Impact of water scarcity on rural livelihood in the drought-prone region: A review of global perspectives

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Abstract

Water scarcity is a challenging task for the vast majority of people in the world, which has occurred due to changes in weather patterns due to less rainfall than usual. According to perceptions, in some parts of the world, water scarcity will be more frequent and intense now. Over 200 published articles and reports from the period 2003–2023 were considered for the measurement of the global impact of water shortages on livelihoods in arid areas. Such a type of review study is designed for a systematic approach. The manuscript illustrated different dimensions of water scarcity impacts by using electronic search engines, including Google, Scopus, Science Direct, Google Scholar, PubMed, ResearchGate, and Web of Science. The study was then distinguished by including the word water scarcity with keywords such as landscape, vulnerability, adjustment, displaced person, health effect, and risk management to inquire about the necessary articles. The study results illustrated that the shortage of water during the drought period increased the misery of affected people. Droughts affect the livelihood of these people in agronomic activities, food production and security, and natural assets, causing prolonged suffering.

Keywords: climate change; drought; food security; groundwater; water security

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Introduction

Water is one of the most important natural resources since it is necessary for human life, economic growth, and ecosystems. It is a vital component of the world, and this resource is completely connected to global climate change (IPCC, 2013). The unstable climate of the world carries a probable rearrangement of water resources as the climate changes (WHO, 2021). From the age of the hunter-gatherers to early established human civilizations and up-to-date society, water has endured as the key component in bringing up human life. However, this necessity for gatherers unfavorably affects civilized society in the matter of its inaccessibility or scarcity. Due to global warming, drought events are gradually expanding, and nowadays, water scarcity has become a serious natural calamity in many parts of the world. The key purpose of this study is to identify the consequences of water scarcity in rural areas, in particular in the drought-prone region.

The Global Risks 2015 Report of the World Economic Forum pointed out that the crisis of supply water was known as the topmost high-impact threat or danger for our time. In the 21st century, 30% of the developing and underdeveloped countries in the world face a severe shortage of water (Kakar, Shah, & Khan, 2018). So, drought management is considered the most urgent for those who establish policies around the world. Nevertheless, the failure of complete methods of water governance to initiate the hold and speech of key water elements in many countries is evident globally. Since 1990, 2.6 billion people have added access to better-quality drinking water sources, and 663 million people are short of this access (United Nations, 2013). In response, the Sustainable Development Goals (SDGs) have unrealized sequences of targets under Goal 6 to

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"Ensure availability and sustainable management of water and sanitation for all." The framework of sustainable livelihood, which naturally contains natural, social, financial, physical, and human capital, is mainly related to realizing vulnerability to drought (Keshavarz, Karami, & Vanclay, 2013).

The global water demand will continuously increase with population and economic development (Ahammed, Chung, & Shahid, 2018). Globally, people have been affected more by drought, which is related to any other natural threat, and its adversative effects have more than doubled in the last four decades (FAO, 2009). The drought affected approximately 55 million people globally (WHO, 2021). Through the years, drought events have been a rising concern worldwide owing to their devastating direct and indirect impacts on life (Sunday, Kahunde, Atwine, Adelaja, & George, 2023). Living faces serious issues in regular life, such as decreased food production, irregular rises in food grain prices, and the availability of jobs (Habiba, Shaw, & Takeuchi, 2011). Around 41% of the world's population lives in water-stressed situations (Ahammed et al., 2018; Islam & Mostafa, 2023). It is projected that approximately 68% of India, which receives 750–1125 mm of rainfall per year, is exposed to dryness. People who are reliant on natural resources are underprivileged in terms of sustenance and susceptible due to damage to their livelihoods (United Nations, 2013). Historically, drought and floods have frequently affected India, which has affected the livelihood of people (Rauf, Nikarthil, Mathur, & Gomes, 2017). The Ministry of Agriculture and Farmers Welfare, in an answer to a query in the Rajya Sabha on April 29, 2016, declared that drought affected 266 districts across 11 states. Recurring droughts affected some of these districts in Andhra Pradesh, Karnataka, Maharashtra, and Uttar Pradesh, resulting in widespread misery over food security and drinking water (UNICEF, 2015). Haroli Village is situated in Maharashtra's drought-prone Sangli District. Since the drought has occurred in the past and established its position in drought-prone areas, about 30% of accessible water (excluding drinking and domestic water) is reserved for future use by permitting it to regenerate in the ground aquifer (Patil et al., 2019).

Pakistan is going through an unprecedented water shortage situation due to climate change and standard water management, which have created misuse of water at a rate faster than it is restored, directly providing or creating the increasing scarcity of water (Khair, Mushtaq, Culas, & Hafeez, 2011). From 1970 to 2019, drought was one of the threats that led to the greatest human losses, with a total of almost 650,000 deaths. Among all the climate-induced deaths during the period, more than 90% happened in developing countries (UNCCD, 2022). On the other hand, in Northwestern China, which is sensitive to the global natural environment and vulnerable to climate change, the rate of extreme drought actions has risen significantly in recent years (Kakar et al., 2018). Furthermore, climate change-linked events such as droughts are expected to create stress on natural resources. For instance, it is assessed that the average yearly runoff in the Pishin (Southeast Iran) and Zayandeh-Rud (Center of Iran) basins will reduce by 33% and 40–70%, respectively, around 2040. Changes in the accessibility of water resources can significantly disturb the whole income and consumption pattern of farmsteads and former families, which would result in higher prices for accessing water for irrigation. Also, droughts are expected to severely decrease the production of many crops (Monira & Mostafa, 2023). With this regard, it is expected that if Iran's temperature rises by 2.7-4.78 °C, then the rainfall, depending on the wheat crop, will decrease by about 18.0% and 24% by 2025 and 2050, respectively (Habiba et al., 2011).

Many people in Tanzania and those who live in rural areas are involved in their livelihood through agrarian and non-farm practices. Due to counting water as a limited resource, mainly in the drylands, which is a pre-requisite benefit for survival through the simplification of most livelihood activities, Tanzanian people are faced with several constraints in a drought-prone land environment, such as low and uncertain rainfall, poor quality soils, labor shortages, and a shortage of capital. People in Mvumi have established certain agricultural activities to manage and adjust to these inharmonious circumstances for a long time (Liwenga, 2008). In SSA (Sub-Saharan Africa) drylands, semi-arid parts are tremendously vulnerable to drought impacts, as was the case in the Sudano-Sahelian province of Cameroon during the 1980s and 2010s, when repeated droughts had enormous effects on livelihoods and structures of existence (Ntali & Lyimo, 2022).

By 2030, the large number of people living in the drought lands of West and East Africa is projected to rise by 65–80%. In Uganda, drought has been recognized as the most challenging climate-induced hazard with appalling effects on food security. It is expected that 70% of rural Ugandans depend seriously on agricultural production (FAO, 2009).

Additionally, climate change-linked events such as droughts are expected to create stress on natural resources. Changes in the accessibility of water resources can suggestively disturb the total income and consumption of farms and former families. Also, droughts are expected to severely decrease the production of many crops and the availability of domestic water. The expected aims and objectives of this review study are: (1) find the global picture of water scarcity; (2) probable consequences of water scarcity on rural communities; (3) measure the rate of global drought expansion connected to climate change; and (4) propose suggestive remediation for global water scarcity.

Methods

Numerous international meetings and conferences focused on climate change, drought, and water scarcity and their probable impacts. The reflections of published articles, conferences, and meetings on these issues indicate that the researchers are concerned about the global problem and getting involved in reducing the impacts. Most of the work was conducted in the last three decades. The study searched PubMed, Scopus, Google Scholar, ResearchGate, Web of Science, and other search engines for publications across 30 years. These make it easy to collect large amounts of data within a short time and also maintain accuracy, consistency, and security. The following terms were searched using the Boolean operators (‘and’ and ‘or’): (a) climate change; (b) water scarcity; (c) weather events; (d) drought; (e) drought adaptation; (f) food security; (g) domestic water crises; (h) sustainable water resources, and others. Besides, other terms that impact water resources, such as land use changes, population growth, and water demand, were also searched using the same operators. A review was done of the literature related to this paper’s research objectives, which included a complete review paper, articles, journals, experimental documentaries, and observational studies published from 2003 to date. Tables 1 and 2 show the list of studies selected for a systematic review of the causes of drought and the impact of water scarcity on livelihood and rural livelihood, respectively.

The principles for the collection of the articles for the recent investigations were as given: (1) The article(s) deliberate on the effect of water scarcity on livelihood. (2) The article examined the influence of water scarcity on drought-affected people’s health, the increased workload on farmers, occupational stress, mental and physical anxiety, endemic spread due to water-borne diseases because of polluted water, shortages of food and damaged crops, and the higher risk of livestock management during the drought. (3) The study paper or literature analyzed the effect of policy and programs on water scarcity. Studies directed outside drought-free areas were excluded from this review.

Screening and extraction are the important sections in choosing the selected article. First of all, titles and abstracts of published papers were screened for their relevance to the present investigation and obviously irrelevant texts. Then, the complete papers needed to be examined for more detailed screening against the eligibility criteria and reviewed by the investigators. Data extraction is the process by which investigators obtain valuable information about investigation characteristics and findings from the included studies. The purpose of this review process was to determine the impacts of state policy and programs regarding actions that were taken to mitigate the water scarcity problem. Literature abstraction was based on the data concerning the water scarcity impact, adoption, alleviation, and susceptibility of the affected people due to scarce water in drought-prone areas.

Table 1.
List of studies selected for systematic review (Causes of occurring drought)

Author name	Year	Major Findings
Haque and Rahman	(2020)	In Bangladesh, Ponds are dying gradually due to the decreasing trend of rainfall, rising temperatures, and speedy evapotranspiration. During the monsoon period, the water depth stays suitable for domestic activities, and at this time of year, the pond's water level dries up, and river beds open up. The problem begins during the summer because of the low water level in ponds due to low recharge.
Patil et al.	(2019)	The main characteristic of Haroli Village is basalt rock. Undulating topography shows up in this middle province. In India, the general temperature of Haroli Village in Sangli District is high (>40), and rainfall is always lower than evapotranspiration. It is measured that about 35 percent of rainfall is affected by evaporation losses, which cause 10% infiltration losses, and overall runoff is 55%.
Khan et al.	(2020)	In Pakistan (2000-2015), two cropping seasons are managed by the prevailing temperature and rainfall patterns. Wheat is the major food produced in the drier winter period, whereas sugarcane and rice are produced in the summer season. For this type of agricultural practice, water is, therefore, a life-threatening resource.
Rockström and Barron	(2007)	The blue water domain warns of a global water crisis that originates from increasing per capita water scarcity (30% of the population of the world is expected to meet water stress by 2030). The over-exploitation of blue water resources used mostly for irrigation practices, resulting in river runoff, deteriorating groundwater tables, and deteriorating wetland and watershed systems (in Savannahs).
Carfagna et al.	(2018)	The division (Cameron) has semi-arid weather with a drier period existing for 7 to 8 months every year, and the rainy period begins in mid-May and leaves in early September, with months of July and August reporting the topmost rainfall (650–950 mm per year). The range of temperature in the zone exists between 27 and 42 °C during the peak of the dry period.
Hohenthal and Minoia	(2017)	The area named Taita Hills in south-eastern Kenya, the division of land ownership that was created from the national land transformation in the 1960s, has created environmental degradation and reduced water accessibility, providing continuous labor migration to the big cities of Mombasa and Nairobi.
Achberger	(2020)	Overall trends in drought regimes over Africa during the 20th century are more ambiguous, as natural variability, especially the effects of ENSO and the North Atlantic Oscillation, need to be considered.
Mekonnen and Hoekstra	(2016)	They describe that 70% of the world's population meets the severe scarcity of water at some view in the year. As irrigation systems are one cause that people adjust to stimulating environmental situations, climate change will raise water demand for irrigation purposes.
Refati et al.	(2023)	The desertification procedure occurs in drought, semi-drought, and sub-humid regions and results from some factors, mainly climatic changes and human activities.
IPCC	(2013)	For example, the 2013 IPCC Working Group II report establishes with the utmost certainty that climate change will vitally decrease renewable water resources and upsurge the incidence of drought events, particularly in dry subtropical provinces, for instance, northeast Brazil.
Rahman et al.	(2017)	During the post-monsoon, Partial water recharged into groundwater bodies is discharged through rivers, canals, and low-lying zones.

Table 2.
List of studies selected for systematic review (Impact of water scarcity on livelihood/rural livelihood in South Asia)

References	Year	Major findings
Haque and Rahman	(2020)	People depend on pond water for their regular purposes, such as cooking, washing utensils, cleaning, bathing, and feeding. Thus, people depend on groundwater to irrigate the paddy fields and for other uses.
Patil et al.	(2019)	A part of the population is migrating to the nearby villages in search of work and water. People shift their livestock to nearby places to get suitable drinking water. No such types of social functions (marriages, annual fare, and social gatherings) were held as the prevailing structures could not afford the people's need for drinking water. The epidemic spread due to polluted water at the beginning of the monsoon.
Climate Change Cell	(2009)	Agriculture and agricultural products in Bangladesh are affected significantly by drought during the 3-cropping times of the year: pre-kharif, kharif, and rabi. One of the key staple foods in our country is rice, which comprises 80% of the total cultivatable zone of the country. According to its report, every year throughout the *Robi* period, 0.45 million hectares are distressed by severe drought, and through the pre-kharif and kharif periods, 40 and 0.34 million hectares are distressed, respectively.
Sorensen et al.	(2018)	Lack of food also poses health threats to pregnant females and mothers and their unborn babies during the drought period.
Patel	(2018)	Every day, the women of the Oriya families are socially discouraged from going outside of the village to work for daily payment. At that time, think about this type of social limitation on women's working situations that had been affected throughout the drought period.
Ahammed et al.	(2018)	The geology of Bangladesh's northwest does not support the widespread degradation of groundwater. In recent years, a recurrent issue in the region has been the decline of groundwater levels below the functioning range of irrigation mines during the peak irrigation time. In the region (northwest section), groundwater exploitation under the operating range of irrigation digs and mines during the peak irrigation season is a frequent crisis.
Ali et al.	(2012)	At the cost of mining groundwater reserves, the area can be granary. That occurs due to low recharge, which is created by the scarcity of rainfall and its irregular distribution all over the year. In the studied area, groundwater resources are at risk owing to rising demand because of increasing population, pollution potential, and climate change.
Khan	(2014)	Though Pakistan is familiar with a water-shortage country that is the world's largest and highest-cost sugar producer, it is politically convenient, even if economically imprudent, to organize so. Some of the most powerful Pakistani politicians profit extremely from this tremendously misleading policy.
Chand	(2003)	As a result of water scarcity, conditions extend over 1203863 sq. km in 1205 units or lots in 223 desert and drought-affected districts of India.
Ahmad	(2006)	According to Ahmad et al. (2004), a large number of people have migrated due to water scarcity. According to Ahmad et al. (2006), the shortage of water creates a poor state of human health. Diarrhea, vomiting, and fever among children are the most common water-related diseases due to a

References	Year	Major findings
		shortage of water.
Habiba	(2012)	The significant effect of drought is that poor people, mostly fishermen, wage earners, and small and marginal growers, are tremendously vulnerable because of a deficiency of dimensions and awareness.
		Since all the reservoirs, like canals and rivers, dried up during the drought period, groundwater is the main source of water irrigation in this area, and people are completely dependent on this.
Hallmann	(2016)	Children might give up on school when parents are not provided with school fees during the drought period.

Table 3.

List of studies selected for systematic review (Impact of water scarcity on livelihood/rural livelihood in the world)

Reference	Year	Major findings
Denchak	(2018)	In developing countries, from 2005 to 2015, more than 80% of drought-induced economic damage and loss was related to livestock, crops, and fisheries.
		Population growth and economic development extend the load on renewable resources.
		Due to water scarcity, around 1800 million people are predicted to be staying in countries or regions in the year 2025.
Hohenthal and Minoia	(2017)	The process of global food supply and dealing network and processing interrelationships has caused drought in some significant food production areas of the world, as well as food values across the globe.
		Droughts created in the world's main food-exporting countries-Australia, Brazil, Canada, Russia, and the USA-are especially problematic in this view.
Refati	(2023)	The Brazilian semiarid province portrays a different and vastly socially vulnerable topographical space, focusing on the high rates of illiteracy, low earnings, population migration, and social rejection.
Habiba et al.	(2011)	Adverse graze facilities and food scarcities suppressed the mass upbringing of cattle and goats throughout the drought period.
		Cattle are pretentious by hot temperatures, high humidity, rising wind speed, and increasing thermal radiation, which affects their growth, production of milk, regeneration, and health.
		Livestock and poultry may even be hurt from heat stroke and various types of diseases like black quarter and anthrax.
UNCCD	(2022)	With a total of about 650,000 deaths between 1970 and 2019, drought was one of the risks that caused the greatest number of human losses. Over 90% of all deaths over the period that were attributed to the climate happened in emerging nations.
		By 2040, 1 in 4 children will be living in places with severe water scarcity, according to estimates. Nearly 150 million children are exposed to severe and extended droughts.
Dilip et al.	(2023)	The landless laborers, poor, and downgraded societies led their lives with suffering in multidimensional ways during the drought period.
		Drought in India generates more than 50% of growers having to take their kids out of school owing to the inability to pay the school fees and family earnings or travel together with their father, mother, or family.
Liwenga	(2008)	In Tanzania, Low and uncertain rainfall is consequently one of the key barriers to agricultural activities in these areas. This situation generally results in crop losses or damage, followed by frequent food insecurities.
		During the rainy season, livestock were kept near farmsteads and

Reference	Year	Major findings
		then moved away from farmsteads in search of grazing during the drought season.

Results and Discussion

Impact of drought on livelihoods around the world

Table 3 shows the major historical drought events in different countries around the world between 1970 and 2022. Landless laborers and marginalized communities are affected by drought in various ways. Social groups like children, females, and scheduled caste and tribe families, which are even now in a detrimental society, are also affected by these types of droughts. Estimates describe, without thinking carefully about water productivity, that a total of 5,600 km^3 per year will be of supplementary freshwater needed by 2050 to feed a total worldwide population of 9 billion people and raise nearly 1 billion people out of undernourishment (Carfagna et al., 2018). Important resources (water, food, and fuel) become scarce during drought situations. For example, the impact of severe droughts was measured to have decreased India's GDP by 2 to 5% over the duration of 20 years (1998–2017) (UNDRR, 2021). Drought caused the total agricultural productivity to fall by 18% between 2002 and 2010 (WHO, 2021). The drought affected over 1.4 billion people from 2000 to 2019. That creates drought, the disaster that distresses the second-highest number of people after flooding. Africa tolerated drought more often than any other continent, with 135 drought events, of which 70 happened in East African territory (Wallemacq, Guha-Sapir, McClean, CRED, & UNISDR, 2015). Fewer or no water provides for a bad harvest, and a bad harvest means no food or food for animals. High levels of food shortages are identified as an economic outcome of the drought that has created major scarcity in numerous portions of Asia and Africa (Pandey & Bhandari, 2009). In Afghanistan, several families, and specifically the young and bodily-able persons, have traveled to towns, the capital city Kabul, and subsequently into Pakistan and Iran owing to both water scarcity and the absence of work prospects in the zones affected by the adversative effects of drought (Bhattacharya, Azizi, Shobair, & Mohsini, 2004).

One more example of the economic impacts of drought can be found in Australia, one of the most important food producers and a country with huge amounts of fertile land, where drought has reduced the production of farms and food within the country notably (Goesch et al., 2007). A decrease in both the amount and rate of food intake is normal in drought-prone zones. Investigations have provided signs of a sharp fall in food quality, an inequity in diet, and a drop in the feeding of important products like milk and vegetables, which result in adverse health consequences for females and kids.

A vital matter associated with droughts is the importance of gender variances in their effect on livelihood actions. According to a United Nations Development Programme (UNDP) study on the effect of drought, females are more affected and bothered about food security than males. There is also the pressure caused by fetching water for their houses. However, droughts can also have a vital psychosocial effect on women (UNDP, 2014). Due to water stress, women have to carry a burden on their shoulders to collect pure drinking water from a long distance. Pregnant females have to fetch water from a longer distance in drought conditions. Millions of girls and women across arid Africa feel the deep impact of the ongoing water crisis in the area as they have to walk longer and further to collect water. That raises the risk of sexual harassment and of girls dropping out of education, also due to the lack of access to water in school throughout their periods, or even missing out altogether. Traditionally, women are responsible for water collection and providing water for the household and consequently suffer from more burdens than men. Although the physical stressors of water scarcity, such as waterborne diseases and the health impacts of Alum (water purifier), affect both men and women, the women's responsibility for water collection leads to additional physical loads, such as body pain due to long-distance walking.

Influence of drought on the health of people in drought areas

When drought creates a shortage of water and food, there can be many effects on the health of the affected population, which may increase illness and result in deaths. In recent years, the maximum number of drought-related deaths has happened in countries that are also facing political and civil struggles. Drought may have severe and long-lasting health impacts: (1) malnourishment owing to the reduced accessibility of food; (2) increased danger of infectious diseases due to acute malnourishment, insufficient or polluted water for feeding purposes and sanitation, and increased thronging among displaced people, and (3) stress on psychosocial and mental health (Dean & Stain, 2010). The community-level health impact due to the drought is shown in Table 4.

Table 4.
Major historical drought events in different countries in the world (1901-2022)

Drought period	Drought affected country	Continent
1934-1940, 1988-1989, 2011-2017, and 2020-2021	North America	North America
2010-2013	Mexico	North America
1968-1977, 1997, and 2010-2019	South America	South America
2010-2016 and 2020-2021	Brazil	South America
1921, 1991-1999, and 2015-2020	Europe	Europe
1910-1920, and 2010-2012	Sahel area	Africa
1983-1985 and 2022	Ethiopia	Africa
1983 and 1990-1999	Sudan	Africa
2018-2021	South Africa	Africa
1979-1983	Eastern Australia	Australia
1900, 1942, and 1965	India	Asia
1928, 2010-2011, and 2017	China	Asia
2015-2018	South East Asia	Asia
2015-2020	Pakistan	Asia
1972, 1975, 1979, 1982, 1986, 1989, 1992, 1994, 2003, 2005, 2009, and 2010	Bangladesh	Asia

Sources: Rahman et al. (2017) and UNCCD (2022)

Drought also has consequences for underprivileged rural health issues. Dean and Stain (2010) established that the psychological health of village communities has been prominently affected by extended droughts in Australia. This matter can affect women more harshly due to the circumstance that, to some extent, they have a subordinate place within the family. So, they habitually overlook their health to give attention to the health of their family members. Males are also more likely to end up with theatrical mental health difficulties due to economic or money-related stress, including helpless conditions and suicide as an outcome of drought events (Alston, 2011). Weakening people's mental and physical health could have disadvantageous impacts on the community's existence and consistency altogether, resulting in families that transfer to search for alternative ways of living.

As usual, there are opposing health impacts between women and kids, particularly throughout a drought, including undernourishment, micronutrient nourishment, and anti-nutrient consumption; water-related diseases (cholera, hepatitis, diarrhea, and others); vector-related diseases (malaria, dengue, and others); and mental diseases (distress and other emotional issues) (Stanke, Kerac, Prudhomme, Medlock, & Murray, 2013). During a drought, a shortage of food exposes pregnant women, mothers, and their babies to a health risk. Undernutrition and a lack of antenatal care cause serious damage to pregnant women, resulting in high rates of maternal mortality.

Vulnerability, adaptation, and coping with the mechanism during the drought period

Drought affected the percentage of plants, and it has more than doubled in the last 40 years, with about 12 million hectares of land lost each year due to drought and desertification calamities (UNCCD, 2022). In the world, strong evidence exists that human-induced climate change has led to an increased risk of drought (UNICEF, 2015). A measured 55 million people worldwide are directly influenced by droughts each year, creating the most serious threat to livestock and crops in approximately every portion of the world (WHO, 2021). Severe and prolonged droughts exposed almost 160 million children to vulnerability; by 2040, it is estimated that 1 in 4 children will be living in zones with life-threatening water shortages (UNICEF, 2019).

The rates of rural poverty in Africa are significantly higher than in urban areas, which is due to a shortage of resources such as protected land, hygienic drinking water, and access to services (Achberger, 2020). livelihood security is threatened by drought. Especially in Africa, the impacts of drought are exaggerated by rural poverty, underprivileged governance, political instability, a shortage of access to services, water, cleanliness, and other infrastructure, and economic disturbances. Droughts, which expose tremendous challenges to the development sector of society and the economy, are the most frequently conveyed disaster in Africa (Achberger, 2020). The community-based consequences of drought events for water scarcity in rural areas are shown in Table 5. On April 30, 2016, the Ministry of Agriculture declined that the activities to mitigate the impacts of drought included delivering a source of water to drink, food supply, relief aid to afflicted farmers, job support, livelihood change, water security, and drought-proofing (India Ministry of Finance, 2016).

Table 5.
Community-based consequences of drought events for water scarcity in rural areas

Factors	Impacts
Livelihood	Lack of food, shortage of safe drinking water, Shortage of drinking water for cattle
	Shortage of water for irrigation purposes
	Shortage of water for cleaning purposes
	Reduce the agricultural and Industrial production
	Increase the income stress
Food security	Food insecurity for human
	Lack of food and drinking water for cattle
	Decrease the crop productivity
Environmental Impact	Disrupt the food chain in the Ecosystem
	Increase the deforestation
	Increase the daytime temperature
	Increase the evapotranspiration rate
	Decrease the soil productivity
	Increase the contaminated water
	Lower water quality
	Increased the occurrence of wildfire
Economic Impact	Loss of the household income
	Shortage of alternate sources of Income
	Rise the workload
	Shortage of labor and requirement of hired labor
	Damage the farm-related income and income diversity
Social Impact	Increase the migration of rural and urban people
	Decrease the quality of life
	Arise conflict for water access and water use
	Increase psychological and emotional impacts including depression, frustration, alienation, and suicide; changed

Source: Dean and Stain (2010) and Stanke et al. (2013)

To compensate for their damages, farmers adopt to convert their farmland for non-farm practice or occasionally migrate to other provinces with higher land scope or space (FAO, 2009). The Maasai pastoralists in Mashuru acknowledged that drought would gradually happen in the past. So, they reported several protective measures that support them to lessen drought effects and protect their livelihood, such as making up their livestock funds by carrying more animals, distributing livestock, migrating during the dry period, agricultural farming, business, acceptance or intake of employment, and saving money (Gaitho, 2018). In an analysis of drought coping procedures in Bangladesh (2012), the majority (more than 90%) of farmers were involved in actions to progress the production of agriculture. In this sense, for instance, the traditional agricultural activities that Habiba and Shaw (2014) observed in their investigation in North-Western Bangladesh contained composting and aging, seedbed process, tillage, and shedding.

According to the study by Campbell, Barker, and McGregor (2011), sharing water is a vital coping procedure during a drought. A strong institutional preparation regarding land and mutual relationships or interconnections between different participants, such as the government, agricultural expansion services, researchers, and farmers, simplifies the accomplishment of an active adaptation strategy toward drought (Bhattacharya et al., 2004). The increasing frequency and strength of droughts result in rising crop losses, alienation from the land, nonemployment or lack of jobs, financial obligations, and migration. The impacts are particularly severe between underprivileged and marginal farmers and farm laborers (OSDMA, 2016). As seen, droughts harm particular social groups like ladies, children, families belonging to scheduled lower social classes or castes, and scheduled tribes. These groups of people now lack an advantage in society (Keine, 2009). A strong institutional preparation regarding land and mutual relationships or interconnections between different participants, such as the government, agricultural expansion services, researchers, and farmers, simplifies the accomplishment of an active adaptation strategy toward drought (Habiba, 2012). However, focusing on the vulnerability of farm production to drought is exactly one part of that vulnerability. The other section is about the vulnerability of harvesters and cultivators to the prolonged impact of the global food economy and the strategy and policy of trade liberalization (Keine, 2009). Habiba (2012) confirmed that, from the harvester's point of view, there are several inevitable droughts impacts by which harvesters are more likely to be affected. Such effects include lack of food, scarcity of water and cattle food, unemployment, and increasing the cost of basic needs.

Conclusion

Water availability is also a significant issue and is generally ignored by national statistics. A global study of the water-for-food challenge over the coming 1–2 generations identify the huge volumes of water required to feed a growing population and decrease starvation. Droughts affect the accessibility of water for agronomic activities, the production of food, food security, and natural assets. The economic effect of droughts is severe and provides prolonged suffering on livelihoods. The effects of water dangers on societies differ dimensionally depending, first, on the socially created vulnerability, strength, and adaptive processes of the affected societies. Progress in communities' resilience to droughts is also needed, especially among the underprivileged. Distribution of free, unrestricted, and unpayable rations through the people's health system in drought-affected or lying-down areas can assist or support mitigating the condition. It is possible to receive new irrigation practices and cropping designs as per water availability and season. To effectively manage migration and decrease migration stress in certain regions, other primary causes of migration need to be recognized and enhanced. Governments should consider plans to develop the destitute's resilience through resource enhancement, diversity of livelihoods, social security, the provision of safety nets, and the empowerment of the most vulnerable groups, including females. There should be efforts by the state government, farmers, water managers, policymakers, and pastoralists to protect the catchment of water and sources of underground water, such as boreholes, storage dams, pans, and water tables. That should support providing continuous water to livestock for agro-farm purposes as well as domestic purposes, thus

supporting the progress of health status through the restriction of waterborne and water-linked diseases.

The study findings indicated that the scarcity of water throughout the drought period increased the suffering of the affected community. Droughts affect the livelihood of these community people in agricultural activities, food production and security, and natural assets, causing prolonged misery. Another judgment of this study is that due to water stress, the female group is more vulnerable than men. Besides, some research gaps have been identified from the existing study reports. There is a huge need for long-term monitoring of both ground and surface water resources in drought areas to realize better resource conditions and relations with the climate change of that place. So far, the changes in physical and chemical characteristics of water in arid regions with global warming have not been investigated enough. For water scarcity, the physiological and psychological changes of rural inhabitants in drought-prone areas have not interested to scientists, and this could be a new idea for future research.

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