

## **Prospect of Rain Water Harvesting In the Islands of the Sundarbans, the Active Deltaic Region with Special References to Sagar Island**

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**ABSTRACT :** Rain water is the part of global hydrological cycle. With the help of heat generated by the sun rays surface water evaporates and transform into water vapour. It is condensed in the condensation level and freezing level, forms drop of water and ice. It falls down as a rainfall and snow fall to the earth surface. With the help of rain water, rain water harvesting can be done. Rain water is intercepted by the tree and human construction. The term rain water harvesting is used to collect water in different way for drinking, irrigation, gardening, freshwater fishing or aquaculture and other domestic requirement. The people living in the vicinity of saline water for their daily purpose, rain water harvesting will be a boon to them. Sundarban active deltaic region is made with the transported material of river the Gangs, the Brahmaputra and their distributaries. This area is isolated by the different tidal saline water river. The people, living in the sundarbans depends for their daily use of water on ground and also on inland sources of water and as a result the possibility of arsenic, pesticide contamination and intrusion of saline water is quite high and life threatening. So we promote the rain water harvesting in this area as an alternative sources of water.

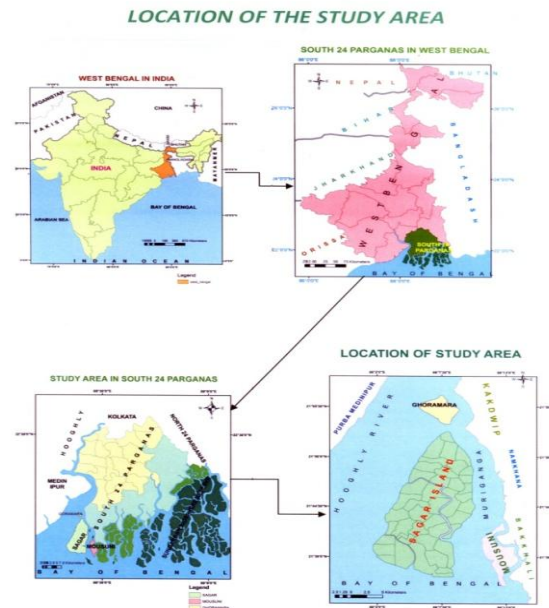
**AIMS AND OBJECTIVES:** Every year, the ground water level in the isolated region of Sundarban active delta region goes down a few centimeters for excessive usage and abuse of ground water. If this continues, the region will soon turn into a water crisis area and increases intrusion of saline water to aquifer. So it is necessary to save every drop of water. Every commercial building as well as big houses and other construction in the isolated region must install Rain water harvesting system to save water.

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### **I. INTRODUCTION**

**Objectives:-**Rain water harvesting may be used of an alternative source of fresh water. So my paper is examined to find out different sources of fresh water, which may be used in future. Common people should be made aware of rain water harvesting and built up consciousness to reduce contaminations of ground water. After analysis the different uses of water this paper suggests to the sustainable uses of fresh water.

**Location of Study Area:** Sundarban, which is made with transported soil or materials of the river The Gangs, the Brahmaputra and their distributaries, a greatest delta of the world, is divided into three broad division Physiographically i.e. mature delta, dying delta, and active delta region. This paper deals with the rain water harvesting in active delta region in Indian Sundarbans deltaic area which is isolated from main land by different type of saline water bodies like tidal river and The Bay of Bengal. There are numerous islands in Sundarban active deltaic region. Indian Sundarbans has been formed by 54 deltas. Sagar Island is one of them. This isolated active deltaic islands has already started showing drinking water crisis, different types of water crisis's/problems have affected the eastern part of Sundarban Hinalganj, sandlebill, dulduli, Sahebkhali, kalitala, jogeshganj, Barunhat, grampanchayet in Hingalgaj block, middle portion of sundarban gosaba, manmathanagar, pathankhali, kachukhali, birajnagar, rangabelia grampanchayet in gosaba Block, western part of sundarban Patharpratima block, kakdwip block and Sagar block may be including in the list in future. Sagar Island, greatest island in Sundarban deltaic region, is situated at western part of Sundarban and western part in South 24 Parganas, West Bengal, India. Latitudinal and longitudinal extension is from 20<sup>0</sup>36'N to 21<sup>0</sup>56N and 88<sup>0</sup>02'E to 88<sup>0</sup>11'E. It is isolated from main land by different type of saline water bodies like The Muriganga in north and north-eastern side, the Hooghly River is situated in the eastern side and the Bay of Bengal is located at the southward side of this land. This land covers by 204.8sq/km area.



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## II. METHODOLOGY:

collecting data by visit in the different block of the Sundarbans deltaic area and taking notes on different type of issues related with water are experienced and analysis relevant data of expert and reached following conclusion.

**Why isolated region (Sagar Island) is most appropriate for Rain water harvesting :** The human habitation in this islands is not more than 100 years and most of the settlers flocked either from Bangladesh in eastern part of the sundarbans of Indian part or from the western part of the Hooghly river, the medinipur and from adjacent Orissa in the western part of sundarbans. Demands of fresh water have been increase and with the ever increasing population. Maximum amount of rainwater in wet season, which is no work in human being, is passing through the inland cannel as a surface run-off and fall down the outside of water bodies in this islands. There are several brackish water river like kalindi, Raimangal, Bidyadhari, Gosaba, Durgaduania, Herobhangi, Matla, Hatania-dowania Muriganga and also lower part of the Hooghly river in this area of the sundarbans active delta region. The formation and destruction of this area is continued by the above mention river. So this region is called active delta region. This region should be promoted for following causes:-

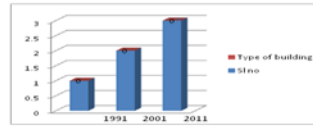
- This area is reclaimed from water bodies and bounded by embankment. In the flooded time water crisis of this area is very high.
- These islands are dissected by the above mentioned different type of tidal water bodies.
- This water bodies are filled with saline (brackish water) water. This water is unsuitable for daily usage.
- Seasonal rainfall is found in this area.
- This area is affected by monsoon climate. Normally rainy season is found mid of June to mid of September. Other season is generally belonging dry season.
- Average annual rainfall is recorded 1358.10 mm. in wet season but people are depending on this rainwater for daily uses except drinking and agriculture. Other season's people of this area depend on ground water and inland fresh water bodies'. Average temperature is recorded 38<sup>0</sup>C in summer and 12<sup>0</sup>C in winter.
- Vulgarism of monsoon wind and unpredictable of delay the season is recorded in this area. The nature whimsicality, i.e. drought, cyclone, delayed monsoon and sometime break of embankment of the rivers inundate the inward land make the fresh water a treasure, most valuable things for the inhabitants.
- This land made by transported soil or sediment soil by nature has heavy texture, which is protects to percolate or leaching of the surface water and delay the storage of ground water. The people of sundarbans deltaic region have been increased as well as sagar islands as following. They are depending on for drinking water in ground water. Demands of fresh water have been increased with the ever increasing population.

### Population growth in sagar island

Table-1

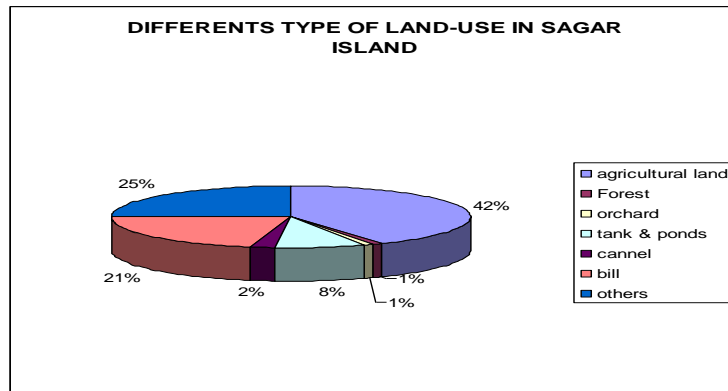
year	population
1991	154202
2001	185630
2011	211993

Population growth of different year in sagar island



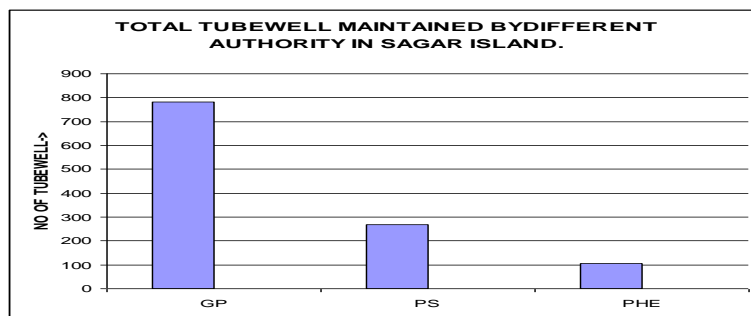
Source:- census data in India.

- Lack of sufficient sources (ground water, Inland fresh water) of fresh water for drinking is found in this area.
- To save fossil fuel and electricity this is used to supply water from ground water available area to water crisis area..
- Increasing the different type of construction like building, road, etc delay to the recharge of ground water.
- High transport cost will promote to supply water from main land to extended pipeline over the river.
- Agriculture is most essential occupation in this area. To supply uninterrupted water, rain water harvesting is most importance element of this area for gardening.
- Different type of land-use categories as following diagram are seen in the SAGAR island-42% agricultural land,1% forestland,1% orchard10% water bodies, 21% bill which is flooded by the water in rainy season, and 25% other land.



Source:-sagar panchayet samiti.

Most of the agricultural lands are irrigated by the inland water bodies and underground water in dry season No of tube well in sagar block



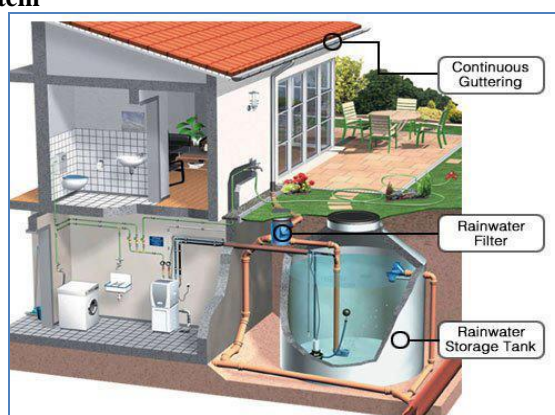
Total tube well	Maintained by		
	GP	PS	PHE
1183	782	296	105

Source:-Sagar panchayet Samiti

- There is 1154 tube well which supply drinking water of inhabitant of this area. Average 6 tubes well/sq.km is found in this area but the level of drinking water level stay below about 1100-1400 meter from the ground. The people of the deltaic area totally depend on ground water as a result the possibility of arsenic, pesticide contamination and intrusion of saline water is quite and life threatening.

For above mention causes the rain water harvesting is most powerful element to prevent uninterrupted water supply in this island.

### Rain Water Harvesting System



Courtesy:-Google.

- Step-I precipitate rain water is caught by the different type of construction like roof of building, pond, plastic, plain platform etc.
- Step-II Captured water is transported along the pipeline from captured area to rain water filtered.
- Step-III After filtered water is stored in storage.
- Step-IV Last time this filtered and storage water may be used in different purpose.

#### **Rain water harvesting may be used for various purposes**

- For uninterrupted supply of pure drinking water.
- To save water from solid material, pesticide etc.
- To save water arsenic contamination.
- To save ground water level.
- To prevent the desertification harvested rain water is supplied from nearest rained area to desert area.
- To supply of the harvested rain water for gardening like orchard etc.
- To supply water for corn cultivations like rice, wheat, millet, also vegetables etc.
- People are depending on fresh water fish in the deltaic area.
- To supply freshwater during hazard time like drought, floods (during flood all sources of fresh water are below sunk flooded water, in this time harvested water most essentially serves as drinking water) and use of fire.
- Rain water is used to clean different types things like house, car, road etc.

### **III. CONCLUSION**

From above discussion the isolated region like Sagar Island should use rain water in different purpose and promote the sustainable use of pure water in this area.

### **IV. SUGGESTION**

- ▶ For sustainable usage of water especially ground water and inland water rainwater harvesting must be used.
- ▶ To make people conscious trough seminar, workshop, and use of law. (Following as Tamilnadu Govt.)
- ▶ Angle roof (Asbestos etc) can be used for rain water harvesting in rural area like Sagar Island.
- ▶ Solar power plate may be used to harvested rain water.
- ▶ The Roof of the government office may be used for water harvesting and used it in different purpose.

Details of existing concrete buildings (approx.) with average roof area and total rain water can be conserved

Sl. No.	Type of Building	No. of Buildings Having cemented roofs	Average Roof area (Sq. m)	Amount of Rain Water can be conserved from the total existing roof tops (Cu m)
1	College	1	647	936
2	High School	30	13087	19020
3	High Madrasa	3	810	3456
4	Junior High School	3	766	3240
5	Primary School	124	22900	32240
6	Hospital	1	1008	1440
7	Village Hospital	5	2915	4375
8	Panchayet	9	1944	2610
9	A.D.A. Office	1	112	145
10	Panchayet Samitee	1	322	460
11	B.D.O. Office	1	144	216
12	B.L.D.O. Office	1	66	87
13	Bungalow	5	1035	1440
14	P.H. Bungalow	1	162	216
15	Jela Parishad	1	288	400
16	Guest House	1	294	430
17	Kolkata Byabsai Samitee	1	396	570
18	Haryana Bhaban	1	396	570
19	Ganges Bhaban	1	207	290
20	Bharat Sevashram	1	574	820
21	Balaka Bhaban	1	162	216
22	Larika Bhaban	1	275	400
23	Individual households having cemented roofs	3000	70	30300
Total no. of concrete buildings:		3194 no.	48580	10, 38,77 Cum
Total rain water can be conserved in a year from concrete building roof tops of Sagar Island				

Source: Gayen.Anadi and Zaman. A., A Mitigation of Water and Growing Crop In Lean period By Rainwater Harvesting though Concreted Roof Tops And Household Ponds Sagar Island.

- ▶ Small and large tanks or ponds as following may be used to store harvested rain water.

Gram Panchayet wise number of small ponds in all households along with their dimensions and quantity of rain water conserved

Name of the conservation structure	Name of the G.P.	Number of Ponds present	Dimension (cu. m.)	Quantity of water conserved in each Small Ponds (cu. m.)	Total quantity of water conserved in Small ponds (cu. m.)
Small households ponds	Ghoramara	815	12.19x15.24x0.91	169.06	137783.90
	Muri Ganga-I	1375	12.19x18.29x1.22	272.01	374013.75
	Muri Ganga-II	1439	15.24x19.81x1.22	368.32	530012.48
	Dhaspara-Sumatinagar-I	1472	10.67x13.72x1.22	178.60	262899.20
	Dhaspara-Sumatinagar-II	1394	13.72x15.24x1.22	255.76	356529.44
	Ramkarchar	1723	15.24x19.81x1.22	368.32	634615.36
	Rudranagar	1585	14.02x18.29x1.22	312.86	495883.10
	Dhablat	1233	13.72x16.76x1.22	280.60	345979.80
	Gangasagar	1397	15.24x17.37x1.22	323.02	451258.94
	Total		12418		2528.55

Source: Gayen.Anadi and Zaman. A.,A Mitigation Of Water and Growing Crop In Lean period By Rainwater Harvesting though Concreted Roof Tops And Household Ponds Sagar Island.

- ▶ The roof of school/college building also may be use for rainwater harvesting and this water may be used for school students.
- ▶ The government and private office building can be used rain water harvesting and this water may be used in drinking, office clean, flashes in office toilet and bath room.  
.Harvested rain water may be flashed in toilet, bath room etc.
- ▶ Rain water can be harvested from clean plastic, umbrella and u shaped structured.
- ▶ Harvested rainwater may be recharged in aquifer by the percolated processes.
- ▶ Harvested rainwater may be supplied to nearest area by pipe line.
- ▶ Construction process (like total areas of place minimize cementing) may be restricted.
- ▶ Government policy may be applied in rain water harvesting to sustainable use of water.
- ▶ Common people should be made aware of rain water harvesting.

At last says that It will be one of the major steps to reduce the use of ground water and the rain water can be used for our daily life.

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