DROUGHT MANAGEMENT

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***Abstract*: There were about 25 major famines across India in latter half of the 19th century. The Famines continued until independence in 1947 with the Bengal famines of 1943-44, which affected 3-4 Millions People. Drought is a climatic disorder characterized by deficit of moisture. The National Commission on Agriculture has defined and classified drought as meteorological drought, Hydrological drought and Agricultural drought. The drought monitoring cells are established at State level to control the drought situation. The drought mitigation measures as providing works under Employment Guarantee Scheme with timely payment, Rationing of food and water, Fodder camps for cattle and necessary medical facilities are arranged wherever required. Even long term drought mitigation measures are also taken like, PM Krishi Sinchin Yojana, Water saving technologies as Drip and Sprinkler, Rain water harvesting, long term irrigation management, Afforestation, Crop insurance, Inter Basin transfer of water etc. The situation has been improved in agriculture productivity after Independence.**

***Keywords*: Drought, Monitoring, Mitigation Measures, Drought Indicators.**

I. INTRODUCTION

Drought is a natural hazard that differs from other hazards since it has a slow onset, evolves over months or even years, affects a large spatial extent, and cause little structural damage. Its onset and end and severity are often difficult to determine. Like other hazards, the impacts of drought span economic, environmental and social sectors and can be reduced through mitigation and preparedness. Because droughts area normal part of climate variability for virtually all regions, it is important to develop plans to deal with these extended periods of water shortage in a timely, systematic manner as they evolve

Drought in India occurs in areas with high as well as regions with meager rainfall. Water scarcity conditions in the Himalayan region are also not uncommon. Drought is no longer mere scarcity or the absence of rainfall, but related to inefficient water resource management. Analysis of incidence of droughts over the last two centuries in India does not show any increase in the incidence of droughts in recent years. However, their severity appears to have increased. India in 2002 experienced its worst drought in 20 years. However the probability of drought in India varies from once in 2 years in Western Rajasthan, to once in 15 years in Assam.

II. OBJECTIVE

1) To study the nature and classification of drought.
2) To study the drought monitoring at State level.
3) To study the preventive and mitigation measures.

III. METHODOLOGY

Only secondary data like books, Research papers, Report of GSG, MWRRA, DM Manual, National Disaster Management Guidelines are used for the present Research Paper.

IV. CLASSIFICATION OF DROUGHT

The National Commission on Agriculture 1976 and the Manual for Drought Management has defined and classified drought as below.

[1] METEOROLOGICAL DROUGHT:

Meteorological drought is defined as the deficiency of precipitation from expected or normal levels over an extended period of time. Meteorological drought usually precedes other kinds of drought. According to the legend, meteorological drought is said to occur when the seasonal rainfall received over an area is less than 25% of its long-term average value. It is further classified as moderate drought if the rainfall deficit is 26–50% and severe drought when the deficit exceeds 50% of the normal.

[2] HYDROLOGICAL DROUGHT

Hydrological drought is best defined as deficiencies in surface and subsurface water supplies leading to a lack of water for normal and specific needs. Such conditions arise, even in times of average (or above average) precipitation when increased usage of water diminishes the reserves.

[3] AGRICULTURAL DROUGHT

Agricultural drought, usually triggered by meteorological and hydrological droughts, occurs when soil moisture and rainfall are inadequate during the crop growing season causing extreme crop stress and wilting. Plant water demand depends on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth and the physical and biological properties of the soil. Agricultural drought thus arises from variable susceptibility of crops during different stages of crop development, from emergence to maturity.

V. EARLY INDICATORS OF DROUGHT

The following constitute 'early warning indicators':

[1] Delay in onset of Monsoon.
[2] Long 'Break' or Dry Spell during the Monsoon season.
[3] Insufficient rains and skewed spatial distribution, particularly during the sowing periods.
[4] Rise in price of fodder.
[5] Absence of rising trend in reservoir levels and / or reduction in stream flows and depletion rate of groundwater.
[6] Drying up of sources of rural drinking water supply.
[7] Declining trend in the progress of sowing as compared to total normal sown areas.
[8] Out migration of rural population.
[9] Increased deployment of water through tankers.

VI. SCOPE OF DROUGHT MANAGEMENT PLAN

Drought Management Plan (DMP) is designed to help reduce the time taken in mobilizing resources for an effective response and enable a harmonious relationship among stakeholders. The goal of DMP is to facilitate overall management of the drought situation in a structured and planned manner with the most efficient and optimum utilization of time, effort and resources so that adverse impact on the community is minimized. DMP helps in delineating roles and responsibilities of different Ministries/ Departments of the Government of India involved in drought management for mitigation, preparedness and for relief measures in managing the drought. DMP ensures better preparation and timely communication among stakeholders, which is critical in managing a drought. This DMP would be applicable to the entire territory of India encompassing all the States and Union Territories.

VII. MANUAL FOR DROUGHT MANAGEMENT,

A Manual for Drought Management was published by the DAC & FW in November 2009, which has been revised and updated in December 2016. The revised manual has come into effect from Kharif season of 2017.

The various indices and parameters appropriate for declaration of drought revisited and new indices like Standardised Precipitation Index, Vegetation Condition Index, Percentage Available Soil Moisture, and Hydrology Indices like Reservoir Storage Index, Stream-flow Drought Index and Ground Water Drought Index have been added. Limitations of each of these indices/parameters have been specified, wherever required. The magnitude of the drought event has been graded on a scale of values as "Moderate" and "Severe". Other factors such as extent of fodder supply, scarcity of drinking water supplies, demand for employment and migration of labourers, wage trends, food grains supply position etc. have been touched upon with the suggestion that State Governments may frame guidelines for objective evaluation based on monitoring mechanisms and baseline data.

The drought and the intensity of the calamity will be declared on the basis of findings from the field survey. Time-lines have been indicated for declaration of drought, namely, 30th October for Kharif and 31st March for Rabi.

VIII. DROUGHT MONITORING CELLS (DMCS) AT STATE LEVEL

The National Disaster Management Authority (NDMA) has given the guidelines for Management of drought 2010 for establishing separate DMCs with adequate staff under State Disaster Management Authority (SDMA). DMCs will undertake on a priority basis, the preparation of vulnerability maps for their respective states. Upgrade to decentralize drought management planning and monitoring system and create an opportunity for involvement of various stakeholders to undertake ownership of drought risk reduction.

The occurrence of drought is contingent on a number of factors such as cropping choices and agronomic practices, soil types, drainage and ground water profiles, to name a few. However, rainfall deficiency and spatial and temporal distribution, duration and dry spells are acknowledged as the most important triggers for drought.

About 68% of cropped area in India is vulnerable to drought, of which 33% receives less than 750 mm of mean annual rainfall and is classified as "chronically 14 drought-prone" while 35% which receive mean annual rainfall of 750-1125 mm is classified as "drought-prone". The drought-prone areas of the country are confined primarily to the arid, semi-arid, and sub-humid regions of peninsular and western India. The South West monsoon sets in, during the first week of June in the south-west corner of India and gradually proceeds towards the north-west region covering the entire country by the second week of July. The withdrawal of the Monsoon commences in the first week of September from the west and north and recedes from most parts of the country by

the month-end. Even when the overall rainfall in the country was normal, large variations were noticed across regions, within States, and sometimes even within districts.

IX. PREVENTIVE AND MITIGATION MEASURES

The containment and mitigation of the crippling impact of drought, and the eventual attainment of the objective of drought proofing of an area is contingent upon a proactive and relentless, but planned pursuit of a combination of structural / physical and non-structural long and short term measures. The short term measures are mostly reactive or relief centric in nature and mostly relate to in-season drought management through contingency planning and relief distribution. Long term mitigation measures are geared towards the adaptation to climate change, restoration of ecological balance through adoption of sustainable agronomic and conservation practices, sensible crop choices etc. Most of these measures are translated on the ground through soil and water conservation, watershed management, agronomic practices suited to rain fed agriculture and forestry programmes that seek to integrate soil, water and forestry management in an ecological compliant and sustainable manner.

X. SHORT-TERM DROUGHT MITIGATION MEASURES

[1] Short-term measures are oriented to reduce the damages of a drought event after its onset and mitigate effects of drought. They are included in plans to deal with state emergency situation prepared in advance (Drought Contingency Plan). Such plan would be implemented when monitoring system indicates drought like condition. Following administrative and financial measures for drought mitigation are provided.
[2] Work under Employment Guarantee Schemes to men and women and prompt payment of wages.
[3] Provision of Rationed subsidized food to each individual. Even rationing of water may be needed in future.
[4] Fodder camps are opened at different places as per the needs in a decentralized manner.
[5] Drought is due to scarcity of water. Arrangement for drinking water to human beings and cattle is made on daily basis for minimum essential requirement.
[6] During drought, there is a possibility of outbreak of epidemic. Necessary medical facilities would be required.
[7] Postponement/waiver of revenue and loan recovery as befitting would be necessary.
[8] Wastage of water in any form needs to be avoided.

XI. LONG TERM DROUGHT MITIGATION MEASURES:

Drought mitigation needs to be considered in the regular development programmes of the Centre and State Governments. Some of the most significant current national programmes that may have a decisive bearing on drought mitigation are noted below.
[1] Pradhan Mantri Krishi Sinchayee Yojana (Pmksy) such as Accelerated Irrigation Benefit Programme(AIBP), Har Khet Ko Pani (HKKP), Per Drop More Crop.
[2] Water Saving Technologies such as, Drip and Sprinkler.
[3] National Rain Fed Area Programme.
[4] Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS).
[5] Water Harvesting with Conservation on farm, and Rainwater Harvesting in Urban Areas.
[6] Improved Water Saving Farm Practices
[7] Long-Term Irrigation Management such as, Monitoring Reservoirs, Setting up Water Users Association, Conjunctive Use of Surface and Groundwater, Prevention of Evaporation Losses from Reservoirs and Inter-basin Transfer of Water.
[8] Afforestation
[9] Crop Insurance
[10] Community Participation in Drought Mitigation
[11] Climate Change Adaptation
[12] Public Distribution System (PDS)
[13] Crop Management Practices and Awareness and Capacity Building

XII. MONITORING OF DROUGHT MITIGATION

The State Government /State Executive Committee (SEC) may consider periodic review of the progress of drought mitigation activities of different departments. The SEC should cause the formulation of holistic drought mitigation plans at least for vulnerable districts.

XIII. IMPACT ASSESSMENT AND EVALUATION

States should consider evolving mechanisms for monitoring and impact assessment of drought mitigation programmes/activities periodically.

XIV. WATER MANAGEMENT

The first step in water resource management is estimation of the availability and demand for water from the Gram Panchayat upto the district level on the basis of the consumption needs for drinking, agriculture, industry etc. All follow up measures aimed at

conservation, augmentation and sector-wise prioritization of water supply emerges from an accurate estimation of demand and availability.

XV. DOCUMENTATION OF BEST PRACTICES

The best practices in drought mitigation implemented in different parts of the State need to be documented and showcased to all the stakeholders in order to replicate the same in other parts of the state.

XVI. CONCLUSION

The British Government in India had to constitute the Famine Commission to seek advice for struggling drought situation because of the successive famines of the last quarter of 19th century. After Independence there has not been a single decade without drought year. The years 1970-72, 1986-88, 1991-92, 2001-03, 2012-13 and 2014-16 have been recognized as severe drought years in Maharashtra. The situation has been improved remarkably in post-independence. The investment in water storage works, PM Krishi Sinchan Yojana, Water saving technologies, afforestation, Water harvesting, Crop insurance, improvement and availability in quality inputs, focus on research and extension led to increase agriculture productivity. This development has made the country self-sufficient in food production. Even India is now exporting agricultural produce in the world.

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