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SOCIO- ECONOMIC AND ECOLOGICAL IMPACT OF DROUGHT IN INDIA AND PREPAREDNESS STRATEGIES TO COMBAT

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ABSTRACT:

Water is an essential resource for survival of all living beings and its importance is realised in various sectors. About 35 percent of total agricultural land in India is irrigated and 2/3 of the cultivated land is entirely depend on rainfall. Drought occurred in the past as well at present; but its frequency has increased in recent years due to human activities in turn impact on nature and climate. Among the natural calamities, drought is the most disastrous and effects on untold various miseries.

Drought is a climatic animosity characterised by deficient supply of moisture. India experiences droughts when the southwest (s/w) monsoon remains weak. Thus, failure of rains from South West monsoon results in occurrence of drought in the Indian territory. Indian region experiences drought in one part of the country or the other almost every year and it affects about 50 million population.

Drought is a natural hazard which can impact on economy, social health, environment and people's wellbeing and their livelihood. It is a complex and slow process of ecological challenge, that affects crop failures and cause for decline in agricultural productivity and consequently provide a route to social problems. Water conservation is the best way to mitigate the drought and is to be used wisely with utmost care. Considering the increase in frequency of droughts in different parts of India, it is necessary to shift in public policy from drought relief to drought preparedness and mitigation measures.

KEY WORDS: Concept of drought, socio-economic & ecological impact drought, and strategies to combat.

INTRODUCTION:

Water is an indispensable resource for existence of any life on earth. People need water to drink, to grow food, industrial use, to clean and bath etc. About 35 percent of total agricultural land in India is irrigated and 2/3 of the cultivated land is entirely depend on rainfall. Moreover, water and rainfall distribution vary from region to region, some regions are ever arid and some other receive excess rains. Excess of it can cause calamity and lack of it causes for disaster. Among the various natural calamities, drought is most disastrous and effects on boundless miseries on the living organism and environment.

The Indian sub-continent experience average annual rainfall i.e., about 1200 mm. The slopes of Western ghat receive highest quantity of annual rainfall i.e.,8500 mm., and North East states about 10000 mm. But on and average of the geographical region of India is vulnerable to droughts. Drought occurred in the past as well at present; but its frequency has increased in recent years due to human activities on nature.

Drought is one of those natural events that affects not only the people but specially agriculture of the area and threats to people's livelihood and socio-economic development. Thus, it is a serious and deadly natural calamity.

Drought is a climatic anomaly characterised by deficient supply of moisture. India experiences droughts when the southwest monsoon remains weak. The Indian states that face the most droughts are Rajasthan, Telangana, Gujarat, Andra Pradesh, Chhattisgarh, Jharkhand, Uttar Pradesh, Madhya Pradesh, Maharashtra, Odisha, etc. India has experienced 22 large scale droughts till the end of 2013.

Drought means; when the level of precipitation (rainfall) is less than 50 to 75 percent of the normal South-West monsoon. It is an extended dry period in the natural climate cycle that can occur anywhere and its effects can be seen on various aspects such as vegetation, human, animals, and eco-system of the society etc. National Integrated Drought Information System (NIDIS) defines it is a "deficiency of precipitation over an extended period of time (generally a season or more) resulting in a water shortage". In simple drought is a prolonged period abnormally low rainfall leading to a storage of water affecting badly on growing and living conditions. Indian region experiences drought in one part of the country or the other almost every year and it affects about 50 million population. It is also estimated that; the impact of severe droughts on India's GDP to be around 2 to 5 percent annually, and 55 million people are affected by droughts every year (WHO).

The worst drought was faced by the country in the year 1877, with Indian Summer Monsoon Rainfall (ISMR) deficiency of 33 Percent followed by 1899 with 29 percent deficiency, 1918 with 25% deficiency, 1972 about 24% deficiency and 2002 nearly with ISMR 19 percent deficiency, in the year 2023 about 36 to 40 percent deficiency. In India; between 1970 to 2018 about 18 metrological and 16 hydrological droughts occurred.

OBJECTIVE OF THE STUDY:

1)To understand and analyse the concept of drought

2)To explore the social impact of drought

3)To examine the economic effects of drought

4) To investigate environmental impact of drought

5) To suggest the measures for combating the drought

Data base and Methodology: This research paper is mainly based on secondary source. The data collected from various sources like research articles, books, journals, magazines, theses, Government reports, website e-mails, news, and newspapers etc.

TABLE-1

VERIOUS RANGES OF RAINFAL IN INDIA

Srl. No.	Mean annual rainfall ranges	Classification of rainfall	Percentage
1	Less than 750 mm.	Low rainfall	33 Percent
2	750 mm to 1125 mm.	Medium rainfall	35 Percent
3	1126 mm to 2000 mm.	High rainfall	24 Percent
4	Above 2000 mm.	Very high rainfall	08 Percent

Source: Drought 2002, A Report; Ministry of Agriculture, GOI

DROUGHTS IN INDIAN STATES AND ITS AFFECT ON POPULATION

Srl. No.	Year of Droughts	Droughts affected states	Number of people affected
1	1966	UP, Gujarat, Bihar, TN, Orissa, Rajasthan	Affected on 50 million people
2	1969	Haryana, AP, MP Karnataka	Affected on 15 million people
3	1970	Rajasthan and Bihar	Affected on 17.2 million people
4	1972	UP, HP and Rajasthan	Affected on 50 million people
5	1979	Eastern Rajasthan, Punjab, HP, & UP	Affected on 200 million people
6	1982	Punjab, Himachal Pradesh, and Rajasthan	Affected on 100 million people
7	1983	Rajasthan, Orissa, Karnataka, Kerala, Bihar, TN, and WB	Affected on 100 million people
8	1987	All Eastern and North Western India	Affected on 300 million people
9	1992	MP, Gujarat, Rajasthan, Bihar, and Orissa	Data Not Available
10	2000	MP, Orissa, and AP	Affected on 100+ million population
11	2005	Gujarat, AP, and Rajasthan	Affected on 90 million people
12	2010	MP, Gujarat, Maharashtra, & Rajasthan	Affected on 95 million people
13	2016	UP, Gujarat, TN, Kerala, Karnataka, Bihar, & Haryana	Affected on 330 million people
14	2022	Orissa, UP, WB and Gujarat	Affected on 50 million people
15	2023	Northern Karnataka, Kerala, TN, Gujarat, AP, Rajasthan, Maharashtra, & Odisha	Affected on 150 + million people

Source: Source collected from various sites and google articles (Compiled source from various resources)

SOCIO-ECONOMIC IMPACT OF DROUGHT IN INDIA:

Drought affects all parts of our lives and environment in many ways; since water is such an important part of our various activities. The impact of drought can be grouped as social, ecological, and economic activities of mankind. Drought is a threat to wide range of man and living organisms and has a huge impact on ecology as well. The drought condition impacts the country's economy drastically and farmers are badly affected. Drought caused decline in crop growth and production has ultimately hampers the food supply and GDP of the nation.

Climate change (global warming) plays a significant role in the cause of many droughts. Societal collapses, conflicts and instabilities have happened together due to droughts. Moreover; when we do not have enough water many people and many things of activities will be affected in various ways. It is a natural hazard which can affect on economy, environment and people's wellbeing and their livelihood. The following are some of the important impacts of drought are as;

Socio- economic impact of drought on family: The agricultural sector is most affected by drought. The depletion of water availability significantly declines in crops and livestock productivity and adversely impacting on farmers income, quality of life and life style. Drought destroys the crop of farmers and this consequently effects on the income of the peasant class. Farmers sell their livestock with low price and this again effects on loss of income generating source of the farmers. There may be shortage of supply of food and fodder for animals and human beings. The social impact such as anxiety, and depression and other effects are due to economic losses. Drought also effects on trade and business and purchasing power of the people.

Impact of drought on poverty, crime, and unemployment: The occurrence of drought creates financial disruptions across farming community and brings huge economic losses and this will ultimately cause for poverty. Drought would have also adverse impact on employment opportunities to the farmers and allied farming communities. The unemployment rate would rise drastically since it would be impossible to engage in agricultural due to drought. The prices of agricultural products would increase immensely due to minimal production and a deficient supply of agricultural products.

Owing to drought most of the people would get unemployed, fumbling their income sources which would reduce their purchasing power and degrade their living standards. When there is poverty and unemployment; there will be well crime rate levels in the society. Poverty has been put forward as a decisive motive for crime. Individuals lacking the basic means of subsistence are more to become involved in criminal activity. Economic theory of crime, originally introduced by Becker and said that; individuals like to become involved in criminal activities, when they experience a poverty and negative income shock.

Impact on fishery culture and fisher man, and tourism: Fisheries have important roles for food supply, food security, income generation and livelihood. Fishermen required profession for their livelihoods. Owing to the climatic changes and drought they face enormous challenges. Drought and climatic changes in the coastal waters affects the productivity of fishermen's eco-system, fish stock and fish migration routes. The drought, cyclones or any other natural disasters influence sustainable livelihood of fishermen's community.

The studies reveal that; disasters have a significant negative effect on tours and travels. Drought decline in tourist arrivals at the major tourist attraction places. This resulted in a loss of business, potential revenue generation and jobs. The hospitality industry is also vulnerable to the effect of drought and climate change.

Drought always threatens livelihood and quality of life: Lively hood is the job or other source of income that gives you the money to buy the things we need. According to Britannica dictionary- livelihood means a way of earning money to live. Hence, farming is the major source of livelihood for all the households. Agriculture contributes 15% of the National GDP, it employs over half the labour force and is the main source of livelihood for more than 2/3 of the population. Hence, due to scanty rainfall or drought affects the livelihood of agricultural and allied activities of many families.

Quality of life (QoL) means aims to capture the well -being; whether of a population or individual. This includes wealth, employment, education, physical and mental health, recreation and entertainment facilities, leisure time, safety and security and social belonging etc. Quality of life is a subjective and measure of our happiness. This is an essential component of many financial decisions.

Migration of the poor and labour class people: There is a positive relation between drought and temporary migration. Drought is a period of drier than normal condition, it often has the large impacts on the ecosystem and cause harm to the total economy. Metrological drought causes serious hydrological imbalance in the affected areas and crops will get spoiled and leads for migration of the labour and poor class population. This is happened owing to deficiencies in crop production and allied farming activities.

Food security is the major problem due to drought: Despite considerable progress in all fields like medicine, industry, finance, and health etc. In spite, many people suffer from hunger and malnutrition. Food security means; when all times have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Drought effecting agriculture and causes for

loss of production. Nearly ¼ th of the world's population does not have sufficient food for normal survival and about 1billion people become hungry every year.

Malnutrition and under nutrition are the result of drought: Of all the natural hazards drought results for greatest adverse impact on human population. Malnutrition means poor nutrition; in other words, it is deficiencies or excesses in nutrient or debilitated nutrient utilization. A balanced diet should provide enough nutrients like calories, protein, and vitamins, to keep us healthy. Undernutrition means lack of proper nutrition, caused by not having enough food or not eating enough food containing substances necessary for growth of health. Drought diminishes dietary and reduces overall food consumption, and leads to micronutrient deficiencies.

Health and health related effects of drought: Drought poses many and far- reaching health implications. Droughts are considered as most destructive and challenging climatic hazards. Evidences suggest that health is vulnerable to drought which caused for morbidity and early mortality. Several reviews of the effects of drought on health such as; diarrhoea, scabies, cholera, malaria, chikungunya, dengue etc. Viruses, protozoa and bacteria can pollute both ground and surface water when rainfall decreases. Drought can also cause long term public health problems and shortage of portable and poor quality of water.

Mental health implications are also associated with drought. It is the most severe for farmers and their families, an effect caused by the loss of livelihoods from reduced agricultural activity and loss of crops. The livelihood loss is a risk factor for the increase in anxiety and depression and ultimately this will cause for domestic violence, abuse, and suicide.

Relation between drought and starvation: There is co-relation between drought and starvation. Starvation means it is a severe deficiency in caloric energy intake, below the level needed to maintain an organism's life. Prolonged starvation can cause permanent organ damage and eventually death. It is believed that by using precipitation records; a drought may cause low agricultural yields and as a result food insecurity. Starvation is an extreme deficiency in caloric energy intake which imbalance between energy or nutrient supply and body utilization. Starvation is the deprivation of an exogeneous supply of calories to the energy demands of the body for basic metabolism and other activities

Agricultural drought causes for farmers debt: It is said that; Indian farmer is gambling with monsoon; and is often said that Indian peasant is born in debt, live debt and die in debt. In this background, natural calamities that affects farmers community cause enormous loss and destruction and caused negative impacts on life conditions of a farmer and his economy.

Agricultural drought is a situation where rainfall and soil moisture are inadequate during the crop growing season to support healthy crop growth to maturity causing crop stress. Indian agriculture witness almost every year natural disasters like droughts, floods and pest attacks and climatic variations and which makes the farmers life miserable. The shortfall in the rains causes droughts and drought like situations and farmers were trapped in debt.

Drought causes for suicide and increase in crime rates: In Karnataka agriculture is the major occupation and a total of 1,23,100 km sq. of land is cultivated constituting 64.6 of the total geographical area of the state. And about 25.67 percent are agricultural workers. In 2020 around 500 farmers died, 595 in 2021, 651 in 2022, and 412 in the current year 2023. Rural communities feel impact of drought much more than urban communities. Droughts induce stress disorder, anxiety, and depression among the people in general and farmers in particular and caused in suicide and crimes. The reason behind this is; drought reduce agricultural production, increase financial hardship, and reduce employment opportunities.

The National Crime Records Bureau (NCRB) said the states which are drought hit are reported a greater number of crimes. Thus, the increasing water crises in the country resulting disputes arising out of it are reflected in the latest National Crime Records Bureau. The disputes resulted in crime, clashes and even murders.

Ecological and environmental impact of drought: Drought affects various components of eco-system and environment. Bio-diversity depends on various forms of water, including moisture in soil and atmosphere for their survival. Drought affects the environment in many ways on animals, plants, flora, and fauna etc. There may be water scarcity, shortage of fodder for animals and human beings, this effects on the health conditions of living organisms. Shortage of water can affect soil chemical, physical and biological activities that are essential for plant and soil health. Environmental impacts include; wildfires, wind and soil erosion, destruction of fish and wildlife habitat etc.

IMAGES OF DROUGHT

Figure 1. Crops Drying, farmer in worry

Figure 2. Shortage of water to the streams and rivers

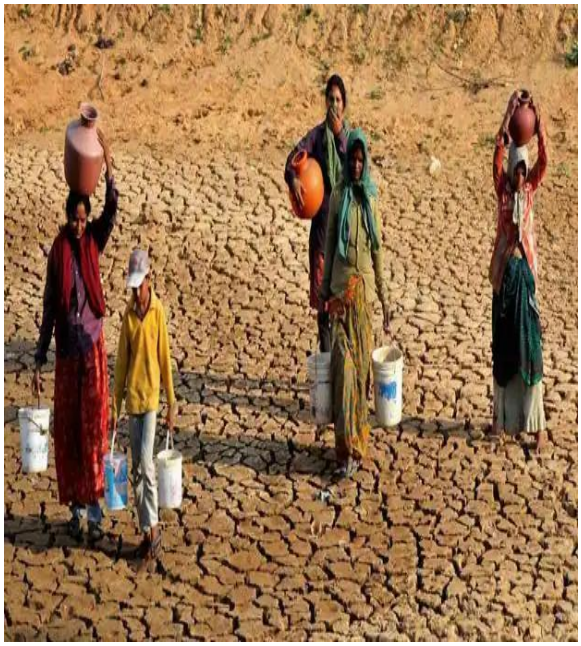

Figure 3. People in hunt of water

Figure 4. Helpless farmer

DROUGHT PREPAREDNESS MEASURES IN INDIA:

With the increasing population, climate change and water scarcity, drought mitigation will have important roles to play for sustained better livelihood of people. Drought needs prevention and priority for sustainable future and national betterment. Several policy measures are undertaken by the Government of India to help in building capacity for drought prevention, preparedness, mitigation, and management.

Apart from this; there are some other measures for drought disaster mitigation. Water conservation is the best way to mitigate the drought and water is used wisely with utmost care. Considering the increase in frequency of droughts in different parts of India, it is necessary to shift in public policy from drought relief to drought preparedness and mitigation measures. There are some of the important strategies to deal with drought are-

1)Designing of farming policies for countering droughts

2)Water conservation and rain water harvesting is the need of the hour

3)Afforestation or planting more and more trees

4)Increase in water storage capacity

5)Planned crop rotation system

6)Repair and rejuvenate of local water bodies where there is scanty rainfall

7)Integrated soil, forest, and water resource management

9)Recharging of ground water and water harvesting

10) Building and proper maintaining dams and reservoirs

11) To develop genetically modified crops or less water resistance crop

12) Cloud seeding or artificial precipitation

13)Developing water sources like micro dams, wells, and ponds

14) Education and awareness among the public and farmers

15) Promotion of crop diversification and universal use new irrigation technologies such as sprinkler and drip irrigation

16) Use of less water consumption crops or shift of cropping system from commercial to food crops

17) To develop agricultural research institutes and drought resistant varieties of crops

18) Conservation and management of water effectively

19) Protecting water against contamination

20) Diversification of agricultural practices

21) Effective and timely co-ordination among various ministries, departments, and organizations can enhance the drought management

22) Desalination and recycling of water i.e. use of sea water for irrigation and consumption

CONCLUSION:

Drought has large adverse impact on the livelihood, ecosystems, agriculture, economy, plant, and species etc. It is one of the major threats to people's livelihoods and causes harm to the economic development. In an increasingly vulnerable world, nations, communities, and individuals are suffering and facing numerous problems owing to drought.

No doubt; droughts are natural disaster that nobody can prevent, but we can prepare for the effects of this calamity to make less difficult as well more manageable. We should prepare for the effects of this natural disaster to make it less impact on society and environment.

Mankind is in a continuous struggle with a vast range of natural disaster. After independence droughts have received more attention of Government and policy makers than before. This calamity is mainly due to natural reasons but nowadays it is observed that increase in drought is due to human interference.

The advance in science and technology enhances drought monitoring capabilities. The strategies to mitigate drought are structural and physical such as growing appropriate crops, construction of dams and proper engineering projects etc. Along with these, non-structural measures such as; Government policies, natural resource operating practices, awareness among the public, public commitment towards protection and preservation of natural resources, knowledge development etc., may limits the adverse impacts of drought.

Comprehensive drought planning and proactive mitigation measures can lessen the impact of drought on individual, communities, and the eco-system. Proactive mitigation activities such as water conservation, reuse of waste water, scientific forest management, water pricing strategies, desalination etc., can reduce drought crises in India.

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