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Assessment the Quality of Water Storage from Rainwater Harvesting from Land Surface Catchments near the Asphalts Roadway in Rural Areas

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Abstract

The aim of this study is to assessment the quality of water storage from rainwater harvesting collected from various land surface catchments near asphalt roadway in rural areas . Rainwater harvesting was storage in underground reservoirs (cistern) system. Water samples for the quality was collected from sixty (60) underground reservoirs (cistern) in the study area during the rain session for year 2005-2006. The samples were analyzed for their physical and chemical qualities. The results showed that the qualities of the collected water samples were within the limits approved by the World Healthy Organization (WHO) and Libyan Stander Specification of Drinking Water. An exception for cadmium ions where its concentration in 56 water samples out of 60water samples is considered high and dose not match. The results of this study showed that the application of an appropriate rainwater harvesting technology can make possible the utilization rainwater as valuable and in many cause necessary water resource. Rainwater harvesting is necessary in areas having significant rainfall but lacking any kind of conventional centralized government supply system and also areas where good quality fresh surface water or groundwater is lacking.

Keywords: Rainwater harvesting, Rainwater quality, Cisterns**.**

Introduction

Worldwide rainwater is harvested from many surfaces including rooftops and ground surfaces. The quality of harvested rainwater depends upon many factors such as air quality, system design and maintenance, materials used, rainfall intensity, length of time between rainfall events, social context as well as water handling. Conflicting data also exists to how rainwater becomes contaminated .Some literature shows that contamination occurs from the catchment area; some suggests it stems from conveyance and storage, others propone that water handling is the main issue. Lye (2002) showed that the rainwater collection process is the source of contamination. On the other hand Mintz et al. (2001) wrote that during collection, transport and storage, consumers face significant health risks. This and other literature highlights the importance of proper maintenance and water handling through the entire process. In addition to the harvesting and handling of rainwater, the environmental surroundings of the catchment system play an important role in water quality. In industrial areas, the risk of sulfur dioxide, nitrous oxide as well as other industrial emissions is present and can cause acid precipitation (UNEP,2000). Gould and Nissen-petersen (1999) note that consuming collected rainwater in highly industrialized or trafficked areas should be avoided. Water quality also affected by the rainwater catchment system components, such as roofing materials. Gould and Nissen-Petersen(1999) agree that the construction materials used are important factors to maintain quality rainwater. Social context also plays a role in water quality . People without the economic means or knowledge about rainwater purification methods will not have access to safe water . Other socio-cultural barriers exist that may affect the quality of water consumed.

The quality of rain water is one reason to use rain as primary drinking water source. However , once rainwater comes in contact with materials in the catchment system ,contaminants can be introduced that adversely affect human health. The need for quality water has been well documented and is crucial for human and ecosystem health(Mintz, bartram, lechery 2001)

However, in resent years where rainwater has been used as household drinking water supply, a concern on its quality has been questioned both by implementing organizations as well as the communities. One of the main constraints on using rain water for domestic use has been the water quality aspects .

Absolute quality of rainwater collected depend on the cleanliness of the atmosphere, material used for the catchment surface ,gutters and down pipe the storage tank and the water extraction device as well as level of maintenance of the catchment system . In rural areas atmospheric pollution is not generally thought to be a problem.

In industrialized urban areas atmosphere pollution has made rainwater unsafe to drinking (Thomas and Green1993).Especially in areas with high traffic intensity and heavy industries where heavy metals such as lead are found in the atmosphere.(Gould, 1999). The purpose of this research is to assessment the quality of water storage from

rainwater harvesting collected from various land surface catchments near asphalt roadway in rural areas.

Description of Study Area

The study area is rural village located in the south Tripoli Libya. It is located between 13^{o}. 07' and 13^{o} .15' E longitude and 31^{o} .51'and 32^{o} .09' N latitude. The average annual rainfall in the area is about 200mm occurred during November to May . During the raining season , the cisterns have the chance to store rainwater and get full. This stored rainwater is the main source of water for domestic use in the study area.

Sixty cisterns with a catchment's areas near the roadway were selected to develop this study. Water samples from all cisterns were collected during the rain season 2005 and analysis for their quality. Physical and chemical parameters were measured and compared with international guidelines. The parameters selected for analysis are these that are necessary for basic water quality monitoring programs. Water analysis was done completely at the laboratory of chemical department using procedures of the standard methods for the examination of water and wastewater.

Results and Dissections

In the following tables (1-A, 1-B and 2-A, 2-B) we present the results about chemical, and physical water quality data of the water samples from cisterns compared with some international guidelines. The parameters selected for analysis are those that are necessary for basic water quality monitoring programs. Since here we are interested in potable water characteristics, we have selected the following parameters:

Temperature, Taste ,Odor, turbidity , Suspended materials, Total, dissolved solids (TDS) Electrical conductivity (EC), PH, Chloride, Nitrate Phosphate, Sulplate, Silica, Sodium, Potassium, Oxygen dissolve, Carbonate, Bicarbonate, Calcium, Magnesium ,Total Hardens, Cadmium, Lade, Orin.

The physical parameters, temperature, taste, odor, turbidity, Electrical conductivity, suspended materials, total dissolved solids was measured and compared to WHO guideline. Water temperature is one of the most important water quality parameters and has directed affects on water chemistry. The result indicate that the temperature in the water sample range from (17 -24) C^{o}.

The results indicate that the taste of all harvested water samples was acceptable, also the result indicate no odor in the water samples. Turbidity analysis shows that most of water samples have low and very low turbidity. From all samples only three samples show high turbidity. This is probably due to the resuspension of accumulated sediments during water extraction from the cistern. Electrical conductivity (EC) of the water samples is low. It is range from (585-150.3) µs/cm. These values indicating the absence

of any salinity hazard. The total dissolved solids (TDS) values of the water samples are very good and it is in the limits approved by the WHO guideline.

Usually, we measure turbidity to provide estimate of the total suspended solids (TSS) or sediments concentration. The results indicate that the values of TSS are acceptable, it is range from (0.8-8.4) mg/L and it is in limits approved by the WHO guideline. The PH values of the water samples range from (7.03-8.4).This result approved that the PH values in all samples are within required range of drinking water.

Water samples were analysis for chemical parameters. The results show acceptable values for different parameters. The results show low values for chloride concentration, it is range from (2.60-49)mg/L. From the nitrate contamination point view, the water samples show acceptable values within the limits of WHO guideline. The values range from (0.58-6.25) mg/L. Also the results show low values of Phosphate, it is rang from (0.0040-0.155)mg/L. Non homogenous in Phosphate concentration in the study samples may be due to the plant and animal materials in the catchments where is the runoff happened during rainfall. The results indicate that the Sulphate concentration in the water samples are within required range of drinking water. It is range from (4.78-52.24) mg/L. Silica concentration in water samples are within the limits required for drinking water. It is range from (0.063-3.63)mg/L. The results indicate that Sodium and Potassium concentration range from (1.9 -14.4) mg/L for Sodium and 1.5-17mg/L for Potassium. In respect to Sodium and Potassium, the results indicate that all analyzed samples did not exceed safe limits. In respect to dissolved oxygen (DO), the results indicate acceptable values. It is range from 7.8 mg/L to10.4 mg/L. The average value of bicarbonate (HCO_3) in collected water samples are range from (85.75 - 377.4) mg/L. In respect to bicarbonate, the collected samples were found within the safe limits except three samples exceeded the safe limit. Collected water samples were analysis for total alkalinity (TA). Alkalinity of water is its acid-neutralizing capacity. It is primarily a function of carbonate, bicarbonate and hydroxide contents. The average value of total alkalinity in collected water samples are range from (70.29 - 309.37) mg/L. Calcium and magnesium are the dominant anion in most surface and ground water. There content may rang from zero to several hundred milligrams. The concentration of calcium in collected water samples range from (17.97 -64.24) mg/L and from (3.20 - 16.67) mg/L for magnesium. These results indicate that all samples were found in safe limits of drinking water guidelines in respect to calcium and magnesium. Calcium and magnesium are the possible sources of total hardness by $CaCO_3$. The results of analysis show that the values of total hardness in all samples rang from 66.62 to 228.88 mg/L, which is within safe limits of WHO guideline .Iron is an essential element in human nutrition. Its presence in natural waters can be attributed to dissolution of rocks. Excessive iron in water makes the taste unpalatable. WHO has recommended 0.3mg/L as guideline values for iron. In this study , all collected samples were found within safe limits except one sample exceeded the safe limits. The main sources of the lead are paints, lead pipes, wastes of batteries manufacturing industry and leaded

gasoline. In this study, water samples were analyzed for lead concentration. The results of all analyzed samples were found within permissible value rang from (20-7.79) µgm/L. These results show that all water samples are within the limits of WHO guideline. For this study , cadmium concentration were measured in all water samples collected from the cisterns. The results indicate the cadmium concentration range from (2.3-24) µgm/L. This results show that all water samples excess the limits of WHO guideline except three samples were found within the safe limits. The possible source of cadmium in most samples may be due to the cars and other vehicles products which carried by runoff to the cisterns. The other source may be due to the place of cisterns near the roadway.

Table 1 -A: Physical Properties of cisterns samples

No	Taste	Odor	Turbidity	EC µs/cm	Suspended Materials mg/l	TDS mg/l	Tempe/C°
1	Accept	No odor	Low	308	3.06	237	17.1
2	Accept	No odor	High	364	6.2	279	19.4
3	Accept	No odor	High	585	8.4	519	20.1
4	Accept	No odor	Very low	231	2.33	179.5	20.4
5	Accept	No odor	Very low	295	3.53	231	23.8
6	Accept	No odor	Very low	266	3.56	210	18.9
7	Accept	No odor	Transpire	330	4.1	240	18.8
8	Accept	No odor	Transpire	294	3.3	219.5	20.5
9	Accept	No odor	Very low	200	3.61	164	19.5
10	Accept	No odor	Transpire	244	2.6	201	20.5
11	Accept	No odor	Transpire	365	4.2	279	19.1
12	Accept	No odor	Transpire	333	4.5	270	20.5
13	Accept	No odor	Transpire	224	3.43	177	21
14	Accept	No odor	Very low	279	4.5	219.5	20.1
15	Accept	No odor	Transpire	258	4.6	203	22
16	Accept	No odor	Very low	227	2.73	1.83.5	22.1
17	Accept	No odor	Very low	181.4	1.86	148	23.3
18	Accept	No odor	Very low	237	2.32	196	22.7
19	Accept	No odor	Very low	213	3.3	179	23.7
20	Accept	No odor	Very low	342	2.5	272	23.2
21	Accept	No odor	Very low	173.4	3.72	146	20.8
22	Accept	No odor	Very low	329	4.2	256	19.8
23	Accept	No odor	Very low	240	0.93	186	22
24	Accept	No odor	Very low	267	2.78	241	22.1
25	Accept	No odor	Very low	319	7.5	268	22.6
26	Accept	No odor	Very low	336	4.21	299	21.5
27	Accept	No odor	Very low	287	4.36	239	24
28	Accept	No odor	Very low	356	3.42	278	21.9
29	Accept	No odor	Very low	229	2.77	211	23
30	Accept	No odor	Transpire	279	2.92	271	23.3

Table 1-B Physical Properties of Cisterns samples

No	Taste	Odor	Turbidity	EC µs/cm	Suspended materials mg/l	TDS mg/l	Temper/ C^o
31	Accept	No odor	Low	260	3.04	243.5	22.4
32	Accept	No odor	Low	259	2.77	244	21.1
33	Accept	No odor	Low	150.3	3.41	151.5	18.1
34	Accept	No odor	Low	289	1.99	248.5	23
35	Accept	No odor	Low	221	2.9	193	22.9
36	Accept	No odor	High	316	5.2	253	23.6
37	Accept	No odor	Low	317	2.31	320	22.9
38	Accept	No odor	Low	238	2.75	220	23.2
39	Accept	No odor	Low	346	4.21	261.5	23.4
40	Accept	No odor	Low	400	2.86	292	21.2
41	Accept	No odor	Low	459	4.2	347	22.1
42	Accept	No odor	Transpire	395	2.3	266.5	21.6
43	Accept	No odor	Low	432	2.36	340	22.4
44	Accept	No odor	Low	236	3.2	198.5	23.2
45	Accept	No odor	Low	367	0.8	291	24.1
46	Accept	No odor	Low	290	2.7	245	22.6
47	Accept	No odor	Low	408	2.36	312.5	22.9
48	Accept	No odor	Low	355	4.21	243.5	23
49	Accept	No odor	Low	297	2.031	223	23.8
50	Accept	No odor	Low	476	2.46	263	21.7
51	Accept	No odor	Low	279	4.16	209.5	21.9
52	Accept	No odor	Low	337	5.01	260	22.8
53	Accept	No odor	Low	293	6.31	246	20.1
54	Accept	No odor	Low	274	3.06	231	20.9
55	Accept	No odor	Low	287	2.66	243.5	22
56	Accept	No odor	Transpire	354	2.83	290	23
57	Accept	No odor	Low	291	2.91	239.5	24
58	Accept	No odor	Low	362	3.18	251	21
59	Accept	No odor	Low	330	2.11	259.5	22.2
60	Accept	No odor	Low	329	3.06	246.5	23

Table 2-A: Chemical Properties of Cistern Samples

No	PH	CL mg/l	No_3 mg/l	PO_4 mg/l	SO_4 mg/l	SOi mg/l	Na mg/l	K mg/l b	DO mg/l	HCO_3 mg/l	TA mg/l	Ca mg/l	Mg mg/l	TH mg/l	Fe mg/l	Pd µg/l	Cd µg/l
1	7.95	9.18	1.06	0.007	6.7	1.05	3.4	2.5	10.1	161.1	132.1	45.2	6.57	139.83	0.06	7.79	2.76
2	7.8	6.2	1.01	0.037	13.07	1.4	6.0	6.0	10	189.6	155.43	48.38	7.53	151.8	<0.06	11.98	10.44
3	7.03	9.55	3.61	0.011	19.13	3.04	7.5	17	9.2	377.4	309.37	64.24	16.67	228.88	0.097	18.42	7.15
4	8.08	6.94	0.99	0.012	6.37	0.58	3.4	4.5	10.1	118.3	97.02	29.34	7.37	103.55	<0.06	15.84	6.88
5	8.4	4.96	1.19	0.012	5.75	0.063	4.1	13.1	7.8	159.4	130.68	33.83	5.77	107.2	0.22	16.61	12.24
6	7.93	6.2	0.87	0.012	9.56	0.919	3.1	2.5	10.1	140.1	114.89	35.42	7.37	118.72	0.20	16.61	16.14
7	7.86	12.77	1.04	0.017	19.45	0.84	5.5	3.5	8.5	141.9	116.32	44.94	7.37	142.47	0.097	15.82	15.18
8	8.4	11.6	1.93	0.01	11.48	0.82	4.7	3.0	10.2	137.6	112.86	37.01	7.05	121.36	<0.06	18.84	11.84
9	7.95	4.46	1.36	0.018	6.06	1.86	4.1	9.5	9.8	103.8	85.14	23.26	4.97	78.49	0.097	14.46	19.78
10	8.29	6.42	2.32	0.019	19.13	1.69	4.1	6.5	10.4	112.9	92.56	43.63	6.88	170.17	0.20	14.06	9.73
11	7.79	15.8	0.89	0.014	10.84	1.21	7.5	3.0	9.9	177.5	145.53	48.38	9.13	158.3	<0.06	15.03	9.1
12	7.74	8.18	3.12	0.015	11.08	0.71	3.4	9.0	8.3	179.9	147.51	42.56	10.41	149.06	<0.06	12.88	7.8
13	7.99	5.7	1.09	0.015	7.01	1.1	3.1	8.0	9.8	114.7	94.05	29.87	4.97	95.05	<0.06	14.58	5.9
14	8.14	5.83	1.01	0.053	19.31	1.01	4.4	6.5	9.0	139.4	114.34	35.16	4.97	108.17	<0.06	16.27	11
15	7.75	4.71	1.57	0.03	4.78	0.97	2.5	4.0	9.0	135.2	110.88	36.48	7.37	121.36	<0.06	16.61	9.3
16	8.09	3.94	1.09	0.04	7.65	0.93	2.2	4.5	8.9	123.1	100.98	33.83	3.20	97.62	<0.06	9.71	21.1
17	8.08	6.2	0.77	0.014	10.84	0.52	3.1	3.0	10.3	85.75	70.29	23.52	4.81	78.5	<0.06	17.06	10.4
18	8.05	2.6	0.83	0.016	8.93	0.89	1.9	2.5	9.3	131	107.41	35.16	6.24	113.45	<0.06	19.21	16
19	7.84	6.2	1.03	0.014	18.99	0.61	2.6	3.0	8.6	111.7	91.57	28.02	5.13	91.02	<0.06	14.49	13.2
20	7.65	13.27	1.56	0.008	15.19	0.8	5	4.0	10.1	167.8	137.61	43.62	10.09	150.38	<0.06	14.58	11.5
21	8.33	3.47	1.05	0.032	7.65	0.86	3.4	11.9	10.1	89.9	73.75	17.97	5.29	66.62	<0.06	12.66	12.8
22	8.24	16.87	1.17	0.047	15.62	1.20	9.5	4.5	10.4	147.9	121.27	30.93	11.54	124.66	0.40	14.58	2.30
23	8.28	14.04	1.89	0.011	22.16	0.92	7.5	3.0	10.2	90.5	74.25	26.43	10.42	108.83	<0.06	11.98	11
24	7.7	7.64	2.03	0.155	12.34	1.09	4.4	6.0	10.2	148.5	121.77	44.15	6.89	138.51	<0.06	16.27	5.6
25	7.37	5.42	4.94	0.028	10.76	1.56	2.9	6.0	8.9	172.1	141.07	50.49	8.49	161.03	<0.06	17.63	20.9
26	7.63	3.95	5.43	0.022	25.32	1.42	2.9	5.0	10.3	190.8	156.42	57.1	6.37	170.17	<0.06	12.88	18.6
27	7.18	3.56	3.14	0.006	12.34	1.9	1.9	3.5	8.6	158.8	130.18	48.11	4.8	139.83	<0.06	9.83	24
28	8.15	5.18	3.21	0.023	25.51	0.95	3.7	5.0	9.4	167.8	137.61	53.13	8.11	166.07	<0.06	13.56	9.8
29	8.3	4.68	1.27	0.018	15.51	1.1	3.4	5.0	9.3	135.2	110.88	35.16	6.89	116.09	<0.06	11.19	12.4
30	7.4	3.45	2.75	0.013	11.16	1.19	2.5	5.0	8.0	183.5	150.48	51.28	6.73	155.66	<0.06	19.1	13

Table 2-B: Chemical Properties of Cistern Samples

No	PH	CL mg/l	No_3 mg/l	PO_4 mg/l	SO_4 mg/l	SOi mg/l	Na mg/l	K mg/l	DO mg/l	HCO_3 mg/l	TA mg/l	Ca mg/l	Mg mg/l	TH mg/l	Fe mg/l	Pd µg/l	Cd µg/l
31	7.87	3.7	0.87	0.02	6.37	1.24	2.9	4.5	7.9	165.4	135.63	47.32	5.12	139.29	<0.06	18.42	8.7
32	8.2	4.68	0.93	0.016	7.65	1.33	3.4	9	9.1	164.2	134.64	42.29	8.17	139.17	<0.06	14.01	10
33	8.39	7.4	0.58	0.012	5.42	0.74	3.1	2.5	10.1	93.5	76.72	25.9	10.42	107.51	<0.06	19.44	12.3
34	7.21	6.9	5.84	0.01	15.19	1.1	2.5	3.0	10.2	159.4	130.68	38.33	12.98	149.07	<0.06	18.98	6.8
35	7.78	5.55	0.69	0.015	7.01	0.96	3.8	1.5	9.2	123.7	101.47	32.25	8.01	113.45	<0.06	12.2	\10.3
36	7.72	7.1	1.92	0.008	21.12	1.1	5.03	4.6	8.9	166.6	136.62	32.16	11.01	125.54	<0.06	16.41	14.7
37	7.66	3.08	0.71	0.01	52.24	1.81	2.5	4.0	8.4	191.4	156.91	58.42	4.48	164.24	<0.06	14.35	18
38	7.55	5.66	1.12	0.016	23.43	1.13	3.1	2.1	9.1	138.2	133.35	38.06	6.1	120.04	<0.06	16.5	11.9
39	7.73	5.21	3.55	0.022	7.97	1.14	2.2	5.5	10.2	173.3	142.06	50.49	5.35	148.01	<0.06	14.58	20.2
40	7.15	5.38	5.31	0.041	10.84	1.43	4.1	7.0	9.3	187.2	153.45	56.04	7.85	127.15	<0.06	20	17.9
41	7.36	9.42	2.82	0.007	23.11	2.03	6.5	7.0	8.2	230	188.59	56.57	10.24	184.03	<0.06	16.72	8.1
42	8.02	20.12	1.68	0.053	9.88	1.4	12.2	11.9	10	152.7	125.53	41.24	8.01	135.87	<0.06	13.45	16.4
43	7.24	7.38	6.25	0.0083	25.51	1.98	4.1	8.0	9.0	216.7	177.7	57.63	10.74	187.98	<0.06	18.08	11.2
44	7.6	5.86	3.79	0.015	19.77	1.81	4.5	3.9	8.7	117.1	96.03	32.14	5.8	113.6	<0.06	12.3	18.5
45	7.71	3.47	4.22	0.01	16.26	1.44	3.1	8.0	7.9	186.5	125.95	48.11	12.18	170.17	<0.06	12.2	6.0
46	7.37	6.46	4.05	0.042	16.78	1.34	6.5	10.6	8.6	139.4	114.34	47.58	5.61	141.81	<0.06	19.21	15.3
47	7.86	4.23	2.24	0.008	17.54	1.27	4.4	9.0	9.2	205.9	168.8	56.04	8.17	173.47	<0.06	19.1	18
48	7.57	15.46	1.61	0.046	8.61	1.24	10	5.5	10.1	146.7	120.28	41.24	6.41	129.28	<0.06	17.06	11.9
49	7.83	10.85	1.06	0.010	9.49	0.9	4.4	4.5	8.6	138.8	113.85	40.44	4.16	118.06	<0.06	15.93	3.5
50	7.88	49	2.33	0.044	27.54	1.24	14.4	7.5	9.4	109.2	89.59	37.01	7.37	122.68	<0.06	18.31	6.1
51	7.86	10.42	1.21	0.026	11.8	0.91	5.0	4.5	8.1	121.3	99.49	34.36	7.37	116.08	<0.06	16.72	15.5
52	7.3	7.23	1.95	0.023	11.48	1.41	4.4	5.5	9.1	162.4	133.15	45.47	8.4	148.01	<0.06	15.03	8.7
53	8.14	6.51	2.11	0.033	23.12	1.31	6.0	5.5	8.7	135.8	111.37	47.32	9.31	156.47	<0.06	15.12	10.3
54	7.55	5.21	1.11	0.017	17.73	1.0	3.4	2.5	7.9	146.1	119.79	38.59	7.53	127.3	<0.06	15.03	11
55	7.99	5.07	0.95	0.065	15.94	1.14	3.1	5.0	8.1	155.8	127.17	43.88	6.4	135.87	<0.06	11.86	13.4
56	7.53	7..69	1.72	0.004	17.82	1.09	3.8	5.0	8.9	198	162.36	39.11	7.93	130.28	<0.06	17.06	16
57	7.76	7.15	1.17	0.018	18.99	0.93	3.4	4.5	9.2	147.9	121.27	40.44	7.7	132.58	<0.06	17.06	10.2
58	7.65	23.83	2.61	0.041	11.71	1.08	12.2	6.5	9.0	137.6	112.86	35.68	8.97	125.98	<0.06	19.55	13.2
59	7.66	4.0	2.1	0.041	36.04	3.63	4.9	4.5	10	144.3	118.3	44.94	11.7	160.32	<0.06	19.04	10.8
60	7.82	8.9	1.2	0.008	6.44	1.12	3.3	2.3	10.1	160.5	131.6	44.3	7.66	142.15	<0.06	7.86	3.0

Conclusion and Recommendations

The results show that the water samples under investigation are in agreement with the Libyan standards of drinking water and that of WHO standards. An exception for cadmium ions where its concentration in 56 water samples out of 60water samples is considered high and dose not match.

Based on the data presented earlier , the following recommendation are made:

Building rainwater cisterns far away from existing cesspits. Building sediment trap basins and cleaning frequently. Removing sediments and cleaning the internal walls of the cisterns before the beginning of the rainy season. Keeping the catchment area clean during the rainy season. Using a bar screen (mesh) at the entrance of the inlet pipe of the cisterns in order to trap solid waste. As a precaution, chlorinating the cistern water at least once after rainy season ends.

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تقييم نوعية المياه المخزنة من حصاد الأمطار من أحواض تجميع بالقرب من الطرق المعبدة في المناطق الريفية

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تهدف هذه الدراسة إلي تقييم نوعية مياه الأمطار المخزنة من أحواض تجميع قريبة من طرق المواصلات في المناطق الريفية ، حيث تم تجميع المياه داخل نظام من الصهاريج التي يتم إنشائها تحت سطح الأرض مزودة بنظام تجميع يسهل نقل المياه من أحواض التجميع وتخزينها داخل هذه الصهاريج. في هذه الدراسة تم تجميع حوالي 60 عينة من هذه الصهاريج لغرض أجراء اختيارات على نوعية هذه المياه من خلال دراسة الخواص الطبيعية والكيميائية للعينات المجمعة خلال الموسم المطري لسنة 2005 – 2006. النتائج المتحصل عليها من الدراسة أوضحت أن خصائص هذه المياه الكيميائية الطبيعية تقع ضمن الحدود المسموح بها في المواصفات القياسية لمنظمة الصحة العالمية وكذلك المواصفات الليبية لمياه الشرب . الدراسة أوضحت أن إمكانية التطبيق الملائم لتقنيات حصاد مياه الأمطار ذو قيمة عالية ومفيد في الظروف التي يتطلب فيها توفر مواد مائية.الدراسة أوضحت أن الحصاد المائي للأمطار يمكن أن يكون مهم جدا خاصة في المناطق التي تعاني من نقص في المياه الجوفية وكذلك في الظروف التي تفتقر أو تعاني من عدم وجود أنظمة تزويد بالمياه ذات المواصفات الجيدة.

الكلمات المفتاحية: حصاد مياه الأمطار– جودة المياه – الصهاريج تحت الأرض.