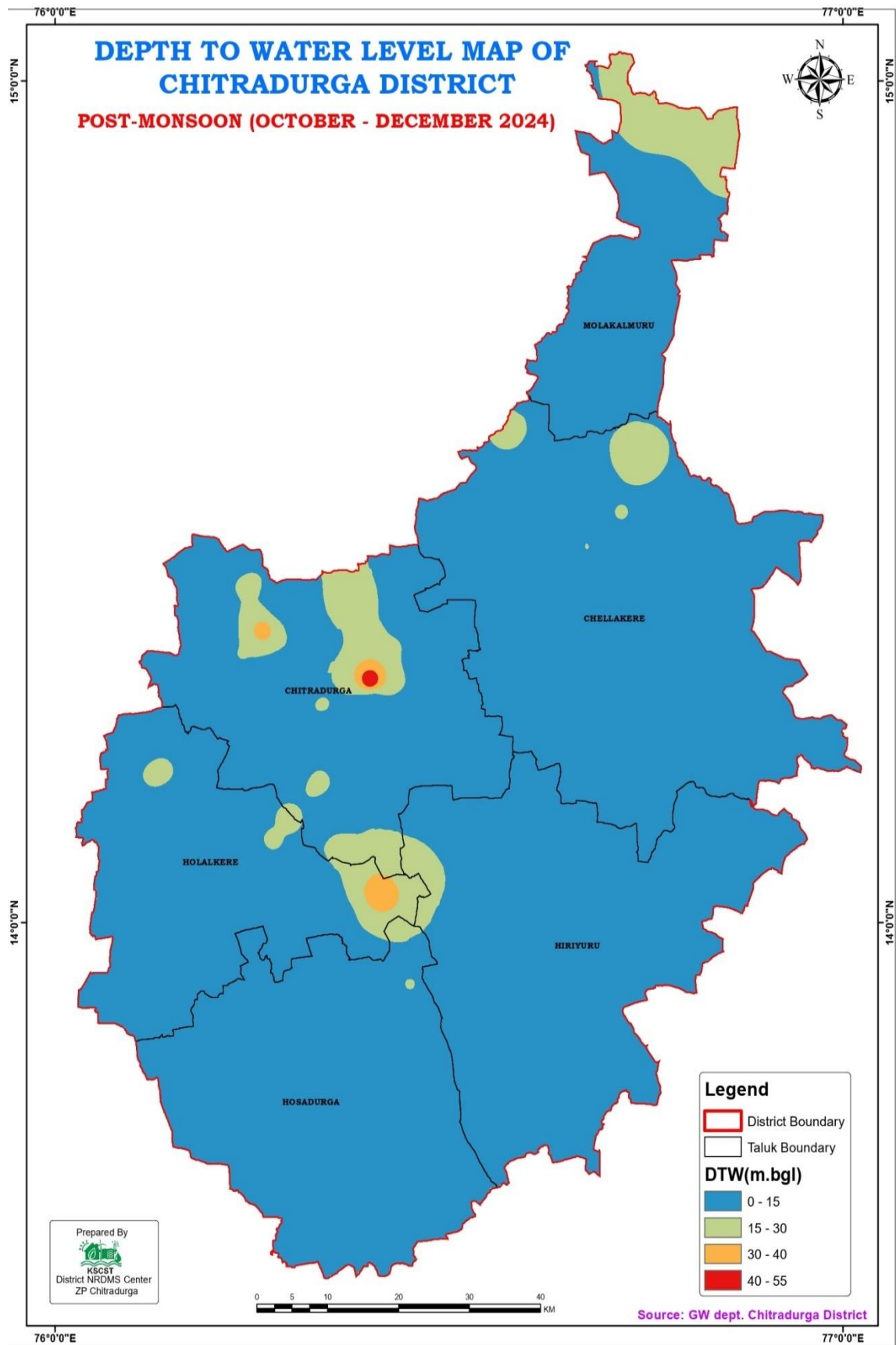


Figure 4. Depth to water Level of Chitradurga District (October to December 2024)

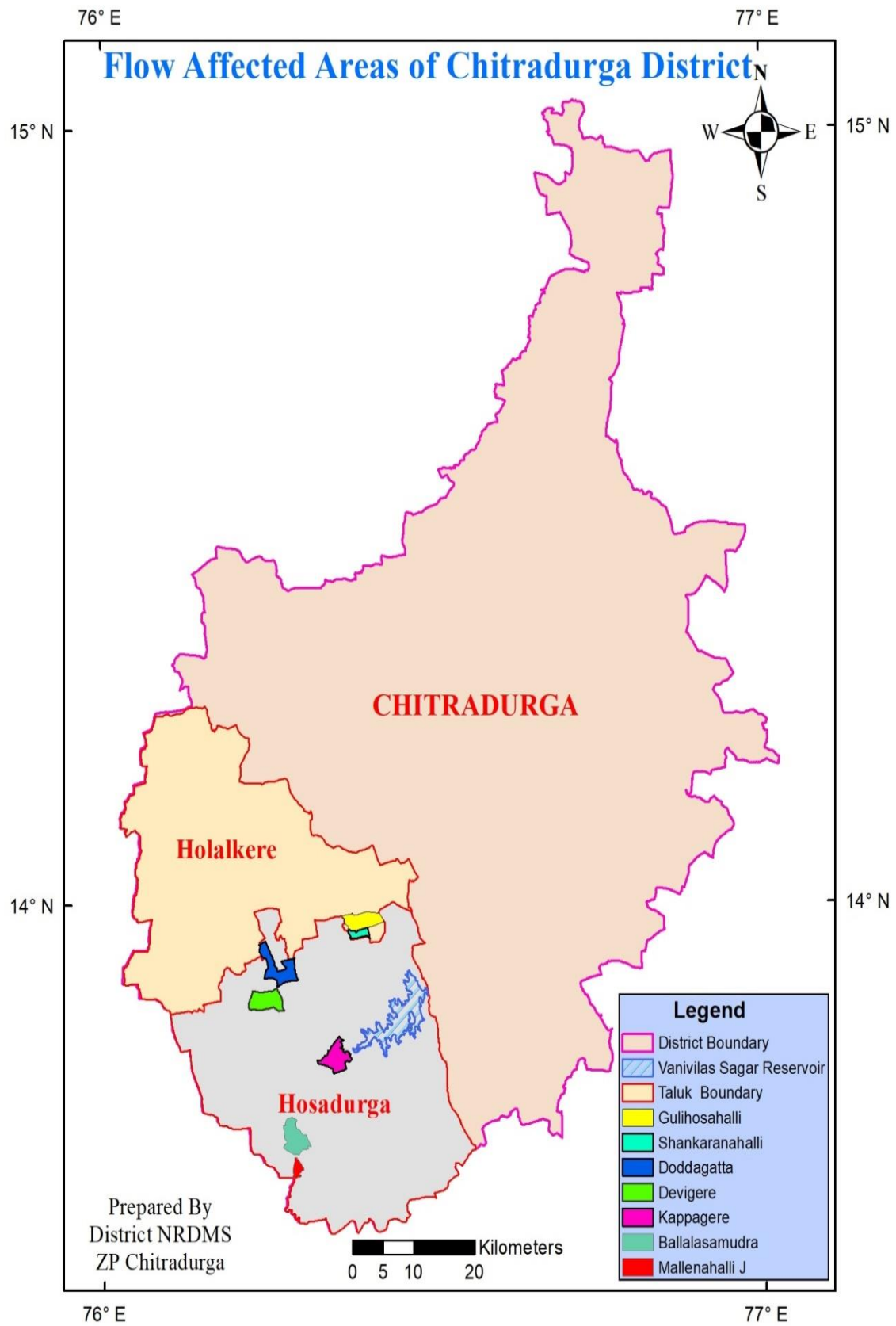


Figure 5. Flow-affected areas of Chitradurga District

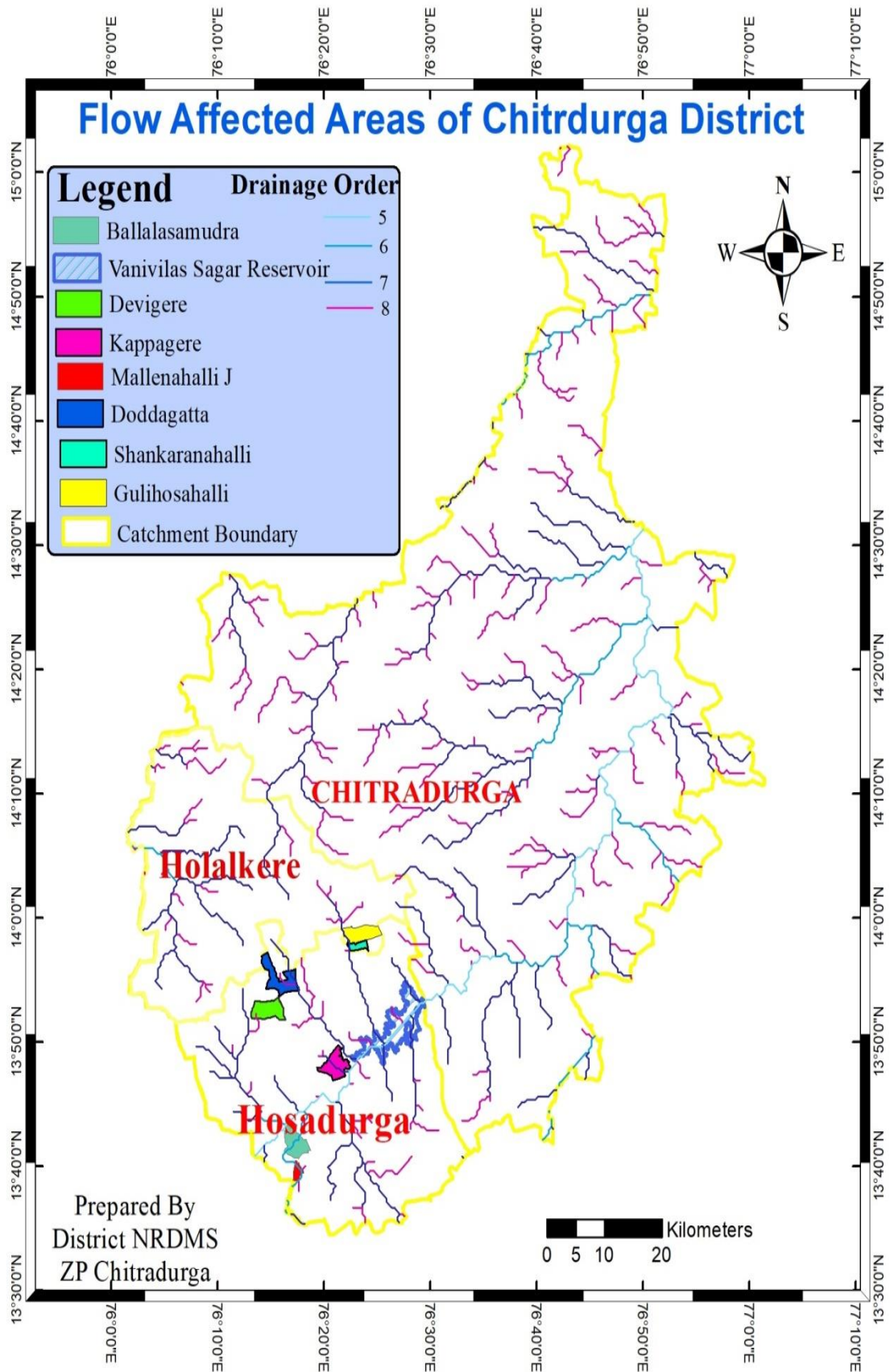


Figure 6. Flow-affected areas (Drainage) of Chitradurga District

- Photographs of events/field visits.



Figure 7. Delivered a special lecture on "Role of Communities in Groundwater Conservation" as a resource person, organized by the Department of Social Work, PG Centre, Ramanagara, Bangalore University. on 18/07/2025