



Research Paper

## Water Resources Management and Food Security – Issues & Challenges

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### ABSTRACT

India is endowed with a rich and vast diversity of natural resources, water being one of them. Its development and management play a vital role in agriculture production. Water is one of the most essential natural resources for sustaining life and it is likely to become critically scarce in the coming decades, due to continuous increase in its demands, rapid increase in population and expanding economy of the country. Integrated water management is vital for poverty reduction, environmental sustenance and sustainable economic development. The global population is growing fast, and estimates show that with current practices, the world will face a 40% shortfall between forecast demand and available supply of water by 2030. Agriculture, with its allied sectors, is the largest source of livelihoods in India. 70 percent of its rural households still depend primarily on agriculture for their livelihood, with 82 percent of farmers being small and marginal. India is the world's largest producer of milk, pulses and jute, and ranks as the second largest producer of rice, wheat, sugarcane, groundnut, vegetables, fruit and cotton. The foodgrains production has increased from 50.82 million Tones in 1950-51 to 310.74 million tonnes during 2020-21. Food security in India is a major challenge and there are several aspects to it. With an ever-growing population and decreasing productive land, food security is even harder to achieve than before. With increasing urbanization and water demand, the per capita water availability in the country has declined by almost 20% in the last two decades and is likely to decline by another 20% by 2050, making India a water-scarce country. This paper presents the Water Resources scenario as well as the various issues and Challenges for achieving the food security.

**Keywords:** Water Resources, Irrigation, Food Security, Production, Productivity

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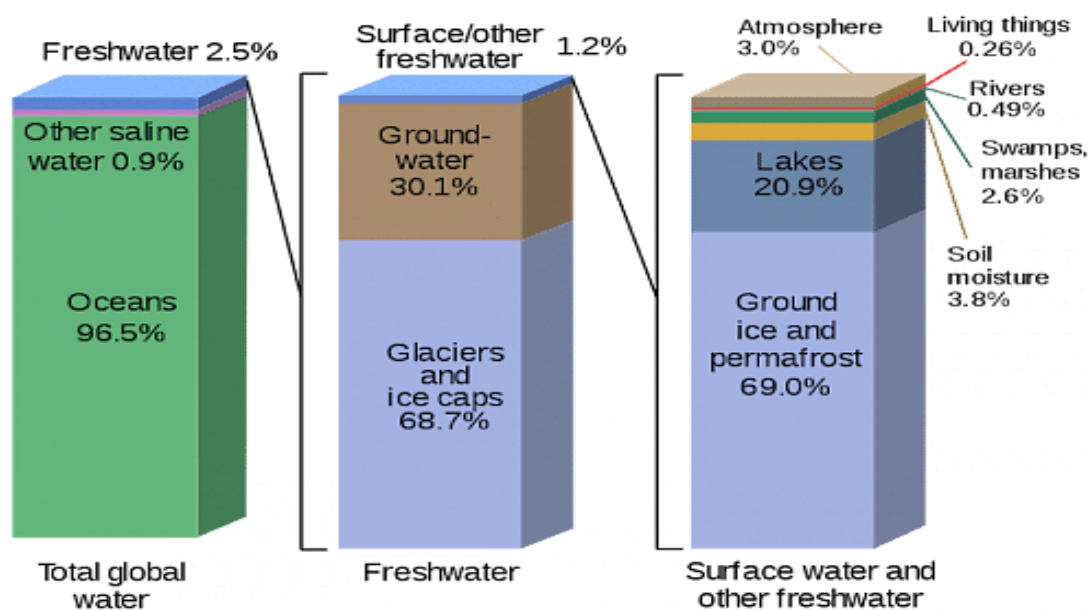
### I. INTRODUCTION

#### *Water water everywhere, not a drop to drink*

India occupies only 3.288 million sq km geographical area, which forms 2.4% of the world's land area, it supports over 16% of the world's population and is endowed with about 4% of its water resources. Water is precious natural resource for sustaining life and environment. Effective and sustainable management of water resources is vital for ensuring sustainable development. Water availability per person is dependent on population of the country and for India, per capita water availability in the country is reducing due to increase in population. Agriculture, with its allied sectors, is the largest source of livelihoods in India. 70 percent of its rural households still depend primarily on agriculture for their livelihood, with 82 percent of farmers being small and marginal. With a population of 1.27 billion India is the world's second most populous country. India is the world's largest producer of milk, pulses and jute, and ranks as the second largest producer of rice, wheat, sugarcane, groundnut, vegetables, fruit and cotton. The foodgrains production has increased from 50.82 million Tones in 1950-51 to 310.74 million tonnes during 2020-21. Food security in India is a major challenge and there are several aspects to it. With an ever-growing population and decreasing productive land, food security is even harder to achieve than before. The assured irrigation water supply is utmost importance for food security. Water Resources Management is one of the key factors for development of Agricultural production and related areas

where water requirement is essential. The country has extended the irrigation facility only 50% of the net area sown after 73 years of independence.

## Where is Earth's Water?



Water Resources on Earth

## II. METHODOLOGY

**Data:** Secondary data has been used from the published reports and datasets.

### Projection

Least Square Technique has been applied for the following linear model:

$$Y = a + b X$$

Where Y is Foodgrains production

a is constant

b is regression of Y on X,

X is year (X=1 for 1995-96

=2 for 2000-01 & so on

## III. RESULTS & DISCUSSIONS

Water Resources Management is one of the key factors for development of Agricultural production and related areas where water requirement is essential. There has been significant development in water resources sector in the post-independence era to meet the food and fibre requirements of the people and accelerated economic growth. The irrigation facilities have increased productivity. The assured irrigation water supply is utmost importance for food security. The total ultimate irrigation potential of the country is estimated about 140 million ha. Major and medium irrigation schemes contribution is 58.5 m ha. Ground water contributes more than 78% of the total potential through minor Irrigation. **Table - I** presents the projected area sown, production and yield for Foodgrains for 2025-26 and 2030-31. The least square model has been used for projection. It is seen that the estimated area will be 129.14 M hectare in 2025-26 and 130.68 M hectare in 2030-31. The production has been estimated of the order of 315.87 M Tones in 205-26 and 339.91 M Tones in 2030-31. The projected productivity be 2458 kg per hectare and 2628 kg per hectare in 2025-26 and 2030-31 respectively.

**Table –I Projected Area, Production and Yield for Foodgrains**

	2025-26	2030-31
Area ( M hectare)	129.14	130.68
Production (M Tones)	315.87	339.91
Yield (Kg per hectare)	2458	2628

**Table - II** presents the projected Sown area and Irrigated area for 2025 and 2030. It is seen that the projected Net Sown area will be 138.94 M hectare in 2025 and 138.38 M hectare in 2030. The Net Irrigated area has been estimated of the order of 75.15 M hectare and 78.95 M hectare in 2025 and 2030 respectively.

**Table –II Projected Net Sown Area, Net Irrigated Area**

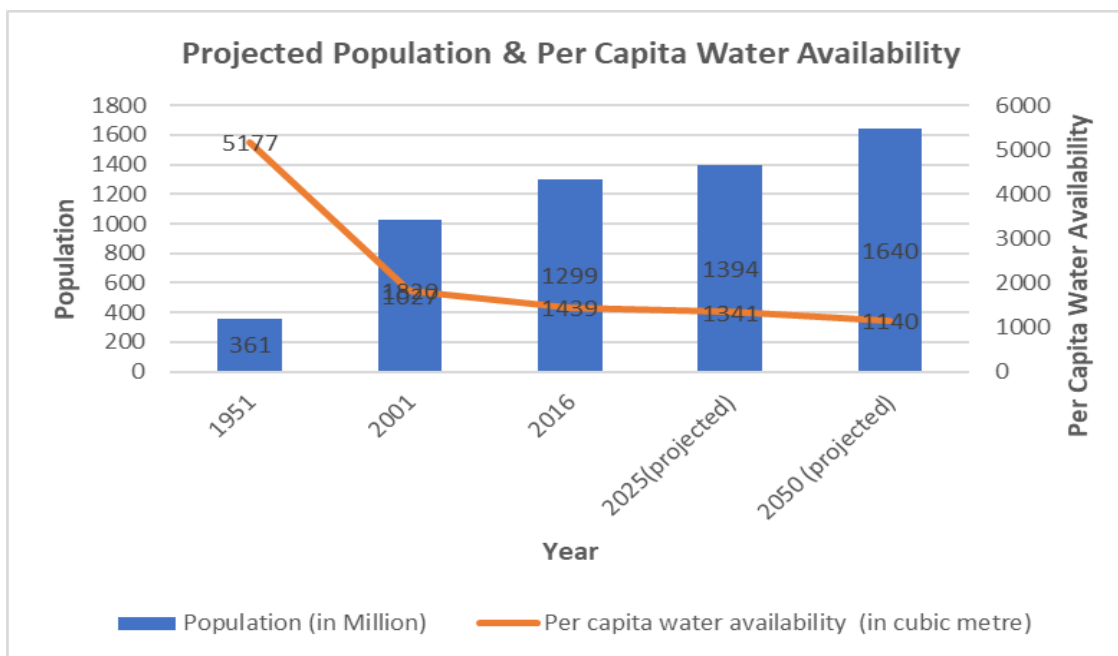
	2025	2030
Net Sown Area (M hectare)	138.94	138.38
Gross Sown Area (M hectare)	203.16	205.87
Net Irrigated Area (M hectare)	75.15	78.95
Gross Irrigated Area (M hectare)	109.41	115.92

**Table - III** presents the projected per capita net availability of foodgrains for 2025 and 2030. It is seen that the estimated per capita net availability of foodgrains will be 478 grams per day in 2025 and 481 grams per day in 2030. Whereas projected per Capita net Availability of foodgrains per Annum will be 171 Kg in 2025 and 172 kg in 2030.

**Table-III Projected per capita net availability of Foodgrains**

	2025	2030
Per Capita net Availability of foodgrains per day (Grams per day)	478	481
Per Capita net Availability of foodgrains per Annum (Kg per year)	171	172

Water availability per person is dependent on population of the country. Per Capita water Availability is presented in **Table IV**. The total water availability in India is about 1869 billion cubic metre. The per capita water availability of water has been reduced from 5177 cubic metre in 1951 to 1816 cubic metre in 2001 and it is likely to reduce to about 1341 cubic metre by 2025 and further 1140 cubic metre in 2050 due to increase in population. Annual per capita water availability of less than 1,700 cubic meters is considered as water stressed condition, whereas annual per capita water availability below 1,000 cubic meters is considered as a water scarcity condition.



**Table IV Projected per capital Water availability**

Year	Population (in Million)	Per capita water availability (in cubic metre)
1951	361	5177
2001	1027	1816
2011	1210	1545
2016	1299	1439
2025(projected)	1394	1341

#### IV. CONCLUDING NOTE

Water is essential for survival of human beings, plants, animals, and fisheries. The requirement of water is increasing due to increase in population, living standards, domestic use, irrigation, industry and environmental conservation. Therefore, water management is very essential to meet the demands in various sectors. Water resources management is one of the key factors in development of agricultural production and related area in order to attain self-reliance in food security. Water crisis is ever emerging in India and needs to be properly addressed. India has abundant water resources, most of it is getting wasted due to mismanagement, pollution, lack of wastewater management, and other such reasons. Water, being the most important resource for survival, should be conserved. The Government as well as the common masses has to work hand in hand in order to conserve water. The availability of water resources may be further enhanced by rejuvenation of drying lakes, ponds and tanks and increasing the artificial means of ground-water recharge. Reforms to land distribution, water management and food distribution systems will further enhance productivity and help India to meet its growing demand for food.

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