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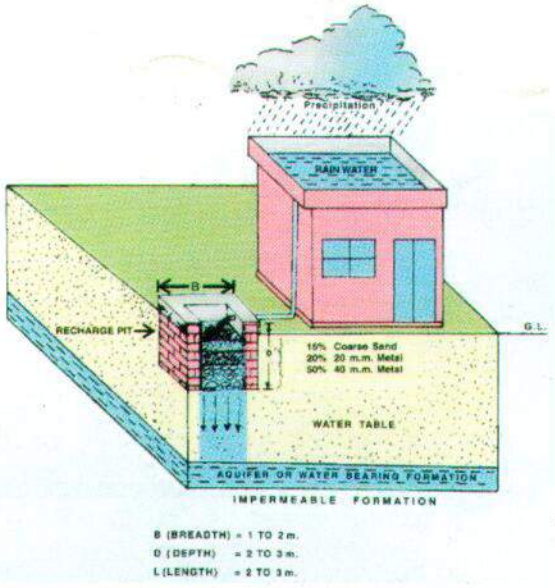
ENVIS CENTRE, CHANDIGARH
NewsLetter
Paryavaran - Patra

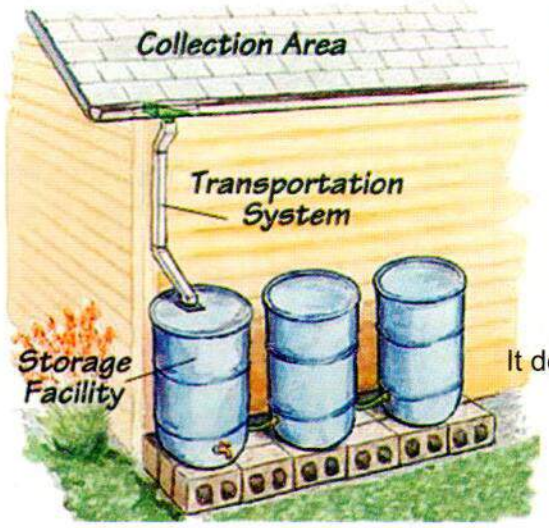
Chandigarh
State of Environment

Ground Water Series Vol

EDITORIAL



Status of Groundwater and water table has gained substantial attention of environmentalists and rest of people recently. With the reports and predictions, supported by media and some scientific queries, of drying up earth in terms of resources of drinkable water has brought number of professional and personals to study and concern ground water and its related issues. The research is taken to next level by the speculations of fourth world war over water resource. It is true that water resources of world, particularly in developing countries, are not managed. India has plenty of natural resources but ignorant people are over either consuming or wasting it. Chandigarh, a city of literate and environment conscious people, has an advantage of its geographical location and life style that has less scope to pollute the ground water. Yet city has two major problems related to ground water to deal with. First, Deep Aquifers are depleting and second, Shallow Aquifers are causing water logging. Administration has taken steps to feed/recharge ground water resources. Numbers of rain water harvesting structures are in place. Awareness oriented activities are performed. Let us pledge not to waste a single drop of water.



It doesn't matter how you do. It doesn't matter how much you do.
Just Save It !
Every drop you save adds up to water resources.

Additional Director, Environment

For Private Circulation only

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Paryavaran patra

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THREATS TO GROUND WATER

Ground water is precious source of water and integrated part of daily life by even its existence only. Ground water is threatened by over extraction and exposure to pollution and its side effects. Once contaminated, it is costly affair to clean and make groundwater usable again and once dried up it takes ages to recharge. Major threats to groundwater are stated below:

1. Over extraction:

   The problem is serious around the world but in context of Punjab, the seriousness of the ground water situation can be gauged from the following facts (CGWB & Department of irrigation, Punjab, 2005 as cited in Tiwana et.al., 2007):

   a. The ground water in 75% of total geographical area of the state is over exploited in terms of stage of ground water development, as exploitation is more than 100 percent,

   b. 7% area of the state is under the category of critical and semi critical category

   c. 18 % area of the state is safe for ground water development and only a part of this is in Kandi area zone. The rest is in south western Punjab and is saline and unfit for use.

   d. The situation is alarming for Chandigarh as city meets most of its water related needs getting water from Punjab.

2. Subsidence:

   a. Extraction of groundwater may disturb the balance of pressure maintaining the pours and spaces beneath the surface of earth and cause the land to compact and unable to hold water hence refraining aquifers.

   b. The phenomena is hard to reverse causing permanent damage i.e. drop in ground surface.

3. Seawater intrusion:

   a. Seawater intrusion is threat to ground water in coastal areas where lowered water table may lead to sea water movement towards the aquifers which in turn may percolate salt and mineral beds to narrow aquifers.

4. Mining:

   a. Mining refers to over extraction/usage of water than the rate of recharging the aquifer.

   b. Such sources of ground water are not renewable and water here is often called as fossil water.

5. Pollution:

   a. Probably four agencies are responsible for contamination of ground water i.e. Municipal, Agriculture, Industries, and individuals.

   b. Municipal waste, landfills, leaking sewage disposal, air pollution, chemical spills, fertilizers, pesticides, underground storage, detergents, motor oil, paint, and septic systems etc. are major ground water pollutants or carriers.

   c. Apart from the above ground water during its movement may get contaminated naturally by available minerals in its vicinity.

6. Rising Water Table

   Not only declining water table is cause of concern but rising water table in shallow aquifers also creating problems in southern sectors of Chandigarh creating water logging conditions.

WHAT AND HOW TO RECOVER GROUND WATER

Ground water recharging/cleaning is a very slow and time and money consuming process. Considering this prevention is the cheapest solution to recover ground water. Some of the measures to recover ground water are listed below:

I. Avoid causing threats to ground water

a. The first measure to sustain water table is to avoid any activity that cause threat to ground water.

b. Use only to the minimum when required with no other alternative.

c. Don't pollute.

II. Artificial recharging of ground water:

a. The artificial recharge techniques can be broadly categorised as follows:

i. Direct surface techniques

1. Flooding
2. Basins or percolation tanks
3. Stream augmentation
4. Ditch and furrow system
5. Over irrigation

ii. Direct sub surface techniques

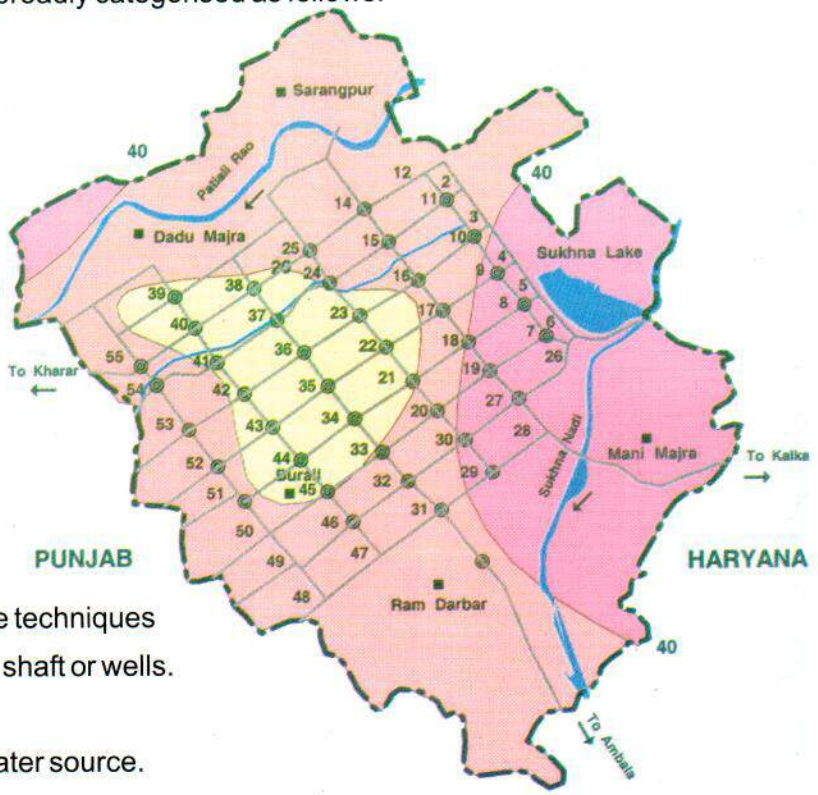
1. Injection wells or recharge wells
2. Recharge pits and shafts
3. Dug well recharge
4. Bore hole flooding
5. Natural openings, cavity fillings.

iii. Combination surface sub-surface techniques

1. Basin or percolation tanks with pit shaft or wells.

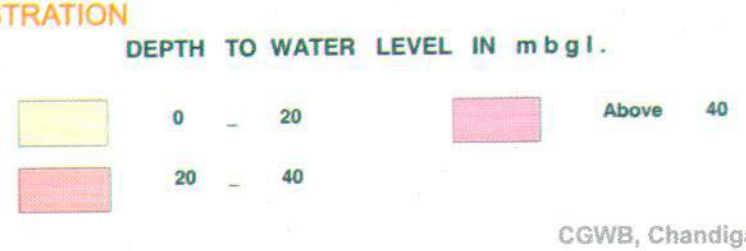
iv. Indirect Techniques

1. Induced recharge from surface water source.
   a. Rain water Harvesting
2. Aquifer modification.



Deep Aquifer Pre-Monsoon

STEPS TAKEN BY CHANDIGARH ADMINISTRATION



Following is an excerpt from the notification issued by Administration on October 21:

All the buildings which are or will be located on plot of one kanal and above shall have rain harvesting system to recharge ground water installed as per the specifications given by the Administration. All the existing buildings shall install rain water harvesting system to recharge the ground water within two years from the date of issuance of this notification.

Some already implemented schemes are also listed in the newsletter ahead.

GROUND WATER Quality DATA 2008

Parameters	Units	Dadu Majra		SEC-15		SEC-22		SEC-34		SEC-47		VILL PALSORA		DHANAS	
		April	October	April	October	April	October	April	October	April	October	April	October	April	October
Temp.	^0C	25.0	24.0	25.0	24.0	25.0	24.0	---	---	24.0	24.0	25.0	24.0	25.0	24.0
pH	---	7.0	7.4	6.9	7.6	6.9	7.4	---	---	7.3	7.9	6.9	7.5	6.9	7.2
Conductivity		1037	1056	1011	844	871	973	---	---	630	752	940	833	966	1104
BOD	mg/l	<1	<1	<1	<1	<1	<1	---	---	<1	<1	<1	<1	<1	<1
COD	mg/l	16	---	12	---	24	---	---	---	23	---	32	---	16	---
NO_3-N	mg/l	5.34	9.50	7.83	8.28	7.05	9.11	---	---	6.30	7.84	6.42	7.30	8.95	9.36
NH_3-N	mg/l	0.11	---	0.15	---	0.33	---	---	---	ND	---	1.18	---	0.10	---
Turbidity	NTU	0.20	---	0.35	---	6.90	---	---	---	0.12	---	24.40	---	0.35	---
P-alk	mg/l	NIL	---	NIL	---	NIL	---	---	---	NIL	---	NIL	---	NIL	---
T-alk	mg/l	384	---	304	---	380	---	---	---	312	---	452	---	392	---
Hardness as $CaCO_3$	mg/l	330	---	350	---	450	---	---	---	330	---	230	---	400	---
Ca as $CaCO_3$	mg/l	250	---	140	---	320	---	---	---	260	---	170	---	340	---
Mg as $CaCO_3$	mg/l	80	---	210	---	130	---	---	---	70	---	60	---	60	---
Sulphate	mg/l	36	---	42	---	33	---	---	---	18	---	53	---	29	---
TDS	mg/l	604	---	496	---	604	---	---	---	363	---	543	---	533	---
Total Fixed Solid	mg/l	402	---	328	---	399	---	---	---	210	---	390	---	343	---
TSS	mg/l	4.0	---	4.0	---	5.0	---	---	---	5.0	---	6.0	---	4.0	---
Fluoride	mg/l	0.19	---	0.09	---	ND	---	---	---	0.11	---	0.32	---	0.20	---
Chloride	mg/l	60.0	---	46.0	---	65.0	---	---	---	30.0	---	26.0	---	47.0	---
Phosphate	mg/l	0.11	---	0.08	---	0.70	---	---	---	0.07	---	0.10	---	0.08	---

Member Secretory, CPCC, Chandigarh

GROUND WATER QUALITY DATA 2009 (APRIL)

Parameters	Units	Dadu Majra	SEC-15	SEC-22	SEC-47	VILL PALSORA	DHANAS
		April	April	April	April	April	April
Temp.	^0C	25.00	25.00	26.00	26.00	26.00	25.00
pH	---	7.30	7.90	7.30	7.30	7.30	7.20
Conductivity		1036.00	880.00	819.00	856.00	747.00	1051.00
BOD	mg/l	<1	<1	<1	<1	<1	<1
COD	mg/l	10.00	10.00	10.00	5.00	15.00	15.00
NO_3-N	mg/l	6.86	9.51	0.96	1.03	BDL	13.58
NH_3-N	mg/l	0.18	0.20	0.15	0.10	0.67	0.30
Turbidity	NTU	3.19	1.80	2.05	2.01	22.00	3.60
P-alk	mg/l	Nil	Nil	Nil	Nil	Nil	Nil
T-alk	mg/l	420.00	340.00	336.00	328.00	336.00	400.00
Hardness as $CaCO_3$	mg/l	112.00	150.00	144.00	175.00	123.00	168.00
Ca as $CaCO_3$	mg/l	103.00	97.00	68.00	169.00	65.00	148.00
Mg as $CaCO_3$	mg/l	9.00	53.00	76.00	6.00	58.00	21
Sulphate	mg/l	40.09	46.18	46.91	86.50	48.09	39.18
TDS	mg/l	654.00	561.00	580.00	602.00	504.00	656.00
Total Fixed Solid	mg/l	377.00	294.00	356.00	360.00	285.00	350.00
TSS	mg/l	4.00	3.00	4.00	4.00	4.00	4.00
Fluoride	mg/l	0.61	0.75	0.50	0.48	0.58	0.36
Chrome^{+6}	mg/l	Nil	Nil	Nil	Nil	Nil	Nil
Chloride	mg/l	46.00	32.00	44.00	27.00	44.04	47
Phosphate	mg/l	0.04	0.03	0.06	0.03	0.09	0.03

Member Secretory, CPCC, Chandigarh

Most of the groundwater is declared safe in Chandigarh from deep aquifers but it is depleting and need to be recharged. Chandigarh receives 1061 mm rainfall annually which can be used to recharge the ground water reservoirs. 80% of total rain is received during June -September. Counting the resources ideally one may save 16 cum of water by using 20 sqm of roof top area. Central Ground water board has taken steps to collect and maintain this natural resource by implementing rain water harvesting structures :

RAIN WATER HARVESTING SCHEMES IMPLEMENTED BY CENTRAL GROUND WATER BOARD

1. Scheme of rooftop rainwater harvesting at CSIO Complex, Chandigarh (1998-99).
2. Artificial recharge to ground water under central Sector scheme in Panjab University, Chandigarh (2000-2001).
3. Artificial recharge to ground water in Leisure valley, Chandigarh (2000-2001).
4. Scheme for roof top rainwater harvesting at Bhujal Bhawan Chandigarh (2001-2002).
5. Artificial recharge to ground water at office of Chandigarh Housing Board in sector 9, Chandigarh (2001-2002).
6. Scheme for rainwater harvesting at DAV School in Sector-8, Chandigarh (2001-2002).
7. Artificial recharge to ground water at TTTI, Sector-26, Chandigarh (2001-2002).
8. Scheme for utilizing surplus water monsoon runoff for sector27, 19, 30, 20, Chandigarh (2001-2002).
9. Artificial recharge to ground water for Government College for Girls, Sector 11, Chandigarh

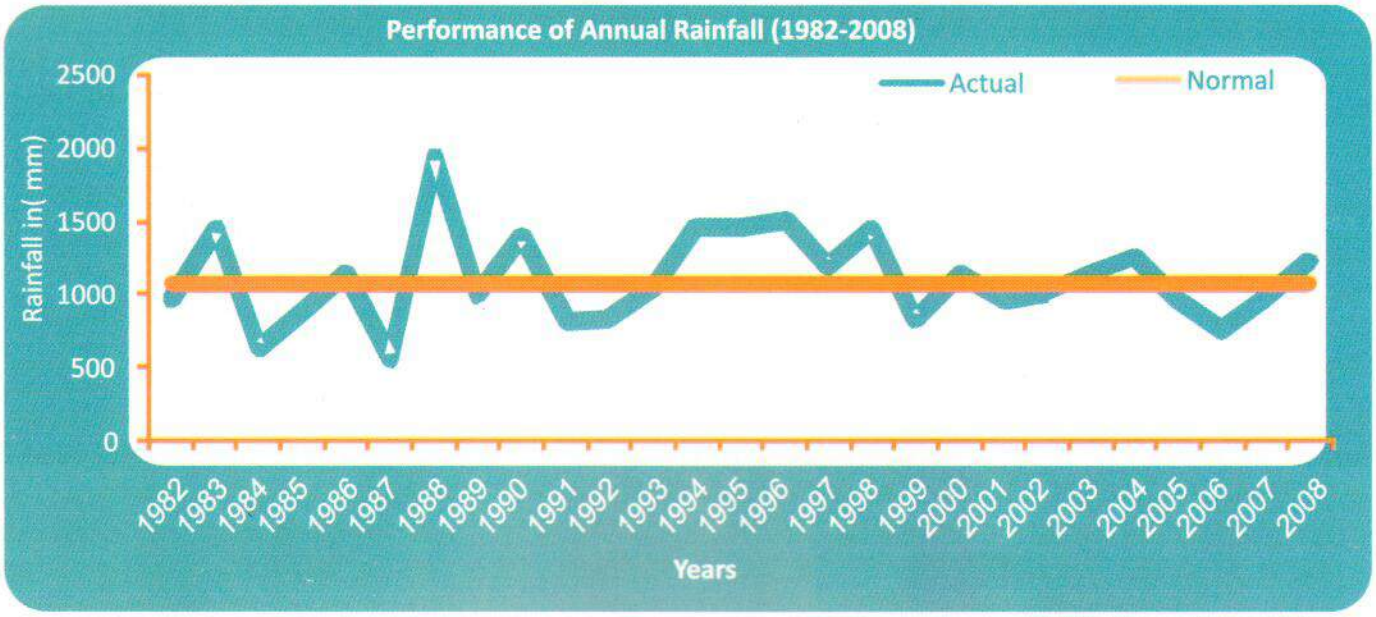
HOW MUCH CAN I SAVE?

Rainfall(mm)	100	200	300	400	500	600	800	1000	1200	1400	1600	1800	2000
Roof top area (sqm)	Harvested water from Roof top (cum)												
20	1.6	3.2	4.8	6.4	8	9.6	12.8	16	19.2	22.4	25.6	28.8	32
30	2.4	4.8	7.2	9.6	12	14.4	19.2	24	28.8	33.6	38.4	43.2	48
40	3.2	6.4	9.6	12.8	16	19.2	25.6	32	38.4	44.8	51.2	57.6	64
50	4	8	12	16	20	24	32	40	48	56	64	72	80
60	4.8	9.6	14.4	19.2	24	28.8	38.4	48	57.6	67.2	76.8	86.4	96
70	5.6	11.2	16.8	22.4	28	33.6	44.8	56	67.2	78.4	89.6	100.8	112
80	6.4	12.8	19.2	25.6	32	38.4	51.2	64	76.8	89.6	102.4	115.2	128
90	7.2	14.4	21.6	28.8	36	43.2	57.6	72	86.4	100.8	115.2	129.6	144
100	8	16	24	32	40	48	64	80	96	112	128	144	160
150	12	24	36	48	60	72	96	120	144	168	192	216	240
200	16	32	48	64	80	96	128	160	192	224	256	288	320
250	20	40	60	80	100	120	160	200	240	280	320	360	400
300	24	48	72	96	120	144	192	240	288	336	384	432	480
400	32	64	96	128	160	192	256	320	384	448	512	576	640
500	40	80	120	160	200	240	320	400	480	560	640	720	800
1000	80	160	240	320	400	480	640	800	960	1120	1280	1440	1600
2000	160	320	480	640	800	960	1280	1600	1920	2240	2560	2880	3200
3000	240	480	720	960	1200	1440	1920	2400	2880	3360	3840	4320	4800

Ministry of Water Resources, India

Readers can easily correlate above data to graph of rainfall given below. The above table shows the saving of rain water via roof top harvesting against the given roof top area and rainfall. Graph given below tells the actual rainfall figures in Chandigarh for the period 1982-2008.

RAINFALL IN CHANDIGARH



MET Office, Chandigarh

Dear Information Seeker,

ENVIS CENTRE, Chandigarh furnishes you with the services to collect and disseminate information related to environment of Chandigarh. To share information with us you are requested to fill up the form given below.

Your feedback is valuable to us and will be highly appreciated

- Name .....
- Designation .....
- Department .....
- Address .....

..... City .....

- State ..... Country ..... Pin
- Phone ..... Fax .....
- Email .....

Your views on scope of improvement :

- Interest Area .....

I would like to have information on following :

e-mail : ch@envis.nic.in • Web : www.chandigarhenvis.gov.in

ENVIS CENTRE, CHANDIGARH
NewsLetter
Paryavaran - Patra

ENVIS CENTRE TEAM

Mr. Ishwar Singh
(Director Environment)

Mr. P.J.S. Dadhwal
(Project Coordinator)

Er. Arun Bansal
(Sr. Programme Officer)

Mr. Surinder Kumar
(Data Entry Operator)

Central Ground Water Board assisted rain water harvesting projects

1 . ISBT, Chandigarh, The Executive Engineer, Project PH Division No. 1, Chandigarh.

2 . GPRA quarters, Sector 7, The Executive Engineer, CPWD Division-2, CPWD, Chandigarh.

3 . Ryan International School, Sector 49-B, Chandigarh (U.T.)

4 . Judicial Academy, Sector-43, Chandigarh. Executive engineer, PH Division 7, sector-11

5 . Petrol Pump sector-41, Bharat Petroleum Corporation Ltd., Sector 19-B, Madhya Marg, Chandigarh

CGWB, Chandigarh

RAIN WATER HARVESTING PROJECTS (Contd...)

6. Indian Oil Petrol Pump, Sector 28-C, Chandigarh.
7. National Bank For Agriculture and Rural Development, Plot No. 3, Sector-34-A
8. A.G. Punjab Building, The Assistant Engineer, CPWD, Division VIII,
9. DLF Complex, IT Park, Kishangarh, Chandigarh.
10. BBMB complex, Sector 19, Chandigarh
11. Plot No. 4 and 5 for the existing building of A.G. Haryana, Sector 33-B, Chandigarh (U.T.). Chandigarh Central Sub Division No. 10, Central Public Works Department,
12. Geological survey of India, Sector 33-B Chandigarh Central Sub Division No. 10,Central Public Works Department,
13. Air force station, Sector 31 and Sector 47 for Married Accommodation Project (MAP).The Chief Engineer, HQ, CE Chandigarh Zone, 'N' Area, Airport Road, Chandigarh - 160 003.
14. G.G.D.S.D. College, Sector 32, Chandigarh.

SPO, Chandigarh

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To,

Book Post