Ilkogretim Online - Elementary Education Online, 2021; Vol 20 (Issue 2): pp.3415-3426
http://ilkogretim-online.org
doi: 10.17051/ilkonline.2021.02.358

Study And Analysis The Water Crisis In Drought Prone Area

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ABSTRACT

The purpose of this investigation is to test some hypotheses about the water crisis in drought-prone areas. There are several different parameters that can be used to determine which places are prone to drought. In this section, we will talk about two different strategies. When the combined effects of many characteristics, such as rainfall intensity, periodicity of rainfall, ground water potential, and agricultural production, are taken into consideration, it is possible to distinguish between three distinct levels of drought severity. The current study makes use of secondary data regarding rainfall and areas that have been affected by drought. At the moment, the majority of regions make excessive use of the water resources at their disposal.

Keywords: Water, Drought Prone Area.

INTRODUCTION

A region is said to be experiencing drought when there is an abnormally prolonged and temporary decrease in the amount of available water. A drought can have catastrophic and long-term social and economic effects, the duration of which can range from a few months to many years, depending on the degree of water scarcity that it causes. This is a very gradual process. In most cases, it is brought on by an unfavorable water balance or a shortage of water that is insufficient to meet the typical requirements of agriculture, animals, or the human population. Droughts can be broken down into three categories: those caused by the weather, those caused by water, and those caused by agriculture. A meteorological drought occurs when the average amount of rainfall that occurs across a region on a monthly or seasonal basis is much lower than average. There is a hydrological drought present when there is a lack of water throughout an area, which leads to a

decrease in the amount of water that is accessible in surface water bodies and also causes the water table to drop. When a lack of water leads to the destruction of some or all of a region's crops and has a negative impact on agricultural production, this is known as an agricultural drought.

Drought prone areas

During the 18th and 19th centuries, India had some of its harshest and most severe droughts, which caused millions of deaths and contributed to significant famines across the country, including the Odisha famine of 1866, the Bengal famine of 1943, and the Bihar famine of 1873–1874. In India, the states of Maharashtra, Karnataka, Andhra Pradesh, Orissa, Gujarat, and Rajasthan have all been impacted by the drought. The majority of the people in these states relied on the rice crop produced during the winter season. As a result of the failure of the monsoon, several regions of Punjab and Haryana, as well as sections of Bihar and Jharkhand, are currently experiencing drought conditions. The Irrigation Commission in 1962 defined a drought-prone area as one that receives less than 10 centimetres of rainfall and even three-fourths of this amount is not received in 20 percent or more of the years that are taken into consideration; or an area in which 30 percent or less of the total cropped area is irrigated. Both of these criteria were met by the majority of the United States. Dry spells occurring during the rainy seasons and a highly uneven spatial distribution of rainfall are the primary factors contributing to the occurrence of droughts in India. The erratic nature of the monsoons, which can exhibit late onset and early withdrawals at times, is another contributing factor. There are several different parameters that can be used to determine which places are prone to drought. In this section, we will talk about two different strategies. When the combined effects of many characteristics, such as rainfall intensity, periodicity of rainfall, ground water potential, and agricultural production, are taken into consideration, it is possible to distinguish between three distinct levels of drought severity.

The following describes each of the three levels: I. In the western regions of Rajasthan and Gujarat, as well as western Uttar Pradesh and northwestern Madhya Pradesh, portions are experiencing extreme drought conditions. This accounts for 12 percent of the entire area that is prone to drought. II. The territories on the leeward side of the Maidan plateau, the Rayalaseema and Telengana regions of Andhra Pradesh, and the Marathwada and Vidarbha regions of Maharashtra are all experiencing severe drought conditions. This accounts for 42 percent of the entire area that is prone to drought. III. Orissa, the central-north Madhya Pradesh region, Chhotanagpur, Jammu and Kashmir, and central-east Tamil Nadu are the areas that are experiencing moderate drought conditions. This accounts for 46 percent of the entire drought-prone area. The second strategy disregards the severity of the drought and instead focuses on determining the precise spatial distribution of dry-prone areas. The overall land area in India that is under risk of drought is equal to 10.7 million square

kilometres. A year marked by drought occurs approximately once every five years on average.

Floods and drought

Both droughts and floods are now quite typical occurrences, and the fact that they frequently occur together creates a significant risk that cannot be eliminated but must instead be mitigated. There is the potential for the monsoon water supply to be diverted to regions that are suffering from a shortage of water. Additionally, this would assist in the creation of additional irrigational potential, the generation of hydropower, and the correction of regional imbalances.

The recurrence of drought and famines during the second half of the 19th century necessitated the development of irrigation to give protection against the failure of crops and to reduce large-scale expenditures on famine relief. Irrigation was developed to give protection against the failure of crops and to reduce large-scale expenditures on famine relief.

Floods in India

India is prone to experiencing floods on a regular basis. It has been observed that, although certain areas of the country are going through catastrophic floods, other portions of the country are going through drought at the same time. This is because different regions encounter different patterns of climate and rainfall. There has been a trend toward occupying the floodplains, which has led to damage of a more severe character throughout the course of time. This is a consequence of the rise in population as well as the development activity that has taken place. It is not uncommon for the uneven distribution of rainfall to generate severe flooding in parts of the world that are not typically vulnerable to such disasters. These regions include: As a result, floods are the natural calamity that the country experiences the most frequently.

The inability of the riverbanks to contain the enormous flows that are carried down from the upper catchments as a result of severe rainfall is the root cause of flooding. Erosion and silting of river beds, which leads to a reduction in the carrying capacity of river channels; earthquakes and landslides, which lead to changes in river courses and obstructions to flow; synchronisation of floods in the main and tributary rivers; retardation due to tidal effects; encroachment of floodplains; and haphazard and unplanned growth of urban areas are all factors that contribute to the severity of flooding. Cyclones strike certain regions of the country, primarily around the coasts of Andhra Pradesh, Orissa, Tamil Nadu, and West Bengal. These cyclones are frequently accompanied by extreme precipitation, which can result in floods.

OBJECTIVE

1. To conduct research in areas prone to drought.
2. To conduct research on the Experimental Investigation of the Current Water Crisis.

The drought-prone area includes:

1. I the rectangle formed by the lines from south Saurashtra Coast to Kanpur and then to Jalandhar (6 lakh sq km); a second drought zone that occupies most of the area in the leeward side of the Sahyadris stretching eastward upto 100 km of the east coast and southward upto a line joining Tumkur (Karnataka) and Chittoor; and a third drought zone that occupies the majority of (Andhra Pradesh) (3.7 lakh sq km)
2. specific isolated pockets covering an area of one million square kilometres; these include the districts of Coimbatore and Tirunelvelli in Tamil Nadu; Jhansi, Lalitpur, Banda, and Mirzapur in Uttar Pradesh; the Purulia district of West Bengal; the Palamau district of Jharkhand; and the Kalahandi district of Orissa.
3. The following are the most notable regions in the country that have been affected by drought: The Marathwada area in the state of Maharashtra is suffering from a serious lack of water, according to Jalna-Beed..

The areas of Marathwada that are now experiencing drought include the districts of Aurangabad, Nanded, Latur, Jalna, Beed, Parbhani, and Osmanabad, as well as Hingoli. Jalna is the district in the region that has been hit the most out of all the others. Chitradurga-Bijapur: The Chitradurga district of Karnataka state is one of the talukas that are struggling due to the drought, and North Karnataka is the region that has been impacted the hardest. When there is a drought in the northern region of Karnataka, the areas of Bijapur, Dharwad, and Hubbli along with Bagalkot are always the most severely affected.

Bikaner-Jaisalmer: The districts of Bikaner and Jaisalmer are the most popular tourist destinations in the Great Thar Desert. These two cities are famous for their camel safaris and beautiful sand dunes. Both of these cities, along with Jodhpur, Nagaur, and Barmer, are located in a region of Rajasthan that is prone to drought.

Saurashtra-Kutch: The Saurashtra region of Gujarat state is one of the drought-prone regions, while the Kutch region is the other. The Saurashtra region comprises of seven districts. The region of Kutch is well known for being a barren wasteland and for being one of the hottest places in the country. The Mahbubnagar-Khammam district in the state of Andhra Pradesh was identified as being in a drought-affected area in the year 2002. Its number of mandals that are declared to be in a drought-prone area increased as a result of the poor and delayed monsoon. Mayurbhanj-Balasore: In the Mayurbhanj-Balasore region of Orissa, a total of 30 districts have been categorised as being in a drought-affected area as

a result of the lack of rainfall. During the Orissa famine of 1866, the Mayurbhanj district was the area that suffered the most damage, although Balasore had the worst history.

Every living thing has an essential requirement for water to function properly. Because it is a significant national resource, it is extremely crucial to make the most of the water resources that are available while also conserving those resources. In order to effectively manage water, it is necessary to take into account both the current demand for and available supply of water. The majority of water comes from precipitation, especially rain. Rivers, canals, and tanks, in addition to subsurface resources such as wells and bore wells, are also potential sources of rain water. There is 97 percent water present in seas, 2 percent water present in icebergs, and just 1 percent water that is used by living things. One percent of this total is made up of water. Agriculture consumes seventy percent of the available water, while industry uses twenty-five percent and households use five percent. India is home to around 17 percent of the world's population and is responsible for providing 4 percent of the total water resources on the planet. In total, precipitation in the form of rain and snowfall contributes approximately 113000 cubic km of water to the environment, of which 72000 cubic km is lost to evaporation.

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METHODOLOGY:

The drought-prone tahsils located in the Jalgaon district of the Maharashtra State were chosen as the area to investigate for this project. The current study makes use of secondary data regarding rainfall and areas that have been affected by drought. The information comes from the organization's official website (Pune) Along with certain books, one can also get hold of the information that has been published in newspapers and magazines.

RESULTS AND DISCUSSION

Surface Runoff Water Resources:

According to Table 1, the run-off water resources in the tahsils that are prone to drought are not allocated equitably. Because the Ajanta and Hatti ranges are located in the southern region's surrounding territories, this region has a greater availability of water. In the meantime, the western and northern regions have fewer water resources. The reason for this is due to the fact that the northern and western halves lie in a windward orientation. As a result, these regions have a severe lack of available water. After taking into account the water that is lost through evaporation, the total annual average volume of water that is available in the region under study has been determined to be 2,326 million m3. In terms of the total volume of water, the region's freshwater resources have an average value of 2,326 million m3. This accounts for barely 0.12 percent of the total supply in India.

Table 1: Surface Run- off water resources (MCM).

Tahsil	2001	2010	2011	2020	2001-2020
Chalisgaon	197	425	415	643	409
Bhadgaon	32	66	61	87	66
Pachora	248	248	248	248	208
Erandol	75	209	132	262	153
Parola	126	367	221	339	208
Amalner	122	263	209	285	240
Dharangaon	83	83	211	194	159
Jamner	847	847	847	847	696
Muktainagar	96	240	172	201	187
Region	1115	2664	2416	3069	2326

Source: India Meteorological Department, Pune 2001-2020

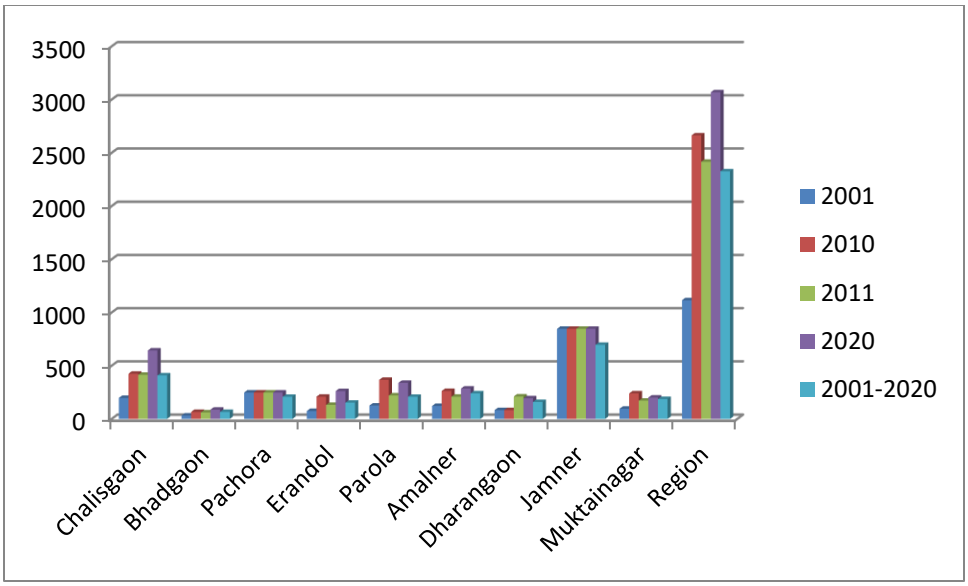

Fig .1 shows run-off water resources in the drought-prone.

Per Capita Water Availability

Because of rising levels of population, there is less water accessible on a per-person basis than there was just one year before. This trend is expected to continue for the foreseeable future. The growing need for water in urban as well as agricultural settings, as well as the development of the economy, are all contributing factors that are putting a strain on the available water supplies. This strain is putting a significant amount of pressure on the water supply. In the area that was the subject of the study, the volume of water that was available per person in 1981 was around 1638 cubic metres. As of the year 2011, this figure was approximately 1,096 m3 less than it had been. The gap between the amount of water that is required and the amount that is available has been widening at a startling rate over the past several years. A dramatic increase in people's need for water may be observed in the area that is the subject of this investigation. Between the years 1981 and 2011, it was discovered that the amount of water that was available on a per capita basis was negligible. In the year 2041, it is estimated that just 894 M3 of water will be accessible on a per capita basis. It suggests that there would be a lack of water for the population to contend with during these decades (Table 2). It has been found that the tahsils of Bhadgaon, Parola, and Amalner suffer greatly from a deficiency in the amount of water that is readily available.

Table 2 displays the available water supply on a per capita basis, broken down per tahsil (Source: Computed by researchers, 2015).

	Populatio					2021	2041

Tahsils	n & Water availability	1981	1991	2001	2011	Projected	
Chalisgaon	p	0.251044	0.329268	0.356808	0.394600	0.441952	0.500000
	W	382	382	382	382	382	382
	A	1522	1160	1071	968	864	764
Bhadgaon	p	0.11234	0.127723	0.142168	0.157226	0.172241	0.187312
	W	126	126	126	126	126	126
	A	1122	987	886	801	732	728
Pachora	p	0.182855	0.227437	0.251907	0.278588	0.307617	0.339148
	W	208	208	208	208	208	208
	A	1138	915	826	747	676	613
Jamner	p	0.200976	0.244795	0.288804	0.319393	0.348138	0.375989
	W	696	696	696	696	696	696
	A	3463	2843	2410	2179	1999	1851
Erandol	p	0.116900	0.133488	0.148114	0.163802	0.180543	0.198597
	W	153	153	153	153	153	153
	A	1309	1146	1033	934	847	770
Parola	p	0.125102	0.154399	0.169919	0.187916	0.208587	0.231532
	W	175	175	175	175	175	175

	A	1399	1133	1030	1931	839	756
Dharangaon	p	0.123113	0.146654	0.160692	0.177712	0.196567	0.217462
	W	159	159	159	159	159	159
	A	1291	1084	989	895	809	731
Amalner	p	0.214300	0.241332	0.262522	0.290328	0.326329	0.366794
	W	277	277	277	277	277	277
	A	1293	1148	1055	954	849	755
Muktainagar	p	0.093257	0.115323	0.137753	0.152267	0.166732	0.180904
	W	150	150	150	150	150	150
	A	1608	1301	1089	985	900	829
Region	p	1.419887	1.720419	1.918687	2.121832	2.348706	2.601563
	W	2326	2326	2326	2326	2326	2326
	A	1638	1352	1212	1096	990	894

Where: P= Population in million, A= Per capita water availability in M^3 /year, W= Run-off water resources.

Water Scarcity

The type of water scarcity that is most common in the region that is the focus of this investigation is that which is brought on by growing demand. The majority of tahsils have sufficient water resources in relation to their overall population, and this is true for the vast majority of them. The locations that were impacted by water scarcity in some way either had high levels of water stress on their own (as evaluated by the WSI), or they suffered both high levels of water stress and water shortage at the same time (high WSI and low WCI value).

Table 3 displays, using a tahsil scale, the population that can be categorised as belonging to each of the several types of water scarcity. 2010-2011 Population of Countries with Water Scarcity, in Millions.

Tahsil	Available water resources (MCM)	Population (Million)	WSI %	WCI (M3/C/yr)	Population not under water scarcity	High water stress	Moderate water shortage	Severe Water scarcity	Total under water scarcity
Chalisgaon	382	0.394600	103	968			0.3946		0.3946
Bhadgaon	696	0.319393	29	2179	0.319393				
Pachora	208	0.278588	140	747				0.278588	0.2786
Parola	126	0.157226	191	801				0.157226	0.1572
Erandol	153	0.163802	122	934			0.163802		0.1638
Amalner	175	0.187916	97	931			0.187916		0.1879
Dharangaon	277	0.290328	85	954			0.290328		0.2903
Jamner	159	0.177712	259	895				0.177712	0.1777
Muktainagar	150	0.152267	100	985			0.152267		0.1523
Region	2326	2.121832	12	1096	0.319393		1.188913	0.613526	1.8024

			5						
					15%		56%	29%	85%
Source: Computed by researcher's 2015									

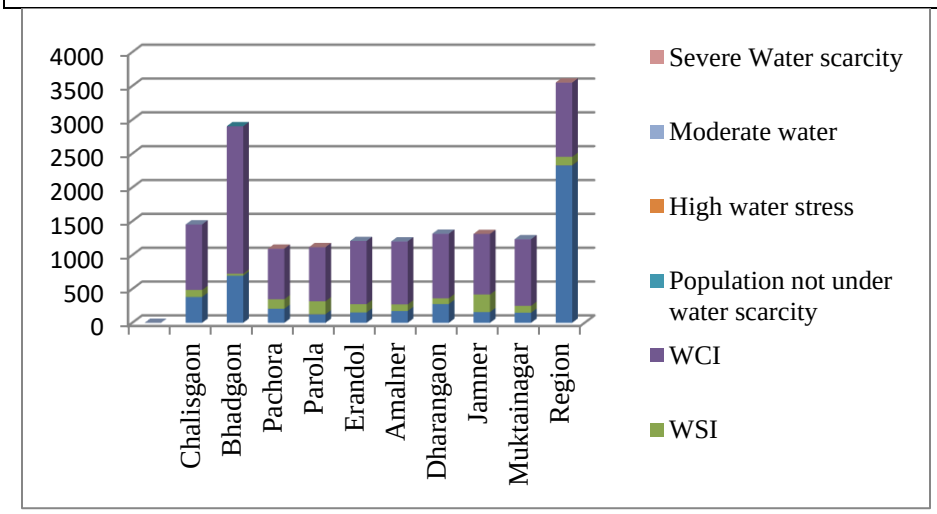

Fig 2. People living in different types of water scarcity, depicted on a tahsil scale people living in water scarcity.

The majority of the overall population, or 84 percent, or 1.802439 million people, resided in regions that are affected by demand-driven water stress, while approximately half of the population lived in regions that were also affected by population-driven water shortages. 29 percent of the population, which is an alarmingly high percentage, resided in areas with severe water scarcity (over 70 percent of available water resources are consumed and per capita water availability is less than 895 m3 per year). The tahsils of Pachora, Bhadgaon, and Dharangaon are the ones that are suffering the most from a lack of resources. Even though the region under investigation has comparatively adequate water resources, it is commonly thought of as being a location with a water scarcity problem. The findings lend credence to the theory that the true issue in this part of the world is related to the accessibility of water resources, as well as their unequal distribution and excessive use. At the moment, the majority of regions make excessive use of the water resources at their disposal.

CONCLUSION

India is a developing nation that has to maintain a well-rounded perspective on its own development. The development of irrigation systems in India dates back many centuries. In several of the tahsils that make up the study region, a severe and steadily worsening water shortage is one of the most pressing issues. Altering agricultural patterns, changing home use (appliances, household size, and behaviour), tourism, and industrial activities have all

been drivers of particular over abstraction. Due to this, the topic of water shortage has shot to the very top of the policy agenda for the semiarid region that is prone to drought. Along with the issue of climate change, the lack of available water is quickly becoming one of the most critical global concerns of our day. It is discovered that the most prevalent form of water shortage in the area under study is one that is driven by consumer demand.

REFERENCES

[1]. B. K. Mishra (2021)"Drought Prone Areas in India "Flood and Drought Management through Water Resources Development in India" Bulletin nº : Vol 56 (3) - 2007 https://public.wmo.int/en/bulletin/flood-and-drought-management-through-water-resources-development-india

[2]. N.A. Patil (2016) "Stress and Scarcity of Water Resources in the Drought-prone Areas of Jalgaon District in Maharashtra State: A Geographical Perspective," Vol. 2(1), March 2016: 14-25 Journal's URL: http://www.crsdindia.com/ans.html.

[3]. Megha P. Jadhav, (2019)"Water Resource Management in Drought Prone Area of Haroli Village, Dist. Sangli" Journal of Water Resource Engineering & Pollution Studies Volume 4 Issue 1.

[4]. N.Bandyopadhyay (2020) "Drought mitigation: Critical analysis and proposal for a new drought policy with special reference to Gujarat (India)" Volume 5, January 2020, 100049.

[5]. Prashant Yashvant Phadnis (2020) "Management of Water Resource in Drought Prone Area" Official Website of Pune Vedhshala 2020 pp112.

[6]. Government of India Ministry of Water R esources Central Ground Water Board, Ground Water Information Sangli District Maharashtra, 2013.

[7]. DAC&FW, 2016, Crisis Management Plan: Drought (National), 2016.Department of Agriculture, Cooperation and Farmers Welfare, Government of India.

[8]. P Phadnis. Management of water Resources in Drought Prone Area, Department of environmental Science, Shivaji University, Kolhapur, Proceeding Of Internal Conference SWRDM, PN 76- 78,2012.

[9]. Rangachari, R. (2017) Rising to the challenges posed by floods and droughts in India. Dr Kanwar Sain Memorial lecture on World Water Day 2017.

[10]. Water Resources Department 2016 Integrated State Water Plans for Krishna Sub Basin: K-5 Upper Bhima Sub-basin (https://wrd.maharashtra.gov.in/portal/portal/mwrd/15mwrdEmployees/6waterplan/2Krishna).