Chapter - IV
Drought

CHAPTER IV

Drought

In this chapter, issues related to impact of drought, drought management, response and relief measures are discussed. The State Government did not bring out region specific guidelines for management of drought though the State had experienced extensive drought regularly. Though the State was the first to establish the Drought Monitoring Cell way back in 1988, the weather monitoring system was flawed with deficiencies such as non-functional equipment, non-installation of soil moisture sensors. The State Government did not have sufficient details regarding socio-economic factors like decline in dairy production, industrial and energy production losses, and the adverse impact on environment.

The efforts of the State Government in managing drought were not comprehensive as preparedness and mitigation measures like forecast mechanism, water conservation, rainwater harvesting, regulating groundwater extraction *etc*., were inadequate. The water supply project taken up for drought mitigation covering two of the test-checked districts (Chikkaballapura and Ramanagara) was inordinately delayed due to frequent changes in design and alignment. The achievement in completion of the items of work in the test-checked districts was insufficient.

Relief employment was provided through MGNREGS only to 2.39 *per cent* of the households in drought affected areas, which was very meagre and thus, did not present an economic rationale for interventions in drought response, relief and mitigation measures.

4.1 Introduction

Drought is a natural hazard and one of the most disastrous among the different natural hazards, as it severely affects all the sectors of society. Its impact, *i.e.*, the damage to the ecology, disruption of socio-economic conditions of communities, the long-term effects of malnutrition on health and morbidity *etc*., are generally non-structural and difficult to quantify and can be reduced only through mitigation and preparedness.

The National Commission on Agriculture in India had classified (1976) drought into three types: meteorological, agricultural and hydrological. Meteorological drought is defined as a situation when there is a significant decrease from normal precipitation over an area (*i.e*., more than 10 *per cent*). Hydrological drought results from prolonged meteorological drought resulting in depletion of surface and sub-surface water resources. Agricultural drought is a situation when soil moisture and rainfall are inadequate to support healthy crops.

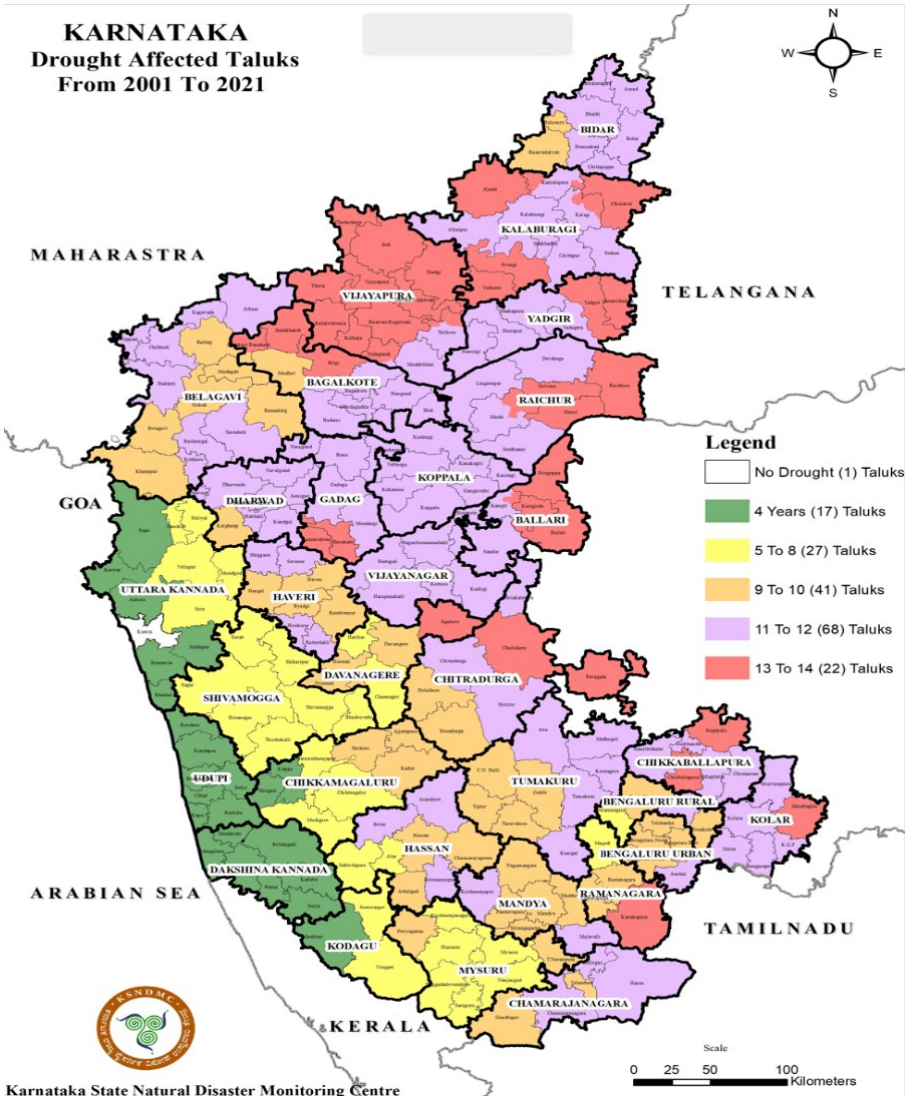
4.2 Drought profile of the State

Karnataka is an agrarian State with more than 70 *per cent* of the people depending on agriculture and most of the cultivable area is rain-fed. Karnataka ranks next to Rajasthan concerning drought. Drought in the State is a common phenomenon due to spatial and temporal variation in rainfall within the region and within the seasons as well. Due to this variability, both spatially and

temporally, different regions are simultaneously prone to disasters like floods and drought in the State. As per the data available with KSNDMC for the period from 2001 to 2022, the State was affected by drought for about 15 years.

Due to sufficient/excess rainfall since the year 2019, the State has not been subjected to drought during 2019-23. The map showing the frequency of drought occurrence during the years 2001 to 2021 is depicted in **Chart 4.1** below.

Chart 4.1: The map showing the frequency of drought occurrence during the years 2001 to 2021



During the period 2017-2023 covered in the performance audit, while the State was affected by severe drought during the year 2018, the intensity of the drought during 2019 was comparatively less. The number of taluks notified as drought-affected under the test-checked districts is shown in **Table 4.1.**

Table 4.1: Number of taluks affected by drought in test-checked districts

District	Total number of taluks	Number of taluks affected	
		2018	2019
Belagavi	14	10	1
Chikkaballapura	6	6	3
Dakshina Kannada	7	5	0
Davanagere	7	6	1
Haveri	8	7	0
Kalaburagi	11	7	3
Kodagu	3	3	0
Ramanagara	4	4	2
Shivamogga	7	4	0

Source: Information furnished by Revenue Department.

Similarly, the year-wise data on the number of taluks affected by drought during 2001-2022 is shown in **Appendix 4.1**.

Audit observed that the taluks under the districts covered under western ghats which used to receive average rainfall over 3000 mm were also distressed by drought, thus, evidencing ineffective mitigation measures.

4.2.1 Drought declaration

Drought declaration signifies the beginning of Government response to conditions representing a drought situation. The Drought Manual brought out by the GoI specified a detailed modality for monitoring and determination of spatial expanse and intensity of drought based on objective parameters, to be further established on the basis of ground truthing through field verification. State Government was to adhere to the stipulations of the manual for an objective, transparent and timely declaration of drought.

Of the six years covered under the PA, State had encountered drought during the years 2018 and 2019. During 2018, while 100 taluks were declared drought hit in the Kharif season, the number of taluks affected with drought increased to 156 during the Rabi season. The effect of drought continued till the Kharif season of 2019 wherein 49 taluks were declared by State Government as drought affected.

4.2.2 Impact of drought

The drought severely impacts the economic, environmental and social sectors at macro and micro levels, both directly and indirectly. The impact of drought has been linked mostly to the agricultural sector, as deficiency of precipitation over an extended period, results in depletion of soil moisture which in turn reduces crop production. Year-wise quantum of crop loss, as estimated by the State Government, during the years from 2013 to 2018[20] due to drought situation in the State is shown in **Table 4.2**.

[20] State did not face drought during 2020-2022.

Table 4.2: Estimated crop loss in the State due to drought

Year	Estimated crop loss (₹ *in crore*)		
	Agriculture	Horticulture	Total
2013	1,016.99	702.30	1,719.29
2014	2,706.17	882.90	3,589.07
2015	21,204.51	1,164.70	22,369.21
2016	22,533.58	1,757.28	24,290.86
2018	26,514.32	1,532.63	28,046.95
Total			**80,015.38**

Source: Memoranda furnished by the department.

As could be seen from the data above, there was a persistent rise in the quantum of loss year after year indicating the upsurge of vulnerability of the State to climatic variations. Besides, drought can result in household food insecurity, water-related health risks, loss of livelihood, *etc*. which affects agriculture as well as other sectors of the economy.

As a relief measure for the population affected by drought, the NDRF/SDRF norms permit the State Government to compensate the loss of crops due to natural hazards at the prescribed rates. The State Government supplemented the compensation additionally through its funding.

Audit observed that the compensation was disbursed through an exclusive portal called '*Parihara*', developed (2016) by the State Government and in the State, a total financial compensation of ₹1,625.39 crore had been paid to the drought affected landholders during the year 2018-19.

4.3 Drought Management

Besides the components of disaster management cycle, drought management in particular encompasses three vital components *viz.*, drought intensity assessment and monitoring, drought declaration and prioritization of areas for drought management, and development and implementation of drought management strategies. The primary responsibility of managing drought is that of the State Government and the Central Government supplements the efforts of the State Government in effective drought management and provides additional resources (foodgrains/financial assistance *etc*.) to combat the situation. The State Government should ensure that the declaration of drought is in accordance with the modalities and timelines prescribed so that relief/assistance can be provided to the drought-affected people on time.

4.3.1 Framework for drought management

As part of the NDM Guidelines, GoI brought out (September 2010) the 'Management of Drought' guidelines which were updated in December 2020. The GoI also had in place the Manual for Drought Management, 2009 which was revised in December 2016. This manual serves as a guide to the Governments and agencies engaged in the prevention, mitigation and management of drought.

Though the State experienced drought situation during most of the years in the past two decades, and the State Government was aware of the spatial and temporal variation of climate/rainfall among the various parts of the State, the

State Government/KSDMA did not bring out region-specific guidelines for management of drought. The topography of the State is distributed widely among vivid climatological regions like humid, sub-humid, semi-arid and arid besides heavy rainfall/dense forest western ghats and malnad region. Hence, there is a need for exclusive region-based guidelines stipulating suitable water harvesting/conservation measures, cropping pattern, contour cultivation methods, sub-surface barriers, irrigation systems, *etc*., to combat the hazards of drought.

The State Government did not furnish any reasons for not publishing region-specific guidelines for the State.

4.3.2 Deficient forecast mechanism

As provided in the Drought Manual, the State Government was expected to develop monitoring systems at the smallest administrative unit levels (*e.g.* Sub-division/Hobli/Taluk/Gram Panchayat etc.), to enable generation of sharper and credible observation data that are reflective of ground realities. However, the weather monitoring system in the State was flawed with deficiencies as discussed below.

4.3.2.1 Non-functional/malfunctioning weather monitoring equipment

The SDMP vests the responsibility of monitoring key indicators for drought declaration to KSNDMC. Though the Government established the Drought Monitoring Cell way back in 1988 in the State, the forecast mechanism was deficient due to under-performance of the installed equipment, as discussed below.

The KSNDMC installed Telemetric Rain Gauges (TRGs) and Telemetric Weather Stations (TWSs) in a phased manner (2009-2015) and refurbished the instruments at different intervals with an annual maintenance contract. On verification of functionality of these TRGs and TWSs, audit observed that the number of these equipment which remained non-functional witnessed an increasing trend, as shown in the **Table 4.3** below.

Table 4.3: Functionality status of TRGs and TWSs in the State

Year	TRGs		TWSs	
	Total installed	Non-functional	Total installed	Non-functional
Upto 2018	5,891	12	834	4
2019	6,240	31	834	5
2020	6,343	159	834	27
2021	6,358	246	834	51
2022	6,358	968	834	102
2023	6,358	2,770	834	463

Source: Information furnished by KSNDMC through email (Status as of 8 December 2023).

As of December 2023, the percentage of defective instruments was 43 and 52 respectively. However, effective action had not been taken by KSNDMC either to repair or replace the defective instruments to obtain the realistic data of weather parameters.

Audit also observed that KSDNMC had not revised the annual maintenance contract for 1,289 TRGs since March 2022 and for 670 TRGs since March 2023, which resulted in non-/malfunctioning of the instruments. Further, a total of 153 TRGs (costing around ₹68 lakh – average cost of ₹45,000/- each) were recorded as "stolen" and 138 TRGs were recorded as 'damaged'. Hence, data was not being recorded from these instruments. Neither had KSNDMC nor the maintenance agency taken any action to ascertain the reasons for theft/damage nor were any complaints filed with the police authorities. Photographs depicting the damaged equipment are shown in the **Exhibit 4.1** below.

Exhibit 4.1: Photographs showing damaged and non-functional weather forecast equipment

Source: KSNDMC.

During the exit conference (January 2024) the State Government attributed the deficiencies in forecast mechanism to absence of maintenance contracts for installed equipment and assured that the issues would be looked into in detail.

Apparently, vital decisions for disaster management are being taken in the State through a deficient forecast mechanism. Reply of the Government highlights its negligence in initiating timely action to renew maintenance contracts (lapsed two years back) or to install new equipment which are crucial for effectively monitoring weather parameters and planning preparatory measures.

4.3.2.2 Non-installation of soil moisture sensors

Measuring soil moisture and moisture adequacy in agricultural systems is one of the crucial components in disaster management, particularly for declaration of drought in a specific location. Soil moisture is highly dynamic in space and time and is measured using soil sensors or satellite remote sensing.

Though Karnataka was second to Rajasthan in encountering ill effects of drought recurrently, the Government had not taken measures for procurement and installation of soil moisture sensors in the State, which could help in region specific drought mitigation plans.

4.4 Preparedness Against Drought

4.4.1 Drought monitoring and preparedness

The preparedness for drought involves strategic planning and resource management to mitigate its impact on communities and ecosystems. Proactive measures are essential to ensure resilience and sustainability in the context of prolonged water scarcity situations. The flowing paragraphs reveal the omissions in this regard.

4.4.1.1 Absence of State Crisis Management Plan

As per Section 2.1.1 of the Drought Manual, 2016 of GoI, it was essential that along with a drought monitoring system, medium and long-term area-specific plans be prepared for drought proofing of susceptible areas. In addition, Crisis Management Plans[21] were to be formulated with care to deal with drought in the short term. Such well-conceived plans, when executed promptly, can go a long way in mitigating distress and disruption to the rural economy and society.

As provided in the Crisis Management Plan of the GoI, the parameters which may indicate an onset of drought conditions are (i) Rainfall (ii) Progression of sowing (iii) Remote sensing based Vegetative Indices, (iv) Soil Moisture Based Indices and (v) Hydrological Indices (Ground water drought index), which are to be monitored. Since crisis management plan relies upon forecast mechanism to predict, prevent and manage drought, deficiencies in forecast mechanism as discussed in preceding paragraphs could be attributable to non-preparation of an effective Crisis Management Plan.

Further, audit observed from the records made available that the State Government/KSDMA/SEC had not formulated the Crisis Management Plan in the State during any of the years (covered under audit) affected by drought.

The Government replied (August 2024) that Crisis Management Plan was formulated during 2023-24 by the Departments of Agriculture, Rural Development and Panchayat Raj and Animal Husbandry to manage drought. The reply thus is in agreement with the Audit observation that no crisis management plan was in place prior to 2023-24.

[21] Crisis Management Plan is part of overall spectrum of drought management but is focused on management interventions required during the time of crisis.

4.4.1.2 Ineffective Crop Weather Watch Group

The State Government had set up a Crop Weather Watch Group (CWWG) in the State to monitor the drought situation in the State on the lines of the CWWG at the national level. As per the Drought Manual of GoI, 2020, the CWWG was to meet once a week during the rainy season (June to September) and the frequency of their meetings was to be increased during drought occurrence to monitor the status of the drought. Audit observed that the CWWG did not meet as envisaged during the years 2017 to 2022. The number of meetings of CWWG varied between zero and six as against the required 16 meetings during the monsoon period of a year.

On scrutiny of the minutes of the meetings held during the drought year of 2018-19, audit further observed that the CWWG decided (28 July 2018) to meet every week to oversee the drought situation in the State. However, no meetings were held thereafter during 2018. Lack of adequate supervision and guidance by the CWWG resulted in affecting the preparedness and response to drought encompassing the State, including those districts/taluks which had faced severe rain/flood/landslides three months back.

The State Government stated (August 2024) that as the State experienced flood during the past four years and was drought hit only during 2023-24, the CWWG is actively functioning and met 14 times. Reply is not tenable as CWWG is required to meet to discuss issues arising not only during drought but also during other natural calamities. However, the reply is silent on shortfall in meetings of CWWG during drought year of 2018 where the estimated crop loss was to the tune of ₹28,046 crore.

4.4.1.3 Drought Management Information System

The Drought Manual stipulated that the State Government should develop a Drought Management Information System (DMIS) at the State level on different aspects of drought management, which was to be replicated at the district and taluk levels with information at each level supporting the DMIS at the higher level. The DMIS was to be updated every week during the period of drought.

The State Government/nodal department did not maintain the stipulated DMIS, either at the State level or district/taluk levels. As a result, the required information on key indicators of drought as well as the important interventions for drought relief like employment, support to farmers, food security, drinking water, supply of feed and fodder as well as health and hygiene were not captured and compiled. In the absence of DMIS, the Government lost the opportunity of maintaining crucial time series data on key indicators, for the State or a particular region, for future planning and preparedness.

The Government replied (August 2024) that information related to Drought relief had been collected from the districts during Kharif Drought 2023 and had been put on a GIS public platform, which is to be further refined.

4.4.1.4 Absence of Standard Operating Procedure

Drought Manual also prescribed preparing/issuing Standard Operating Procedures (SOP) for collection, updation of data related to the drought

variables. Besides, the SDMP also stipulated preparation, regular reviews and improvement of SOPs, protocols, *etc*., which were to complement its plan.

However, in the absence of DMIS coupled with infrequent meetings of CWWG, the required SOPs were not prepared/issued in the State either prior to or after declaration of drought. The drought declaration orders merely included instructions like providing employment under MGNREGS to landless labourers, supply of drinking water, protection of livestock, supply of fodder, *etc*., under SDRF grants.

4.4.2 Drought mitigation measures

Drought mitigation measures are to reduce soil erosion, augment soil moisture, restrict surface run-off of rainwater and improve the efficiency of water use. It involves a wide range of soil and water conservation measures and farm practices. Karnataka experienced a strange situation in 2018. While there was a shortfall of rain in many parts of the State, test-checked southern districts like Dakshina Kannada and Kodagu *etc.*, were affected by heavy rainfall coupled with devastating flood/landslides during August. However, these districts, along with other districts, were declared (December 2018) drought-hit during the Rabi season of the same year.

This is indicative of the fact that the State Government/district administrations did not initiate proper and adequate mitigative measures like water conservation, water harvesting, artificial groundwater recharging activities *etc*., as commented in subsequent paragraphs.

4.4.2.1 Absence of monitoring by the nodal department

Implementing the drought management measures would require a continuous flow of information from the village level to the highest level of decision-making in the State and a responsive administrative structure. The SDMPs prescribe departments to prepare and update a robust database of micro-level details on rainfall, reservoir/ lake water levels, surface water/ ground water, soil moisture, sowing/ crop conditions and socio-economic factors at the end of the South West and North-East monsoons.

However, the nodal department for preparation of information on the SDMP and management of disasters in the State was not in possession of any information regarding activities/measures taken up by the respective department/s [22] and hence, did not provide any information regarding the compliance with NDMA guidelines/manual. The nodal department, thus, did not ensure accountability and did not effectively monitor the activities/initiatives operationalised by other departments towards management of drought in the State. These measures could have gone a long way in reducing the severity of the drought.

[22] Agriculture, Rural Development and Panchayat Raj, Animal husbandry *etc.*

Thus, absence of effective coordination amongst the related departments to initiate necessary drought mitigation measures, led to protracted drought over the years in Karnataka.

4.4.2.2 Absence of a Mission/Task Force

The Drought Manual, 2016 of GoI recommended that the State Government/relief administration should set up a mission/task force for drought mitigation, which would not engage in actual day-to-day drought management but would be a body advising the State Government on policies and programmes. The mission/task force should include experts on water resources, agriculture, forestry and related subjects, senior Government officials dealing with these subjects and NGOs.

Audit observed that, as of 2022-23, the envisaged mission/task force had not been set up in the State for drought mitigation. Consequently, the mandated activities such as analysing the patterns of drought, distribution of impacts across sectors in the State, developing a database on the different indices of drought and suggesting policies and programmes for drought mitigation were not carried out.

In the exit conference, the Government stated (January 2024) that the Task Forces have been formed (November 2023) and strengthened for carrying out envisaged functions like analysis of drought patterns and preparation of database, ensuring water harvesting/conservation initiatives, *etc*.

The Government has given a misleading reply as Audit observed that the Task Force was not at all constituted at the State level as per the Drought Manual which stipulated formation of such a task force for advising on the issues of policies and programmes for drought management. The task force as referred to by the Government was constituted only at the Taluk Level but not at the State level, which is the Audit observation.

4.4.2.3 Inadequate drought risk and vulnerability assessment

The mission/task force on drought mitigation was required to conduct drought risk and vulnerability assessment for the State, which includes identification of drought-prone areas of the State, nature and severity of drought, vulnerable economic sectors, communities and individuals. The assessment was to evaluate the socio-economic cost of drought, by estimating crop losses, decline in dairy production, livestock losses, industrial and energy production losses and the adverse impact on the environment in the State. Such an assessment is important for presenting an economic rationale for interventions and identifying mitigation measures.

Though the data on the drought-prone areas, estimated crop loss and loss of livestock was available with the nodal department, the details of socio-economic factors like decline in dairy production, industrial and energy production losses and the adverse impact on environment in the State had not been evaluated and kept on record.

In the exit conference, the Commissioner, KSDMA stated (January 2024) that the data on socio-economic factors were being collected but not documented and instructions would be issued to document all the relevant factors.

4.4.2.4 Non-engagement of communities/organisations for drought mitigation

Wider the community participation, the greater the public awareness about drought issues and policies/regulations for drought mitigation are likely to be more acceptable in such a situation. The Drought Manual recommended encouraging involvement of different community institutions actively in drought mitigation. Further, the State Government and district administration were to involve NGOs in organizing drought relief. Non-Government Organizations (NGOs) and Civil Society Organizations (CSOs) have the advantage of local presence and community outreach which could be utilized for organizing distribution of relief assistance and implementing mitigation programmes. The State Government and district administration were also required to set up a coordination forum for NGOs and CSOs at the State and district levels respectively.

However, records made available showed that neither the State Government nor the district administrations involved communities, NGOs and CSOs in drought-proofing/mitigation activities. Thus, in the absence of participation by NGOs/CSOs, the Government lost opportunities to augment drought management mitigative measures like alternate cropping, water conservation techniques, *etc*., at the local/regional level.

The Government replied (August 2024) that henceforth communities will be actively involved in drought mitigation and management.

Recommendation 8: The State Government should formulate guidelines for mitigating drought considering geo-spatial climate variations and ensure effective coordination among all the stakeholders in enhancing drought mitigation efforts.

4.4.2.5 Water Harvesting and Conservation

Water harvesting and conservation refer to processes and structures of rainfall and runoff collection from large catchment areas and channelling them for human consumption. Conservation can be attempted through artificial recharge[23] of groundwater, rainwater harvesting and the other traditional methods, which are low-cost, community-oriented and environment-friendly.

However, such beneficial water harvesting and conservation measures were not attempted and adopted entirely in the State, as evident from the fact that test-checked Dakshina Kannada and Kodagu districts which were severely affected by floods were declared drought affected within a span of 3-4 months in the year 2018.

Though the Government enacted amendment to an Act[24] mandating water harvesting, audit observed that the jurisdiction of the Act was limited only to

[23] Soil conservation and artificial recharge structures include contour bunding, contour trenching, contour cultivation, bench terracing, graded bunding, gully plugging, check dams, nalla bunding, percolation tanks, injection wells, *etc.*

[24] Bangalore Water Supply and Sewerage Board Act, 1964 (August 2009).

Bengaluru urban area. Similar action towards water harvesting had not been taken anywhere in the State.

The Government replied (August 2024) that the Departments of Urban Development, RDPR and Water Resources would be requested to look into the matter and take appropriate action in this regard.

4.4.2.6 Artificial recharge of groundwater

Many States have implemented schemes for artificial recharge to groundwater and water conservation through sustainable water management practices viz., Jalyukt Shivar Scheme in Maharashtra, Sujalam Sufalam Jalsanchay Abhiyan in Gujarat, Mukhyamantri Jal Swavlamban Abhiyan in Rajasthan, Mission Kakatiya programme in Telangana *etc*.

However, the State of Karnataka did not formulate any such innovative schemes on artificial recharge to groundwater and water conservation.

Audit observed that the Central Ground Water Board had prepared a conceptual document "Master Plan for Artificial Recharge" which gives the information on areas feasible for recharge, number and type of recharge structures feasible taluk wise. The State Government can use this document to devise pan-Karnataka schemes on artificial recharge and water conservation. However, before construction of any water conservation and artificial recharge structure, site-specific technical feasibility/viability may be checked by technical experts.

4.4.2.7 Laxity in regulation of Groundwater extraction

Groundwater levels are also affected due to over extraction, poor recharge, either due to lack of adequate rainfall or poor water conservation practices. As a result, water availability in borewells and open wells diminishes substantially. Declining groundwater level is the main indicator of probable drought conditions.

The State Government enacted (April 2011) the Karnataka Ground Water (Regulation and Control of Development and Management) Act, 2011 and established (March 2012) the Karnataka Groundwater Authority (KGWA) for the whole of the State. The Act mainly focuses on regulation of ground water in notified areas/blocks. It is pertinent to state that the All India Performance Audit Report of CAG on Ground Water Management and Regulation (Union Report No. 9 of 2021) points to the variation between the Karnataka Act and CGWA guidelines and stresses on uniformity of both. The Act, therefore, needs to be modified and reoriented based on the CGWA guidelines to ensure stringent regulation and control groundwater extraction in Karnataka.

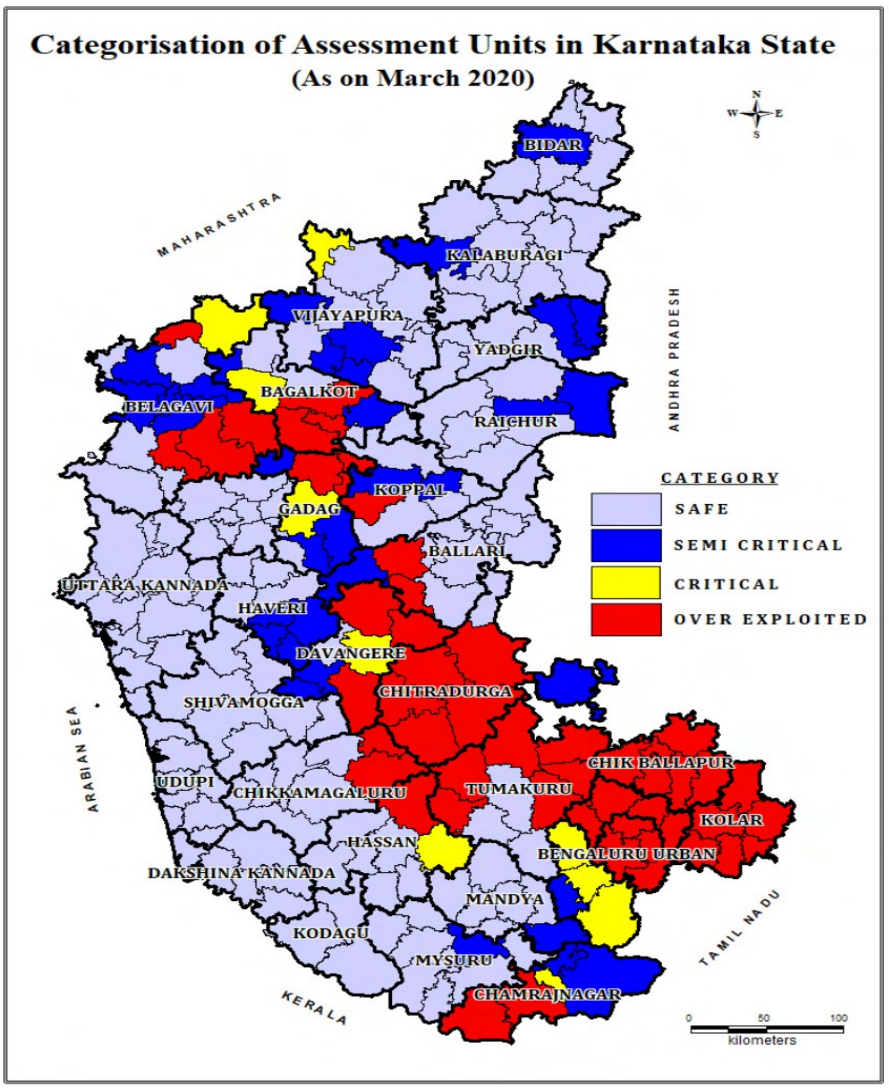
Audit observed that the KGWA could not control inordinate extraction of groundwater, though the State was affected by recurrent drought hazard in as much as it:

- could not control illegal and inordinate extraction of groundwater for commercial purposes through private water tankers;
- Neither possessed the time-series data on the number of borewells in the State nor data on the total number of borewells drilled in the water distressed notified taluks;

- ❖ Did not maintain data on high-rise buildings and groundwater extraction therefrom.
- ❖ Did not adhere to/enforce the norms prescribing a minimum distance of 500 meters between two borewells.

The laxity in groundwater regulation resulted in a persistent increase in notified groundwater distressed taluks from 35 in the year 2012 to 45 in the year 2020 indicating a drift towards the danger of water extinction due to over-exploitation of groundwater. District-wise status of groundwater extraction is shown in **Exhibit 4.2** below.

Exhibit 4.2: District-wise status of groundwater extraction



Source: KSNDMC.

The number of taluks notified as groundwater distressed in the test-checked districts is shown in **Table 4.4** below.

Table 4.4: Groundwater distressed taluks under test-checked districts

District	Number of taluks notified as groundwater distressed			
	2012	2015	2017	2020
Total taluks notified in the State	***35***	***30***	***43***	***45***
Belagavi	4	1	3	3

District	Number of taluks notified as groundwater distressed			
	2012	2015	2017	2020
Chikkaballapur	5	5	5	6
Davanagere	1	1	3	2
Ramanagara	2	1	2	2
Total (% with reference to notified taluks)	**12 (34)**	**8 (27)**	**13 (30)**	**13 (29)**

Source: Triennial data furnished by KGWA.

State Government or the district administrations had not taken effective measures for water conservation/harvesting and prevent over-exploitation of groundwater. Instead, the State/district authorities resorted to drilling borewells in more numbers extracting groundwater besides obtaining water from borewell owners for supply through tankers during drought periods. This further aggravated the stressed groundwater levels.

Lack of preparatory/mitigative measures to conserve available water through various procedures and uncontrolled extraction of groundwater contributed to the severity of drought during the years of poor rainfall.

The State Government stated (August 2024) that the Departments of Urban Development, RDPR and Water Resources would be requested to look into the matter and take appropriate action in this regard.

Recommendation 9: The State Government should emphasise on measures for water conservation and water harvesting along with enforcing regulations on unchecked groundwater extraction.

Laxity in drought mitigation - a Case study of Chikkaballapura district

As discussed in the preceding paragraphs, Chikkaballapura was one of the districts that was always prone to drought hazards. Consequent to over-exploitation of groundwater, all the taluks of the district were notified as groundwater distressed. This required the State Government and district administration to address the needs of the district and mitigate the impact caused by drought. Accordingly, the State Government was required to address the problems in drought prone eastern districts of Chikkaballapur and Kolar, which did not have dedicated water supply schemes, and other needy areas of Hassan, Chitradurga, Tumkur, Ramanagar and Bengaluru Rural Districts. An administrative approval was accorded (February 2014) to divert 24.01 TMC of water from west flowing streams to cater to the drinking water needs and filling of water bodies in these districts. The original project cost of ₹8,323.50 crore as per approved DPR (July 2012) was revised to ₹12,912.36 crore (February 2014) and further revised to ₹23,251.66 crore. The project which was scheduled for completion by 2023-24 remained incomplete as of August 2023 with a total expenditure of ₹14,076.15 crore (financial progress - 60 per cent).

*Insofar as the test-checked districts were concerned, the project envisioned providing 5.093 TMC for drinking water and tank filling (Chikkaballapur) and 1.834 TMC for drinking water (Ramanagara). The project was flawed with improper planning, resulting in frequent changes in design/alignment of the project due to non-availability of land and inordinate delay in implementation. The status of items of works proposed and completed in the test-checked districts is shown in **Table 4.5**.*

Table 4.5: Status of completion of work in test-checked districts

Item of work	Chikkaballapura		Ramanagara	
	As per DPR	Completed	As per DPR	Completed
Length of pipeline (Kms.)	69.87	0	4.50	0.50
Land acquisition (Acre-Guntas)	131.33	0	7.13	0

Source: Information furnished by Visvesvaraya Jala Nigam Limited.

Thus, the objective of providing dedicated drinking water supply to the drought-prone districts was not achieved even after 10 years of commencement of project construction. The completion of the project, therefore, remained a distant dream considering the targeted items of work vis-à-vis the achievement.

4.4.3 Response and relief measures against drought

Drought relief and response measures need to be planned and implemented as soon as the distress signs of drought are visible. It is necessary that these measures are undertaken promptly so that it would mitigate the hardships faced by the people. Though these measures are sector-specific, they require immense inter-departmental coordination.

4.4.3.1 Absence of drought relief measures

Audit observed that while declaring the drought in the State, the districts were generally instructed to initiate measures towards providing employment under Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), drinking water supply, fodder supply and livestock protection, *etc.*, as per the SDRF norms.

The nodal department was not in possession of comprehensive details on any of the above relief measures either for the State as a whole or at the district level, except for funds released for financial compensation towards crop loss. Audit analysis of the data hosted on the official website of MGNREGS disclosed that additional employment provided to distressed rural population during 2018-19[25] was meagre at 2.39 *per cent* of the total registered households in the State. In respect of test-checked districts, the additional employment provided varied between zero and eight.

Details of additional employment provided under MGNREGS in the State and test-checked districts during the drought season of 2018-19 are shown in **Table 4.6** below. While no additional employment was provided to any of the households in the districts of Dakshina Kannada, Kodagu and Shivamogga, it was less than one *per cent* in Belagavi and Haveri districts.

Table 4.6: Details of additional employment provided under MGNREGS in the State and test-checked districts during the drought season(2018-19)

District	Total registered households	Households given employment of 100-150 days	Households given employment of 100-150 days in drought affected areas	Percentage
Belagavi	7,77,607	5,968	5,967	0.77
Chikkaballapura	2,21,327	5,066	5,066	2.29
Dakshina Kannada	1,62,772	902	0	0
Davanagere	2,30,319	9,176	9,176	3.98
Haveri	2,64,324	1,647	1,647	0.62

[25] Only year under the audit period during which State encountered drought.

District	Total registered households	Households given employment of 100-150 days	Households given employment of 100-150 days in drought affected areas	Percentage
Kalaburagi	4,10,512	5,028	5,028	1.22
Kodagu	86,917	402	0	0
Ramanagara	1,97,753	15,163	15,163	7.67
Shivamogga	2,38,908	2,518	0	0
Karnataka	**78,67,647**	**1,98,947**	**1,88,161**	**2.39**

Source: Official website of MGNREGS.

Besides, audit also observed that additional employment of 100-150 days was generally given to registered households during all the years, of which the percentage varied between 1.87 and 3.02 during the years 2019-20 to 2021-22, as shown in the **Table 4.7** below.

Table 4.7: Details of additional employment provided under MGNREGS during non-drought years

District	Percentage of additional employment provided		
	2019-20	2020-21	2021-22
Belagavi	2.37	4.47	5.07
Chikkaballapura	2.92	0.00	0.00
Dakshina Kannada	1.45	1.29	0.00
Davanagere	1.26	3.11	3.30
Haveri	2.43	2.73	5.11
Kalaburagi	1.91	1.61	3.23
Kodagu	1.15	1.08	0.13
Ramanagara	9.20	0.06	0.05
Shivamogga	1.71	1.81	2.05
Karnataka	**2.65**	**3.02**	**1.87**

Source: Official website of MGNREGS.

The Drought Manual issued by the GoI envisaged tax waivers and concessions as measures towards response and relief against drought. However, the State Government did not provide sufficient relief to drought affected population through any sort of tax waivers and concessions like granting remission of land revenue, postponement of the recovery of dues from the farmers towards water, irrigation and electricity charges, or any other dues related to agriculture, converting short-term loans and rescheduling current instalment of medium-term loans, waiving education/examination fees for the students in Government schools located in drought-affected areas, *etc.*

Thus, it can be observed from the tables (4.6 and 4.7) above that additional employment provided during the drought year of 2018-19 to 2021-22 ranged between 1.87 and 3.02 percentage.

The State Government stated (August 2024) in the context of waivers and concessions that it has ensured restructuring of eligible farmer loans as per RBI master direction on relief measures.

Recommendation 10: The State Government should conduct a comprehensive water audit to address demand-supply gaps as part of the mitigation measures and make it mandatory to conduct borewell census at periodic intervals.