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## IMPLICATIONS AND NEED OF WATER HARVESTING IN INDIA

**Y. S. Pathan**

Research Scholar, Solapur University, Solapur.

**Abstract:-** “There are five natural element known as “Panchmahabhutas”. These elements are The Earth, The water, The Fire, The Air, and The Ether. Among this water is one of the five potent element on which the entire universe has been sustaining .The water is the most important nature resource on the earth occupies almost 71% of It is Surface. Water is most necessary to live and to improve the quality of life and it’s the basic ingredient of growth the united nation’s organization has estimated that 2025 two third of humanity might face fresh water shortage. Oceans are the store house of water and act as main supplier for the process of evaporation, condensation, and prescription resulting in run off and recharge .All this process together from the hydrologic cycle and serve the basis of life any change destabilize the equilibrium stage causing critical situation for the survival of life with the growing demand of water due to rapid increase in population the implications will be very serious in near future. Hence these is need of water Harvesting in India Utility and demand of water effect of climatic change of water resources, rainfall variability of water resources, ground water resource and requirement’s water resources in India, Maharashtra and Solapur district are some of the important issues to consider for research related with water resource.

**Keywords:** Implication, Water Harvesting, Groundwater resources, Surface water resources.

### INTRODUCTION

Water is an inseparable entity within life support system, access to water or required quality and quantity is fundamental for all human ,animal and plant life along with most economic activates but only a tiny fraction of the planet’s abundant water is available to use as fresh water . about 97.5% of total water is found in the oceans. Which is not useful for drinking, irrigation and industry. The remaining 2.5 % is fresh water of which 2.49% of this is locked in ice caps or glaciers or is buried too deep to extract. Only 0.003% of earth’s total volume of water is easily available to us as soil moisture, exploitable ground water, water vapor, lakes and streams.

India account for 2.45% land area and 4% of water resources of the world but represents 16% of the world population with the present population growth rate (1.9 per cent per year) the population is expected to cross the 1.5 billion mark by 2050. The planning Commission, Government of India has estimated the water demand increase from 710 BCM (Billion Cubic Meter) in 2010 to almost 1180 BCM in 2050 with domestic and industrial water consumption in India is exerting stress on civic authorities to provide basic requirement such as safe drinking water, sanitation and

infrastructure. Therefore there is an urgent need for undertaking steps for water conservation. one of significant measures is "Rain Water Harvesting".

Everything originated in the water and everything is sustained by water in brief the water is the most significant of natural resources without which human race cannot survive.

**STUDY AREA :**

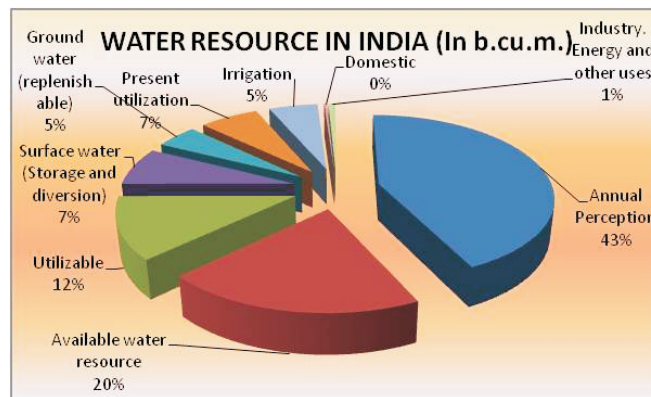
India is a seventh largest country in the world has 3.32 million sq .k. m. area and 1.25 billion population or 125 core or 1250 million According to 2011 year.

**Table.1**  
**WATER RESOURCE IN INDIA (In b.cu.m.)**

<b>Annual Perception</b>	4000
<b>Available water resource</b>	1869
<b>Utilizable</b>	1122
<b>Surface water (Storage and diversion)</b>	690
<b>Ground water (replenish able)</b>	432
<b>Present utilization</b>	605
<b>(Surface water 63% Ground water 37% )</b>	
<b>Irrigation</b>	501
<b>Domestic</b>	30
<b>Industry. Energy and other uses</b>	74

Source : Ministry of water resource Govt. of India 2011

**Graph -1**



**HYPOTHESES :**

- 1) India has less fresh water resources in comparisons to it is total requirement population.
- 2) Much of the water is wasted by run off.
- 3) There is need to arrest water for the fulfillment of the requirement of people.

**OBJECTIVES :**

- 1) To understand the availability of water resources in India.
- 2) To understand the concept of rainwater harvesting.
- 3) To understand methods of rainwater harvesting in India.

**SOURCE OF DATA :**

The data has been collected from the secondary sources from the published and unpublished research work . Present research work is based on the secondary data. Data is collected from the following sources.

- 1) Research source
- 2) Book's
- 3) Website

**METHODOLOGY :**

This data collected from different sources has been represented through various cartography techniques and data has been process and percentage and finally interpreted for the results.

**CONCEPT OF RAINWATER HARVESTING:**

**STAGE OF RAINWATER HARVESTING:**

1. Filtration
2. Storage
3. Recharging the ground water level.

**PREMITIVE METHODS OF RAINWATER HARVESTING:**

- **khadin/Dhara** : First designed in Rajasthan in 15th century. This system used saturated rainwater on far land which is used for crop production.
- **Bavadi/Vavdi** : They are traditional step wells in Gujarat and Northern India they were constructed in 8th to 15th Century. They were located within or at edge to the village which were
- **Ahar/Pynes** : It was flood water harvesting system found in south Bihar. Ahar is it was used to grow rabbi crops. 10 km to 20 km from river. In 1995 Dhira Village youths in Bihar started Ahar pynes system which completed in 2000. It has integrated 80 million hectares of land which was used to grow two cereal crops and vegetables every year.
- **Bengal's inundation Channel:** Williams will cocks British irrigation expert has given distinct features. were closed when flood water was over.
- **Kohli tanks** : Group of villagers cultivators constructed before 25 year ago. The tanks of all sizes which bring water to door- step of villagers. They are as follows. 1) Bhandaras 2.) Phad

**MODERN METHODS OF RAINWATER HARVESTING:**

Particularly in urban areas the most suitable method of rainwater harvesting has following important components.

- **Catchment :** In urban area the apartment system of housing is most widely used. In this apartment system or even in the separate individual bungalows system the rainwater can be caught on cement concrete terrace where directly rain falls.
- **Conduits :** Conduits are the pipelines that carry rainwater from catchment area to harvesting system
- **First Flushing:** The first flush device is a valve that flushes out first spell of polluted rain water.
- **Filter:** It is a unit which contains filtering media like fiber coarse. Coarse –sand of filter rainwater.
- **Storage Facility:** The Storage tanks can be of cylindrical rectangular and square shape. They can be of plastic or meta
- **Recharge Structure:** Rain water can be used for recharging the ground water through dug wells and bore wells which can promote percolation of water through soil strait at shallower depth.

**Method of Recharging Ground water are-**

1. Recharging of dug wells and abundant tube wells,
2. Settlement tanks,
3. Modified
4. Injection well,
5. Recharge pits.

**SIGNIFICANCE OF RAINWATER HARVESTING:**

1. To Meet the increasing demand of water for growing population :  
The demand for water is increasing in India with growing population. At present the population of India is 121 corers. With the existing water resources of per capita availability water in the first half of 21st century is given in the following

**Table .2**  
**Projected Average Annual Per Capita Availability of Water In India.**

YEAR	POPULATION IN MILLION	PER CAPITA AVAILABILITY IN CUBIC METER
2001	1027 (2001 Census)	1820
2025	1394 (Projected)	1340
2050	1640 ( Projected)	1140

Source: Yojana-July 2011 P.No.37

This table no.2 points out the declining per capita availability of water in India to increase the per capita availability of rain water harvesting.

**Fig -2**



## 2 To Meet current and expected requirement of water for different uses in India

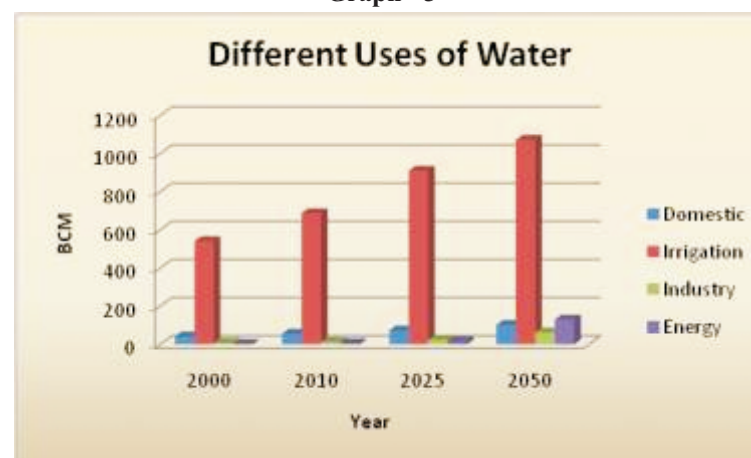
Water is used for consumption and non-consumption purpose. The requirement of water is higher and expected requirements are still higher so there is need of proper water management. So the rain water harvesting provides the solution to meet current and future water requirements in India.

**Table . 3**  
**Annual Current and Expected Requirement of water in India**  
**(in Billion Cubic Meters BCM)**

Different use of water	2000	2010	2025	2050
Domestic	42	56	73	102
Irrigation	541	688	910	1072
Industry	08	12	23	63
Energy	02	05	15	130
Total	634	813	1093	1447

Source : Compendium of Argil. Statistics 2011

**Graph - 3**



## 3 To eradicate poverty :

There is inverse relationship between net irrigated area and level of poverty. In low poverty states of Punjab and Haryana their percentage of net irrigated area is 95.2% and 78.2% as compared with high poverty states of Orissa and M.P. where only 25% of area is net irrigated. Thus rainwater harvesting can help to eradicate poverty.

Rainwater harvesting has brought dramatic betterment in many villages for example the jamkandoran taluka of Rajkot district in Gujarat .the community based rainwater harvesting undertaken through check dams has completely changed the socioeconomic lives of the villager.

## 4 Agriculture Developments :

With growing population it is becoming difficult to satisfy the water needs of our people of agriculture. India is at the there should of water scarcity situation. About one third of the country's area is draught prone. Over all agricultural productivity entirely depends upon water for irrigation in many villages, poor agricultural output is directly linked to the absence of irrigation facilities. The growth rates of gross and net irrigated areas between 1990-91 and 2007-08 the growth rates



reduced by 12.3 and 10.9 percentage points. Rainwater harvesting has been carried out in India even in the past it has served people by supplying water for domestic use and supplemental irrigation.

**Table .4  
Major City Population in India 2011**

	Major City	UA 2011	Extended UA 2011	2001 Census
1	Delhi	16,314,838	21,753,486	12,877,470
2	Greater Mumbai	18,414,288	20,748,395	16,434,386
3	Kolkata	14,112,536	14,617,882	13,205,697
4	Chennai	8,696,010	8,917,749	6,560,242
5	Bangalore	8,499,399	8,728,906	5,701,446
6	Hyderabad	7,548,976	7,749,334	5,742,036
7	Ahmadabad	6,240,201	6,352,254	4,525,013
8	Pune	4,369,845	5,049,968	3,760,636

Sources: Government Censuses 2011

#### 5 Urban Water Supply :

In India the rain water harvesting is helpful for urban water supply , in India 80% of potable water is used for cleaning, bathing, washing, and flushing. 20% to 25% water is used for drinking and cooking. The urban rainwater harvesting will save the water bills. Many on water tanks, it will save up to 200 liters of water per family in the society per day. The rain water harvesting will provide 24 hour water supply in urban apartment system. This water can be used for flourishing, watering garden and even fore drinking it properly filtered per capital water supply for metropolitan cities. Total replenish able groundwater resource of the country was estimated to be 433.68 b,.cu.m. However, according to the decision taken in 1995 the agreed figure of 432 b.cu.m. is retained as the rounded of figure for 431.88 b.cu.m. The discrepancy has crept in due to inclusion of figures in respect of states like Mizoram, Sikkim and UT of Andaman and Nicobar Island at a later stage. Negligible

**Table . 5  
GROUND WATER RESOURCES OF INDIA (B.cu.m ) AS ON 31MARCH 2011**

State/Union Territory	Total replenish able ground water resource	Provision for domestic industrial and other uses	Available Ground water resources for irrigation	Net draft	Balance ground water resources use	Level of ground development
Andhra Pradesh	35.29	5.29	30	8.57	21.43	28.56
Arunachal Pradesh	1.44	0.22	1.22		1.22	Neg.
Assam	24.72	3.71	21.02	1.84	19.17	8.75
Bihar	26.99	4.05	22.94	10.63	12.31	46.33
Chhattisgarh	16.7	2.41	13.66	0.81	12.85	5.93
Delhi	0.29	0.18		0.12		
Goa	0.22	0.03	0.19	0.02	0.17	8.3
Gujarat	20.38	1.28	17.32	9.55	7.77	55.16
Haryana	8.53	1.28	7.25	8.13	0.00	112.18
Himachal Pradesh	0.37	0.07	0.29	0.03	0.26	10.72
Jammu & Kashmir	4.43	0.66	3.76	1.84	3.73	0.81
Jharkhand	6.53	0.98	5.55	4.76	3.71	33.13



Implications And Need Of Water Harvesting In India

State/Union Territory	Total replenishable ground water resource	Provision for domestic industrial and other uses	Available Ground water resources for irrigation	Net draft	Balance ground water resources use	Level of ground development
Karnataka	16.19	2.43	13.76	1.46	9	34.60
Kerala	7.9	1.31	6.59	8.02	5.13	22.17
Madhya Pradesh	34.87	5.22	29.6	8.5	21.58	27.09
Maharashtra	37.87	12.04	25.47	8.02	16.04	37.04
Manipur	3.15	0.47	2.68	Neg.	2.68	Neg.
Meghalaya	0.54	0.08	0.46	0.02	0.44	3.97
Mizoram	1.4	0.21	1.19	Neg.	1.19	Neg.
Nagaland	0.72	0.11	0.62	Neg.	0.62	Neg.
Orissa	20	3.00	17.00	3.61	13.39	21.23
Punjab	18.66	1.87	16.79	16.4	0.00	97.66
Rajasthan	12.71	1.99	10.71	9.26	1.45	86.42
Sikkim	0.07	0.01	0.06	Neg.	0.06	Neg.
Tamil Nadu	26.39	3.96	22.43	14.45	7.98	64.43
Uttaranchal	2.7	12.17	68.95	32.33	36.62	46.78
Uttar Pradesh	81.12	0.41	2.29	0.82	1.47	35.78
West Bengal	23.09	3.46	19.63	7.5	12.13	38.19
<b>TOTAL STATE</b>	<b>433.24</b>	<b>71.14</b>	<b>361.98</b>	<b>149.92</b>	<b>212.78</b>	<b>41.53</b>
<b>UNION TERRITORIES</b>						
Chandigarh	0.03			0.025		
Andaman and Nicobar Islands	0.326	0.013	0.313	Neg.	0.313	Neg.
Pondicherry	0.029	0.004	0.02	0.116	0	
Daman and Div	0.013	0.002		0.008	0.003	70
Dadra and Nagar Haveli	0.042	0.006	0.04	0.005	0.031	12.81
Lakshadweep	0.002			0.007		
<b>Total Union Territories</b>	<b>0.442</b>		<b>0.384</b>	<b>0.16</b>	<b>0.348</b>	
<b>Grand Total</b>	<b>433.88</b>	<b>0.025</b>	<b>362.364</b>	<b>149.97</b>	<b>213.128</b>	<b>41.57</b>

(Source Central Ground Water Board)

The table 5 concerned clearly indicated the total replenishable ground water resource was 433.24 b.cu.m for India as a whole in 2011. The Provision for domestic, Industrial, and other uses was estimated 71.14 b.cu.m available ground water resource for irrigation was almost 361.98 b.cu.m. The balance ground water resources use was 212.92 in 2011. The level of ground water developed was 41.53 b.cu.m for India in 2011

Use	year 1997-98	Year 2010			Year 2025			Year 2050		
		Low	High	Percentage	Low	High	Percentage	Low	High	Percentage
Surface										
Irrigation	318	330	339	48	325	366	43	375	436	39
Domestic	17	23	24	3	30	36	5	48	56	6
Industry	21	26	26	4	47	47	6	57	57	5
Power	6	14	15	2	25	26	3	50	56	5
Inland navigation	-	7	7	1	10	10	1	15	15	1
Environment ecology	-	5	5	1	10	10	1	20	20	2
Evaporation loss	36	42	42	6	50	50	6	76	76	6
<b>Total (A)</b>	<b>399</b>	<b>447</b>	<b>458</b>	<b>65</b>	<b>497</b>	<b>545</b>	<b>65</b>	<b>641</b>	<b>752</b>	<b>64</b>
Ground water	206	213	218	31	236	245	29	253	344	29
Irrigation	13	19	19	2	25	26	3	42	46	4
Domestic	9	11	11	1	20	20	2	24	24	2
Industry	9	11	11	1	20	20	2	24	24	2
Power	2	4	4	1	6	7	1	13	14	1
<b>Total (B)</b>	<b>230</b>	<b>247</b>	<b>252</b>	<b>35</b>	<b>287</b>	<b>298</b>	<b>35</b>	<b>332</b>	<b>428</b>	<b>36</b>
<b>Grand Total</b>	<b>629</b>	<b>694</b>	<b>710</b>	<b>100</b>	<b>784</b>	<b>843</b>	<b>100</b>	<b>973</b>	<b>1180</b>	<b>100</b>
Total Water Use										
Irrigation	524	543	557	78	561	611	72	628	817	68
Domestic	30	42	43	6	55	62	7	90	111	9
Industry	30	37	37	5	67	67	8	81	81	7
Power	9	18	19	3	31	33	6	63	70	6
Inland navigation	0	7	7	1	10	10	1	15	15	1
Environment ecology	0	5	5	0	10	10	0	20	20	2
Evaporation loss	36	42	42	1	50	50	6	76	76	7
<b>Total</b>	<b>629</b>	<b>694</b>	<b>710</b>	<b>100</b>	<b>784</b>	<b>743</b>	<b>100</b>	<b>973</b>	<b>1180</b>	<b>100</b>

Source- ministry of water resources in India)

**Conclusions:**

The present paper has following important conclusions.

1. In highly populated agrarian country like India water crises is a serious problem.
2. Increasing demand and mismanagement of water is responsible for water crisis.
3. Water management is the need of the hour to attain food security, fight against global warming and poverty in India.
4. Rainwater harvesting is the best method of water management
5. Rainwater harvesting has been done in India since long. It is not a new concept.
6. Need of hour is to apply modern technology for rainwater harvesting for better water management.
7. The solution for water crisis lies in better water management with social awareness.
8. Rainwater harvesting will help in attaining faster, sustainable and more inclusive growth and the approach of five year plans.
9. Every living being is derived from the water.
10. Water is the most essential part of life, without it life is not possible
11. Hence, "SAVE WATER SAE LIFE"

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