

Impact of Water Scarcity on Agricultural Productivity and Food Security: An Analytical Study

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Abstract

The mainstay of India's economy is agriculture. Agriculture is the backbone of the Indian economy. Agriculture and allied sectors are unquestionably India's largest sources of revenue, particularly in the country's vast rural areas. Also, it contributes significantly to GDP of the country. Ultimately, generating a production surplus will require raising agricultural output. Agriculture, the main sector of the Indian economy, accounts for around 34.8 percent of the GDP and 66.7 percent of the working force. Agriculture is frequently referred to as one of the primary industries, along with forestry, mining, and fisheries. Agriculture is the pillar of the economy and provides the necessities for human survival, regardless of wealth, which attests to the significance of this sector. According to the histories of economic development of several sophisticated nations, the expansion of agriculture was, in part, what led to the rise of their secondary and tertiary sectors. The foundation of our nation is agriculture.

Keywords: Water Scarcity, Agricultural Productivity, Food Security, Impact of Water Scarcity, Agriculture Sector

Introduction

Agriculture accounts for the largest portion of the nation's population and wealth. Also, it has provided raw materials for some of our most significant industries, such as those that create sugar, cotton, jute, textiles, hydrogenated oils, soap, and other agro-based goods, which collectively provide 50% of India's industrial sector's income. For an agrarian economy like India's to thrive, agriculture must be expanded continuously and broadly. The economy may be heavily impacted by the agriculture sector's slow growth, regardless of whether it is linked. To boost the agriculture sector of India various initiatives were launched on mass level. Improved agricultural productivity has been fueled by increased agricultural water security through irrigation to offset soil moisture deficits in many parts of India. The Green revolution increased food production in amazing ways, yet it was ultimately unsustainable. The result includes unforeseen consequences such diminished river flow, isolation of river basins, groundwater depletion, and significant water pollution. The negative impacts are so severe that they have prompted experts to wonder how much longer the planet's water supply can last before significant problems arise. Increasing crop production is therefore a matter of water security, which can only be attained by overcoming the challenges of rainfall

variability and by developing creative ways to rely on local water through water harvesting for supplemental irrigation. In many arid climate countries, the dominant form of water is the green water resource (Porkka, Gerten, Schaphoff, Siebert, & Kummu, 2016).

Using the perspective of production, one method of relating water shortage and farm labor may be used. Water productivity is a statistic that is increasingly being used to examine the irrigated agricultural production over time and place. It is calculated as the physical or financial output per unit of water intake. The effectiveness of irrigated agriculture in boosting crop yields, which has led to expanding crop output while reducing the requirement for increases in total agricultural land usage, has been crucial to food security. The expansion of irrigation has been made possible by increased freshwater resource exploitation, and as a result, water scarcity has reached catastrophic levels over most of the world. Increase in water productivity and associated indicators are frequently linked to sustainable future improvements in agricultural production, as the expansion of water inputs is frequently no longer feasible or desired (Kummu, Gerten, Heinke, Konzmann, & Varis, 2014 and Gautam, 2012).

India is an agrarian economy where majority of population relies on agriculture for their living. The major problem today India is facing is water scarcity which has ultimately resulted in the food shortage and increase in its prices. A scenario when there is a greater demand for water resources than there is availability is known as a water shortage. It is becoming a bigger issue, especially in developing nations and areas with poor access to water resources. Water shortage becomes a more urgent problem as the population expands and the need for water rises. Prices of food are directly impacted by water shortage. Farmers are unable to provide the demand for food as water resources become scarcer. Food and other products may become more expensive as a result, becoming unaffordable for many people. Water scarcity can also result in crop failure and lower crop yields, which can lead to a shortage of food and further price hikes (Giordano, Barron, & Ünver, 2018 and Nayar, 2013).

Literature Review

A research indicated that the global economy and food prices might be significantly impacted by water shortage. Food supply is challenged when water supplies dwindle, which raises the cost of food products. The global food market may be affected significantly by this ripple effect. We must examine the variables that influence food costs in order to comprehend the economic effects of water shortage. Prices for food are mostly influenced by supply and demand. When food is scarce owing to a drought or other water-related problems, demand may exceed supply, pushing up costs. This might increase food prices and have an impact on the entire economy. The cost of production is a significant element in setting food prices in addition to supply and demand. Food costs may rise when the cost of producing food is high owing to a lack of water or other resources. When fewer people can afford food due to

increasing prices, this may have a cascading effect on the world food industry. Food prices are affected by water shortage in markets other than the global one. Local markets may also be significantly impacted by it. Local farmers could not be able to supply local demand for food if water supplies run out, which would raise the cost of food in the region. Due to the difficulty in affording necessary food, this can have a disastrous effect on regional economy (Rosegrant, Ringler, & Zhu, 2009 and Gopinath, Kirubakaran, 2018).

In research it was found that due to reliance on the availability of water for agricultural development, rural farmers' incomes are directly impacted by water shortage. Yields may decline when water supplies become scarce, resulting in a reduction in revenue. Since farmers need to buy or rent water to make up the shortfall, water scarcity can increase the cost of input. This may result in even lower revenue. Lack of water can have negative long-term effects. Farmers may not be able to support their livelihoods without access to water and may be compelled to search for alternative forms of revenue. Rural communities may be uprooted as a result, and there may be a rise in unemployment, both of which can be disastrous for regional economies. Due to restrictions on their capacity to cultivate crops and create money, many rural farmers experience a considerable pressure on their earnings as a result of this lack of access to water. When crops are not being harvested as quickly as they once were due to water restrictions, fewer people have access to food. Due to the difficulty in obtaining enough food to fulfill basic needs, food insecurity increases in rural regions. Rural farmers are particularly concerned about water shortages since they depend on it to irrigate their crops and generate money. Due to climate change, water is becoming more erratic and limited, making it harder for rural farmers to make ends meet (Kumar, 2003 and Kumar, Anbukkani, Singh, and Kar, 2016).

In a research it was estimated that the need for food is rising. Farmers are being forced to discover ways to boost their output and yields because of the burden this is placing on resources, notably water. As irrigation is used to grow the bulk of the world's food supply, water shortage is one of the most urgent issues confronting farmers today. Farmers must be aware of the effects that water shortages can have on crop productivity, yields, and quality as water becomes a more precious resource. Water accessibility is a crucial element in crop productivity. There is a cap on the number of crops that can be grown without enough water. Lower yields or even the total failure of a crop may result from this. This can not only harm a farmer's bottom line but also compromise the local food supply. Moreover, a lack of water might result in lower-quality crops being produced. This may be caused by the plants' inability to get nutrients, which increases their risk of disease and insect infestation. It was observed that due to low productivity and low income in agricultural activities many people are shifting towards other activities. This might be called as a threat to agricultural production of the country because especially the youth finds no income opportunity in agricultural sector due to lack of availability of water for irrigation. This can impact the economy of the country in long term. It is important to mitigate the adverse effects that are causing scarcity of water in the country (Dhawan, 2017 and Kumar, and Nain, 2013).

According to a report, the agriculture industry is progressively suffering as the issue of global water shortage becomes more urgent. Long-lasting droughts are affecting agricultural output in many regions of the world, which is costing farmers' income and putting their families' food security at risk. Innovative solutions must be created and put into practice if the agriculture sector is to survive and prosper in the face of water shortage. The best approach for combating water shortage in agriculture includes short-term and long-term tactics. Farmers can adopt short-term water-saving techniques like crop rotation and drip irrigation. These techniques help cut water use while maintaining high crops. To guarantee that water is used as efficiently as possible, farmers need to make long-term investments in irrigation systems that are more efficient, including smart irrigation technology. To guarantee that water is used in a way that is both effective and sustainable, sustainable water management measures should also be used, such as rainwater collecting. It is crucial that the agriculture industry creates novel solutions that can aid in addressing the issue as water shortage becomes a more severe concern. Farmers can make sure that their crops are not just productive but also sustainable by putting both short- and long-term plans into action. Farmers can guarantee that their crops are robust in the face of water constraint by putting the proper measures in place (Falkenmark, 2013 and Khajuriya, and Khajuria, 2015).

Methodology

This study is descriptive in nature in which data is obtained from 190 respondents who are mainly engaged in farming activities or have a good knowledge of agricultural sector. In the study mix of people has been covered who are engaged in different kind of farming activities. A checklist question was used to analyze and interpret the data. In a checklist question respondents choose “Yes” or “No” for all the questions

Table 1 Impact of Water Scarcity on Agricultural Productivity and Food Security

SL. No.	Statements	Yes	%Yes	No	%No	Total
1	Water scarcity impacts agricultural productivity	179	94.21	11	5.79	190
2	Water scarcity increases food prices	175	92.11	15	7.89	190
3	Water scarcity hamper food availability	170	89.47	20	10.53	190
4	Water scarcity forces farmer to change cropping pattern	161	84.74	29	15.26	190
5	Water scarcity increases global inflation	157	82.63	33	17.37	190
6	Water scarcity forces farmers to shift towards other occupational activities	145	76.32	45	23.68	190
7	Water scarcity decreases nutrients in food	156	82.11	34	17.89	190
8	Water scarcity retards the goal of sustainability and self reliance	143	75.26	47	24.74	190

9	Water scarcity decreases the income of agricultural labors	155	81.58	35	18.42	190
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Table and Figure 1 show that 94.21% respondents agree that water scarcity impacts agricultural productivity while 92.11% respondents agree that water scarcity increases food prices. 89.47% respondents agree that water scarcity hamper food availability, while 84.74% respondents agree that water scarcity forces farmer to change cropping pattern. 82.63% respondents agree that Water scarcity increases global inflation, while 82.11 % respondents agree that water scarcity decreases nutrients in food. 81.58% respondents agree that water scarcity decreases the income of agricultural labors, while 76.32% respondents agree that water scarcity forces farmers to shift towards other occupational activities. 75.26% respondents agree that water scarcity retards the goal of sustainability and self reliance in agriculture sector.

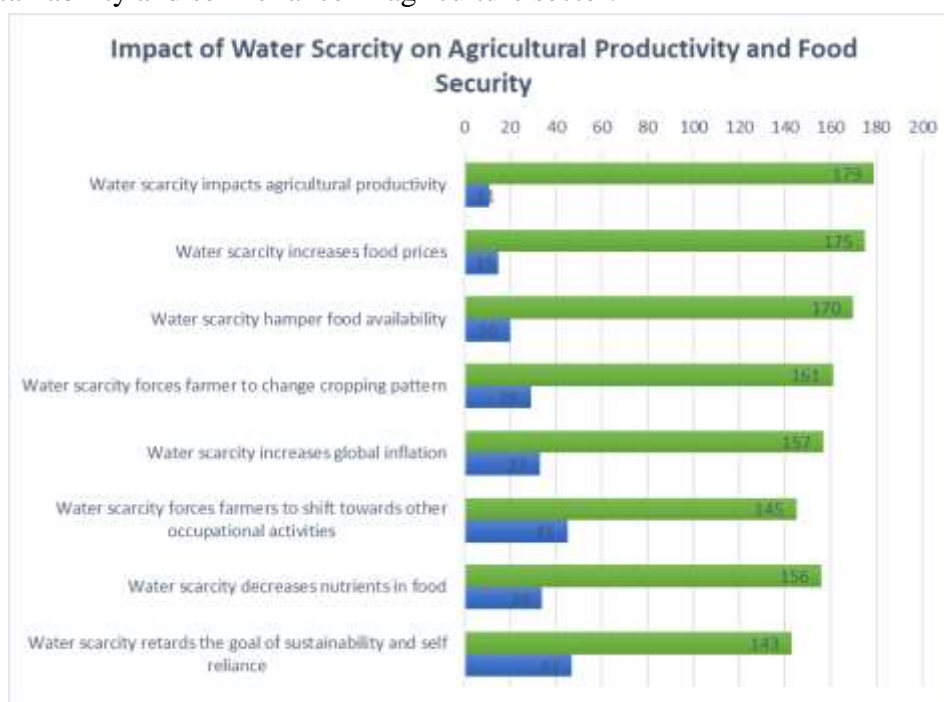


Figure 1 Impact of Water Scarcity on Agricultural Productivity and Food Security

Conclusion

This article explores the impact of water shortages on rural farmers' incomes and examines the ways in which governments and other stakeholders can help to mitigate these effects. Water shortages can have a catastrophic effect on agricultural production, leading to reduced incomes and increased poverty. They can also lead to unsustainable agricultural practices such as overgrazing and deforestation, which can lead to soil erosion and desertification. Governments and other stakeholders are starting to understand the value of access to water and are taking action to lessen the impact of water shortages on rural farmers, such as by giving farmers subsidies to assist them buy irrigation systems and other agricultural technology that use less

water. Water scarcities can ultimately have a terrible effect on rural farmers' incomes and the environment, but with the assistance of governments and other stakeholders, it is possible to lessen these effects and make sure that rural farmers have access to the water they need to maintain their livelihoods. Climate change has made fresh water increasingly scarce, which has had a huge impact that has fundamentally changed the global agricultural business. Crop yields have fallen, food costs have gone up, and food waste has increased as a result. Customers are thus unable to afford as much food as they were able to prior to the water problem, which directly affects their capacity to make purchases. Governments and organizations must find ways to decrease the effects of water shortage in order to maintain the sustainability and stability of the global food supply since these effects will only worsen as long as the water crisis continues. The growing population forces farmers to develop ways to boost output and yields since it puts pressure on resources, notably water. As irrigation is used to grow the bulk of the world's food supply, water shortage is one of the most urgent issues confronting farmers today. Farmers must utilize their water resources as effectively as possible in order to lessen the consequences of water scarcity. This includes employing water-saving practices like mulching and drip irrigation as well as initiatives like rainwater collection and water recycling. Farmers should also make an effort to utilize crop kinds that can withstand droughts and conserve water and soil. Farmers can safeguard the future of their crops and the sustainability of their businesses by taking the required measures to ensure effective water use and putting water-saving techniques into place.

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