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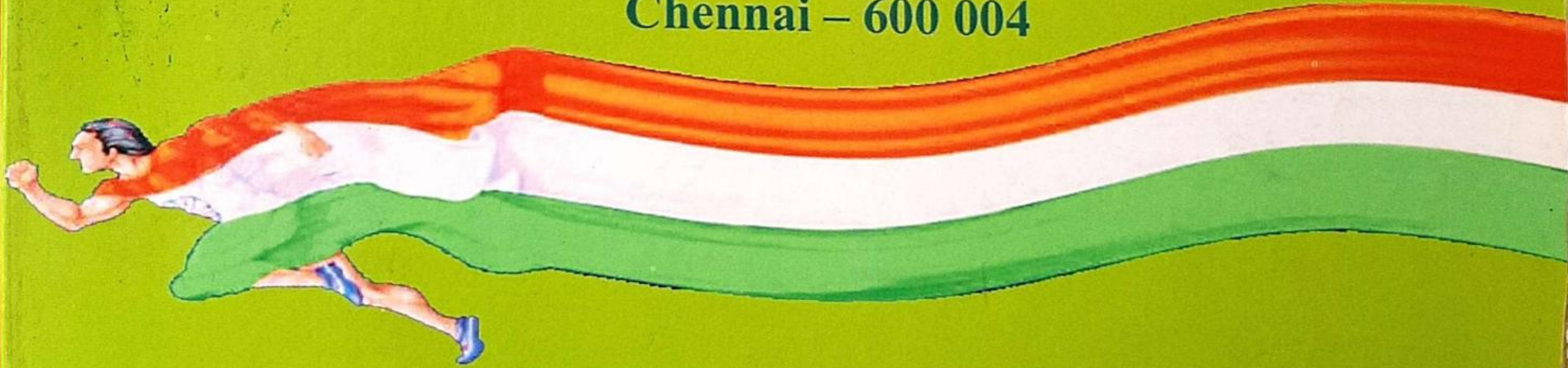
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Queen Mary's College
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INTERNATIONAL SEMINAR
ON
LEADING SOCIO-ECONOMIC ISSUES IN THE
MAKING OF NEW INDIA :
CHALLENGES, WAYS AND MEANS

Editor

Dr. K. SUDARKODI

Controller of Examination,
Associate Professor of Economics,
Queen Mary's College (Autonomous),
Chennai, Tamil Nadu, India.

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A STUDY ON IRRIGATION REQUIREMENT OF INDIAN AGRICULTURE

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Abstract

“World cannot exist without water” based on this poem there is nothing happened in the world without water. In particular the need for water is especially important for agriculture country like India, water and soil plays an important role in an agrarian economy. It is vital for sustaining all forms of life, food production and clean environment for the state, domestic, plants and microbes for their wellbeing. Rain fall is the only source for getting water. Particularly India’s agriculture mostly depending on monsoon. Climate change and global warming are now widely recognised as there major environmental problem which has put an additional stress on the ecological, Social and economic. In this climate change regime the monsoon onset is becoming late. That’s why irrigation is one of the most important critical inputs for enhancing the productivity that is required at different critical stages of plant growth of various crops for optimum production.

Water is not an industrial product as and when to increase and decreases its production. It closely connected with natural environment, which play a vital role to get the rain water in time. Failure of monsoons over the last three year has hit the farm production. There has been no water in dams, reservoirs and tanks. Then wells have gone

dry. The crop was darkened. Formers committed suicide. The fields remain parched. There has been acute scarcity even for drinking water. The mothers have come to streets with empty Pots demanding drinking water. The fathers have come road with tears demanding rebates. The children have come to road with empty stomach demanding justice. That’s why the paper is analysing the issues related to irrigational water.

Keyword: Irrigation, Water Management, Agriculture, Rainfall, Climate Change.

I. INTRODUCTION

Water is a basic good for all human activities and it is also important for the economic development of a nation. Water covers almost 70 percent of the global surface. It is all around us as vapour in the air. There is about 1.4 billion cubic kilo meter of water in the hydrosphere. Of this about 77.2 percent of fresh water is lodged in ice caps and a glacier, 22.4 percent occurs in underground pools and soil moisture and 0.36 percent is distributed in swamps, lakes and rivers.

The importance and scarcity of water could be seen from the fact that on global level the per capita availability of water is about 10000 cubic meter per year whereas in India, it is only about cubic metre per person per year. This quantity will be proportionately reduced in the coming years as

the population is increasing steadily especially in India. However the minimum requirement of water for a reasonable living including irrigation, industry and household purposes is about 1000 cubic meter/person/ year. It shows that there is an urgent need to conserve and use the water to the maximum efficiency.

Irrigation presently claims more than, 90 percent of the water available in the country. It is estimated that the allocation of water to agriculture will be reduced to about 70 percent in the next 10-15 years since the demand of water for industries and municipal needs is expected to increase substantially. Since agriculture takes bulk of the nation's water budget, saving even 'a small percentage means a large amount of water to meet other needs. The irrigation efficiency in the major irrigation projects have been estimated at about 35% - 40% and by raising the irrigation efficiency by 10% enough water would be saved to supply for the needed areas.

Problem related with water resources

In Modern days global warming, deforestation and depletion of ground water intimidate every individual. Increase in population and expansion in industry and agriculture have produced more demand of water. In India increasing scarcity of water and its implication for the economy of the country have become the most concern of the government and it may be expected that this will increase in the year to come. The traditional water resources like ponds, tanks and rivers are misused and continuously neglected. Rivers are polluted as urban and industrial wastes are dumped into them. Due to the growth of population deforestation and denudation, a large portion of the monsoon water flows into sea.

II. OBJECTIVES

1. To analyse the importance of irrigation requirement in Indian agriculture.
2. To study the factor that determines the implementation of irrigation system.

Need for economics use of water

It has been recognised that among the basic factors of Agriculture productivity. Adequate (not excess) and to timely provision of irrigation water is crucial. The development of irrigation is given top priority in Indian economy as agriculture contributes about 20% of gross National Product (GNP). The overtone of irrigation also arises due to the fact that over 70% of the people live in rural areas of which more than 70% are directly or indirectly dependent on agriculture for their livelihood. Further the investment per hectare in irrigation project has been rising enormously in the last 5 – 10 years and it will be more in the coming years due to escalation of prices. The cost was about Rs. 1500/ hectors during the first plan period and now it is between 1.50 ro 2.0 lakh per hectare. Hence it is necessary to adopt modern methods to economise the use of water, to increase productivity and to bring more areas more areas under irrigation. This will not only increase the production needed, but also minimise the hazards of water logging which bring large areas under salinity and alkalinity every year.

Water resources availability and utilisation

India is blessed with good rainfall and water resources, still the scarcity is felt everywhere not only for agriculture but also for drinking purposes. The average annual rainfall is about 1150 mm compared to would average of about 850mm. The sunshine is also favourable to take.

Crops throughout the year, but the every-growing population demand the optimum utilisation of the fixed land and water resource of the country. It is estimated that the average annual

surface flow is about 195 MHM of which only about 69 MHM is harnessable/ utilisable due to the terrain conditions rain during a few months, suitable sites for dams are limited and due to political reasons. Similarly, the annual recharge of ground water is estimated at about 43 MHM and the utilisable amount is about 39.5KHM.

As regards ground water, the utilisable amount depends not only on the quantity of water available, but also on its quality. At the same time, not all this water (79+39.50=108.50) i. e., 108.50 MHM would be available for irrigation as there would be demands for other purposes like municipal, industry including thermal, nuclear power, recreation etc. through the irrigated area in 1950 – 51 was only about 21 MH, this has been increased to about 100 MH at the end 11th plan (2011). The entire utilisable water will be harnessable by 2020/25 AD. But in many states like Tamil Nadu, the entire water resources already have been fully utilised, but the percentage of irrigation is only about 50. In states like Maharashtra, Karnataka and Gujarat, even after utilising the entire available water, the percentage of irrigated area to sown areas will be less than 40%.

Availability of water

Irrigation is the one of the most important critical inputs for enhancing the productivity that is required at different critical stages of plant curve growth of various crops for optimum production. Various commissions had estimated the total water resources available in India as indicated below. Two agencies, namely, ministry of water resources and national commission for integrated water resource development (NCIWRD) have estimated the total water requirement for various sectors it's found out that irrigation sector accounted for a large chunk of 68 percent of total water requirement among all sector.

Table-1: Estimates Of Water Resource In India

Agency	Estimate in bcm	Deviation from 1869 bcm
First irrigation commission (1902-03)	1443	-23%
Dr. A. N. Khosla (1949)	1673	-10%
Central water and power commission (1954-66)	1881	+0.60%
National commission on Agriculture	1850	-1%
Central water commission (1988)	1880	+0.60%
Central water commission (1993)	1869	

Source: Eleventh five year plan – 2007-12

Table-2 elucidate water requirement for various sections. Water resource management is varying important issues with regarded to the conservation and the production. Water demand management is meant to mace the available water resource wisely and to deliver the necessary amount for sustainable development.

Table-2: Water Requirement for Various Sectors

Sector	Water demand in km3 (or bcm)				
	Standing subcommittee of MoWR			NCIWRD	
	2010	2025	2050	2010	2025
Irrigation	688	910	1072	557	611
Drinking	56	73	102	43	62
Industry	12	23	63	37	67
Energy	5	15	130	19	33
Others	52	72	80	54	70
Total	813	1093	1447	710	843

Source: Nation Commission on Integrated Water Resource

Department

The blow Table-3 shows that as a consequence of the increasing demand on finite water resource to meet the varied demands of burgeoning population, its availability declining with each passing day. While the total water resource availability in the country remains constant, in the per capita availability of water has been steadily declining since 1951 due to population growth.

Table – 3: Population Growth and Precipitate Water Availability in India

Year	Population (Million)	Per capita water availability (Cubic Meters)
1951	361	5177
1955	395	4732
1991	846	2209
2001	1027	1820
2025	1394	1341
2050	1640	1140

Source: Eleventh five year plan – 2007-12

Table- 4 explains the irrigation potential created and utilised in India. The pace of creation of additional irrigation potential came down sharply from an average of about 3 percent per

annum during 1950 – 51 to 1989-90 to 1.2 percent, 1.7 percent and 1.8 percent per annum, respectively during the eighth, ninth and tenth five year plan periods. The ratio of growth of utilisation of the potential created declined to 1 percent per annum during the ninth five year plan period and improved to 1.5 percent per annum during the tenth five year plan period. The average annual rate of utilisation remain lower than the average annual addition to the irrigation potential resulting in the cumulative utilisation witnessing continues erosion. This not only amounts to an in efficient use of funds, but also a forgone income from irrigated land.

Plan	Potential created				Total	Potential utilized			Total
	Major and Medium	SW	Minor GW	Total		Major and Medium	SW	Minor GW	
Upto 1951 per plan	9.70	6.40	6.50	12.90	22.60	9.70	6.40	6.50	12.90
First plan 1951-56	12.20	6.43	7.63	14.06	26.26	10.98	6.43	7.63	14.06
Second plan 1956-61	14.33	6.45	8.30	14.75	29.08	13.05	6.45	8.30	14.75
Third plan 1961-66	16.57	6.48	10.52	17.00	33.57	15.17	6.48	10.52	17.00
Annual plan 1966-69	18.10	6.50	12.50	19.00	37.10	16.75	6.50	12.50	19.00
Fourth plan 1969-74	20.70	7.00	16.50	23.50	44.20	18.39	7.00	16.50	23.50
Fifth plan 1974-78	24.72	7.50	19.50	27.30	52.02	21.16	7.50	19.80	27.30
Annul plan 1978-80	26.61	8.00	22.00	30.00	56.61	22.64	8.00	22.00	30.00
Sixth plan 1980-85	27.70	9.70	27.82	37.52	65.22	23.57	9.01	26.24	35.25
Seventh plan 1985-90	29.92	10.90	35.62	46.52	76.44	25.47	9.97	33.15	43.12
Annual plan 1990-92	30.74	11.46	38.89	50.53	81.09	26.31	10.29	36.25	46.54
Eight plan 1992-97	32.95	12.51	40.80	55.31	86.26	28.44	11.07	37.70	48.77
Ninth plan 1997-2002	37.05	13.60	43.30	56.90	93.95	31.01	11.44	38.55	49.99
Tenth plan 2002-2007	42.35	14.31	46.11	60.42	102.80	34.42	12.00	40.81	52.81

Source: Water and Related Statistics

Water management practices

The following are the new irrigation strategies

- Proper method of irrigation canals and tanks command areas. Specially for paddy.
- Providing drainage and reuse of drained water if it is suitable.
- Conjunctive use of surface and ground water.
- Using sprinkler irrigation in canal or tanks command area for closely spaced millets and commercial crops.
- Introducing drip irrigation in well irrigated areas for wide spaced high value crops.
- Micro irrigation for closely spaced crops like sugarcane, vegetables, cotton, etc., by adopting crop geometry (paired row method).
- Introducing concept of supplemental irrigation/productive irrigation even for dry land crops to increase the yield.
- The irrigation based on water/fertilizer production function curves.
- Training the farmers and extension officers on water management.
- Conducting seminar/work shop in villages to bring awareness to all farmers in villages.
- Demonstration/ pilot programmes in the farmers' field to use water judiciously such as:
- Proper method of irrigation in canals command areas specially for paddy.

In major irrigation projects, water is flowing continuously and the farmers use as much water as possible without understanding the adverse effect of over irrigation. In many cases, they do it? So they are not sure whether they can get water for the next irrigation. In many projects especially in the southern states, the fixed and canals are designed taking the duty (water requirements) as 40 – 60 acres/cusec for paddy and 80/ 100 acres/ cusec for dry crops. It is observed that the farmers use about 1500-3000 mm of water for

paddy though the consumptive requirement is only about 800 mm. Unless, the design of the channel and concept duty are changed, it's not possible to economise the use of water since paddy crop consumes about 45 percent of the total agricultural water in the country and about 70 percent-75 percent of the water in Tamil Nadu state. It is necessary to introduce the water saving method of irrigation which means irrigating only to a depth of 3-4 cm as soon as the standing water disappears in the field. It is also suggested that the channels should have proper water control structures to regulate and supply of water. SRI method is the latest technology for paddy irrigation to save water and to increase the yields.

Reason for Low Irrigation Efficiency

The reasons that contribute to low irrigation efficiency can be identified as follows.

- Completion of time/bad works ahead of canals.
- Dilapidated irrigation systems.
- Unlined canal system with excessive seepage.
- Lack of field canals.
- Lack of canal communication network.
- Lack of field drainage.
- Improper field levelling.
- Absence of volumetric supply.
- Inadequate extension services.
- Low rate for water.

III. CONCLUSION

The word 'drought' indicates scarcity of water for ecosystems, land and human use, resulting in killing crops, livestock, livelihoods and human health. Drought is a complex and least understood natural disaster, the impacts of which often depend upon the nature of socio environmental background in the region, and affects more people than any other disaster.

Where we are and what we do, we are all dependent on water. We need it every day, in so many ways. We need it to stay healthy, for growing

food, vegetation, transportation, irrigation, industry, energy and its sheer life giving properties. For increasing the availability of water resources, there is a need for better management of existing water resources. The vast majority of sicknesses and deaths of people caused by waterborne illness and it can be eliminated by improved water quality, hygiene, and sanitation. Research and new technology should form the foundation for new strategies designed to address the challenges for increasing food production, improving water supply and ensuring efficient environmental protection. If initiatives are not pushed forward, water will become a more constraining factor in the quest for inclusive and sustainable growth.

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