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# Impact on Water Resource and Sustainable Development in India

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## ABSTRACT

Water is fundamental to the development of Economy. It is an essential for sustaining all forms of life. Food production and quality environment for population, animals, plants and microbes worldwide for their well as being. It is also an impossible to substitute for most of its uses, difficult to de-pollute and it is truly a unique gift to mankind from nature. Water is one of the most manageable of the natural resources as it is capable of diversion, transport storage, and recycling. All these properties impart to water its great utility for human beings. A human populations and economies grow water shortages and reduce biodiversity both in aquatic and terrestrial ecosystems. Water pollution facilitates the spread of serious human diseases and diminishes water quality.

## INTRODUCTION

In recent years the sustainable development and efficient water management is become complex challenges in Indian States Increasing population, growing urbanization and rapid industrialization combined with the need for raising agricultural production generates competing claims of water. Per capita food supplies have been decreasing for nearly 20 years in India, in part because of shortages of freshwater, cropland, and the concurrent increases in population. Shortages in food suppliers have in part contributed to more than 47 percent of children's exhibit a degree of malnutrition. Major malnourished people in India both iron and protein/calorie deficiencies which results in about 5.6 million deaths each year. Consider that the Indian population currently numbers 1.21 billion with over a 20 million people added each year and it was estimates that approximately 1.56 billion people will be present by 2050. In addition freshwater demand has been increasing exponentially as population and economies grow. Population growth, accompanied by increased water use, will not only severely reduce water availability per person, but stress all biodiversity in the entire global ecosystem (Patel, C.C, 2009). These conflicts are escalating among new industrial agricultural, and urban sectors. Government of Indian and its 11 th Five Year Plan (2007-12) lays down provisions for efficient management of water resources in the country to provide additional irrigation potential of 229.16 thousand hectare and focus on water harvesting and improving water use efficiency through better maintenance or irrigation system and promoting efficient in judicious, equitable and economic manner of water distribution among the sectors across the states.

## OBJECTIVE

1. To know the study growing need for new technology for water resource management.
2. To know the study Water agencies should adopt a comprehensive framework which would help guide decisions about developing water resources.

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3. To know the study Co-operation for the sustainability of shared water Resources.

## METHODOLOGY

The present studies cover and analyzing the institutional changes in water resource management the impact of such change on the state economy. As the study focused on India particularly in Tamil Nadu this paper the research is based on secondary data. The data is taken from different research reports, journals, websites and Various Annual report.

## WATER RESOURCE AND UTILIZATION

Water is part of a larger ecological system. Both the surface water and groundwater resources of the country play a major role in agriculture, hydropower generation, livestock production, industrial activities, forestry fisheries, navigation, recreational activities, etc. Water resources of a country constitute one of its vital assets. A national water resource in India receives annual precipitation of about 4000 billion cubic kilo metress. The total average annual flow per year for the Indian rivers is estimated at 1953 km. The total annual replenish able groundwater resources are assessed as 432 km. The annual utilizable surface water and groundwater resources of India are estimated at 690 km and 396 km per year respectively. With rapid growing population and improving living standard the pressure on our water resources is increasing and per capita availability of water resources is reducing day by day. India's per capita availability of fresh water has fallen 64%, from 5177 to 1869 cubic meters from 1951 to 2009-10, which is perilously close to the 1700 cubic meters mark that would make a India a "Water –stressed" nation by the UN's definition )World Bank, 2006). Due to spatial and temporal variability precipitation the country faces the problem of flood and drought syndrome across the States. Over exploitation of groundwater resources, and salt water intrusion in aquifers of the coastal areas. The quality of surface and groundwater resources is also deteriorating because of increasing pollutant loads from point and non-point sources. The climate change is expected to affect precipitation and water availability. The efforts initiated under the Hydrology project are expected to bridge some of the gaps between the developed advanced technologies of water resources planning, designing and management and their field applications.

Growth process and the expansion of economic activities inevitably lead to increases demands for water for diverse purposes etc. One sixth of the world population etc. 16 percent resides in India but the land area of India is only one-fortieth of the world i.e. only 2.40 per cent. Water resources of India are only 4 percent to that of the World. So, far the major consumptive use of water has been for irrigation. Agriculture is the greatest uses of water, accounting for about 70% of all consumption. About 60 per cent or irrigation water is wasted in run-off or inefficient irrigation systems. It is estimated that after considering all these constraints, the utilizable water I terms of diversions would be around 690 billion cubic metres per year from surface sources and about 432 billion cubic metres per year from the ground sources. Unfortunately much of the water abstracted from surface and ground water sources for human activities is used very inefficiently. In irrigation for example, more than 60 per cent of the water seeps from the channels of the distribution systems and is lost by evaporation. Expansion of irrigation facilities, along with consolidation of the existing systems, has been the main part of the strategy for increasing production of food grains. With sustained and systematic development or irrigation, the irrigation potential through major medium and minor irrigation projects has increased from 22. 6 million hectares in 1951, when the process of planning began in India, to 102.77 m. ha at the end of the

 

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year 2006—7. Plan-wise irrigation potential created and utilized through major, medium ad minor irrigation projects in the country.

In India, the total utilizable water resources is assessed as 1123 billion cubic meters. Out of total 433 billion cubic meters of groundwater, 362 billion cubic meters of the resources is estimated to be available for irrigation requirement is going to increase drastically in future in India and presently our total water requirement is about 800 billion cubic meters. This would grow to 1039 billion cubic meters by 2025, and 1447 billion cubic meters by 2050. It is almost at par with exploitable water resources including both surface and ground water thereafter additional supply will be necessary or else scarcity conditions would prevail in Indian States. The estimates by Ministry of water Resources indicates that, by year 2050, India needs to increase by 5 times more water suppliers to industries, and 16 times more for energy production, while its drinking water demand will double and irrigation demand will raise by 50 percent.

**TABLE-1: WATER UTILISATION AND FUTURE REQUIREMENTS FOR VARIOUS PURPOSES**

| USE | 2000 | 2010 | 2025 | 2050 |
|---|---|---|---|---|
| Irrigation | 501 | 688 | 913 | 1072 |
| Domestic | 30 | 56 | 75 | 102 |
| Industry | 20 | 12 | 23 | 62 |
| Energy | 20 | 05 | 15 | 130 |
| Others | 34 | 52 | 72 | 80 |
| Total | 605 | 813 | 1093 | 1447 |

**Source:** Ministry of Water Resources, Government of India, Various Issues.

Similarly , the distribution of population and per capital availability of water and food grains population has been increasing continuously at substantial rate in one side and the other side, the per capital availability of water resource and food grains have been decreasing considerably during last decades and it seems to be an acute stress in future demand. The per capita availability of water at national level has been reduced from about 5177 cubic meters in 1951 to the estimated level of 1625 cubic meters in 2011 with variation in water availability in different river basins.

**TABLE -2: PER CAPITA WATER AVAILABILITY IN INDIA**

| YEAR | POPULATION (MILLIONS) | PER CAPITAL AVAILABILITY OF WATER(CUBIC METRE) | PER-CAPITA SURFACE WATER AVAILABILITY | PER-CAPITA UTILIZABLE SURFACE WATER | PER CAPITA AVAILABLE OF FOOD GRAIN (PER DAY IN GRAMS) |
|---|---|---|---|---|---|
| 1951 | 361 | 5177 | 5410 | 1911 | 394.9 |
| 1991 | 846 | 2209 | 2309 | 816 | 510.1 |
| 2001 | 1027 | 1820 | 1902 | 672 | 416.2 |
| 2011 | 1210 | 1625 | NA | NA | 444.0 |
| 2025 | 1396 | 1341 | 1519 | 495 | 250.7 |

 

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|---|---|---|---|---|---|
| 2050 | 1656 | 1140 | 1451 | 421 | 275.6 |

**Source:** Economic Survey, Ministry of Agricultural / Ministry of water Resources, GoI.

## AGRICULTURE AND WATER

Water and agriculture are considered in terms of water availability and grain productivity water allocation/reallocation in the economy. Water used by plants is non-recoverable, because some water becomes a part of the plant chemically and remainder is released into the atmosphere. The processes of carbon dioxide fixation and temperature control require plans to transpire enormous amounts of water. Various crops transpire water at rates between 600 to 2000 liters of water per kilogram of dry matter of crops produced. Agriculture plays a fundamental role in food security and socioeconomic development. Strategically its multifunctional role has been to ensure food security, protect and restore agro-ecosystem, health, and reduce rural poverty as well as promote urbanization and modernization. Agriculture has provided food, nutrition, employment and environment securities to the ever increasing population of human being and livestock.

**TABLE -3: DISTRIBUTION OF AGRICULTURAL PRODUCTION PRODUCTIVITY**

| YEAR | RICE | WHEAT | COARSE CEREALS | PULSES | TOT FOOT GRAIN | PER CAPITAL AVAILABILITY FOOD GRAINS | NET SOWN AREA | NET IRRIGATED AREA |
|---|---|---|---|---|---|---|---|---|
| 1950-51 | 20.58 | 6.46 | 15.38 | 8.41 | 50.83 | 394.9 | 118.75 | 20.85 |
| 1960-61 | 34.58 | 11.00 | 23.74 | 12.70 | 82.02 | 468.7 | 133.20 | 24.66 |
| 1970-71 | 42.22 | 23.83 | 30.55 | 11.82 | 108.42 | 468.8 | 140.27 | 31.10 |
| 1980-81 | 53.63 | 36.31 | 29.02 | 10.63 | 129.59 | 454.8 | 140.00 | 38.72 |
| 1990-91 | 74.29 | 55.14 | 32.70 | 14.26 | 176.39 | 510.1 | 143.00 | 48.02 |
| 2000-01 | 84.98 | 69.68 | 31.08 | 11.07 | 196.80 | 416.2 | 141.36 | 55.13 |
| 2007-08 | 96.69 | 78.57 | 40.76 | 14.76 | 230.78 | 436.0 | 140.86 | 62.69 |
| 2008-09 | 99.18 | 80.68 | 40.03 | 14.57 | 234.47 | 444.0 | N.A | N.A |
| 2009-10 | 89.13 | 80.71 | 33.77 | 14.59 | 218.20 | N.A | N.A | N.A |

**Source:** Ministry of Agriculture Government of India.

Table indicates that in a span of six decades, food grain production, which barely 50.83 M.tons in 1950-51, crossed 241.56 M.Tonnes during 2010-2011. India is not only self-sufficient in meeting the food needs of the vastly increased population bur also has built a buffer stock of over 55.5 M.Tons of food grains to tide over any shortages which may arise due to bad weather conditions.

 

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The country's population which is over 1210 million (2011) at present, is expected to reach a level of around 1396 million by 2025 and 1656 million by 2050. Consequently the food grain production will however have to be raised to around 350 million tons by the year 2025 and 430 million tons by 2050.Compound Growth Rates in Production, yield and Other Components in Indian Agriculture: The growth rates of major components are at decreasing rate except and gross

irrigated land during 1960's and 1970's. It is an interested to note that the compound growth rate of per capital availability of food grains is in negative growth during 1960's and 1970's with increasing population.

## CONCLUSION

Estimates of water resources and their future availability can only be based on environmental and climatic patterns. The continued loss of forests and other vegetation plus the accumulation of carbon dioxide, methane gas, and nitrous oxides in the atmosphere are projected to lead to environmental degradation and climate change. Over time, such changes may alter precipitation and temperature patterns thought the society. Current climatic changes are predicting global warming of about 1.4 to 5.8 degrees centigrade during 21 st centuary which will create many challenges to agriculture in terms of economic growth, poverty eradication, land degradation, access to water ad food security. Climate change does not in itself stimulate development of new adaptive strategies, but it encourages a more adaptive, incremental risk-based approach to water management. More precisely it provides further encouragement for a trend that already is gathering pace. Available Research studies provide directional evidences that climate change would influence the biophysical vulnerability of Indian farmers.

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