Chapter – 3: RESULTS

1 Water Quality Parameters.

2 Soil Quality Parameters.

3 Plankton Analysis.

4 Biodiversity of Mollusca.

5 Fish Data Analysis.

6 Health Data Analysis.

The study of physico-chemical properties of an aquatic ecosystem is important because fluctuations in water quality have an influence on its biotic communities. Water samples collected from Sama pond and Harni pond were analyzed for some essential physico-chemical parameters in the laboratory to understand general as well as site specific water quality status. This chapter contains all observations made in the form of result tables and graphs.

Water Quality Parameters:

Water Quality Parameters of Sama pond:

In the first year i.e. 2007-08 the pH value ranged from 7.4 to 11.1 for all the three sites which indicate that the samples were alkaline in nature. In the second year i.e. 2008-09 the highest value of pH was recorded during summer months at site-1 and site-3 and the minimum values were observed in winter and monsoon respectively at site-1 and site-2 (Table- 3.1, Fig- 3.1). The surface water temperature fluctuates from 18°C to 30°C during total period of observations. In 2008 the highest value of temperature was recorded in September while lowest of 18°C in February (Table- 3.2, Fig- 3.2) which represents the seasonal fluctuations. The maximum and minimum temperatures (22°C - 29°C) of pond water were observed in the months of July and January respectively on all the sites in 2009.

The acidity ranged from 0 to 40 mg/l and its value was recorded lowest at site-3 in first year. In second year the acidity values ranged between 0 to 85 mg/l at all the sites and it was highest in monsoon months at site-1 and at site-2 and was

not in detectable range in winter months (Table- 3.3, Fig-3.3). The alkalinity varies from 172 to 440 mg/l in 2008 which was recorded highest at site-3 in the month of May and minimum during monsoon season. In year 2009 alkalinity ranged from 212 to 540 mg/l and the highest values of alkalinity were recorded in monsoon season at all the sites (Table- 3.4, Fig- 3.4). The chloride values ranged from 122 to 594 mg/l in first year which was recorded highest at site-3 in July and lowest - 122mg/l at site-1 in the month of April (Table- 3.5, Fig-3.5). In the second year the concentration of chloride in the pond ranged from 200mg/l to 452 mg/l at all the sites. In first year the amount of water hardness ranged from 40 to 176mg/l at all the 3 sites. In second year the water hardness on the entire study site ranged from 100 to 244 mg/l which was highest during monsoon and lowest in winter at site-3 and in summer at site 1 and 2 both (Table-3.6, Fig-3.6). In the first year Ca^{++} hardness was recorded highest in monsoon at site-1. In the second year its value was highest in December at site-2 (Table-3.7, Fig-3.7). In first year Mg^{++} hardness was highest in month of April at site-3 and was lowest in monsoon at site-1and site-3. In the second year it was recorded highest in winter and summer months at all the sites (Table-3.8, Fig-3.8).

The value of Total Solids (TS) ranged from 400 to 2000mg/l in the first year which was recorded highest at site-2 in the month of May. In the second year TS ranged from 400 to 600 mg/l and its minimum value was recorded at all the sites in monsoon and maximum at site-1 during summer and at site-2 and 3 in winter (Table-3.9, Fig-3.9). In the first year the Dissolved Oxygen (DO) ranged from 0.8

to 10.4 mg/l and the minimum value of DO 0.8 mg/l was recorded at site-2 in the month of November. The value of DO ranged from 0 to 10 mg/l during second year and the highest value of DO was observed in winter at site-1 and site-2 and in monsoon at site-3 while lowest at site-3 in (February) winter (Table-3.10, Fig-3.10). The values of nitrate ranged from 0.36 to 9.4 mg/l in first year. In the second year the same ranged from 0.64 to 5.6 mg/l and was recorded highest in summer months and early monsoon on all the sites (Table-3.11, Fig-3.11). During first year Total Phosphorus values varied from 0.06 to 5.88 mg/l. The Total phosphorus values varied from 0.2 to 3.29 mg/l in second year and high concentration of Total phosphorus was recorded in July at site-3 and minimum values of Total phosphorus were observed in winter at site-1 and site-2 (Table-3.12, Fig-3.12).

Table- 3.1: pH for year 2007 to 2009.

YEARS	2007-2008			2008-2009		
MONTHS/SITES →S1	S1	S2	S3	S1	S2	S3
NOV	8.4	8.6	8.4	8.6	7.8	8.5
DEC	8.6	8.5	8.7	8.4	9	8.3
JAN	9.6	9.6	9.7	8.3	8.2	8.2
FEB	9.5	9.6	8	9	8.9	8.4
MAR	8.1	8.5	8.22	8.6	8.5	7.9
APR	9	8.9	8.92	8.8	8.5	8.4
MAY	10.8	10.8	10.8	9	8.9	8.9
JUNE	10.9	10.9	11	8.6	8.2	8
JULY	9.23	8.3	8.6	7.8	7.5	8
AUG	8	8.35	8.2	8.5	8.4	8.4
SEPT	8.5	8.5	8.7	8.6	8.5	8.3
OCT	7.6	7.5	7.4	8.7	8.5	8.1
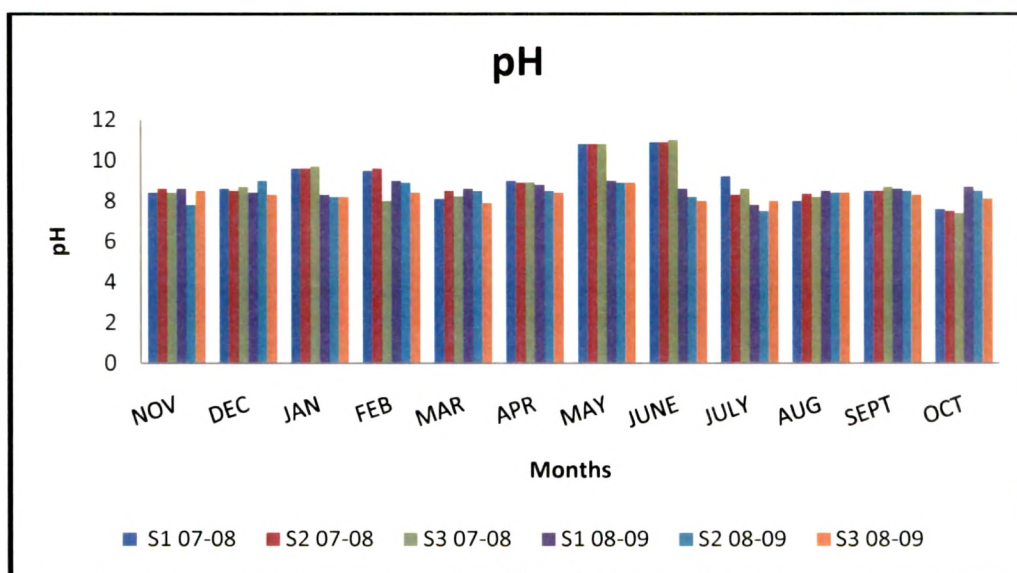
Fig -3.1: Variation in the pH for year 2007 - 08 and 2008 – 09.

Table -3.2:   Temperature (°C) for year 2007 – 2009.

YEARS	2007-2008			2008-2009		
MONTHS	S1	S2	S3	S1	S2	S3
NOV	24	23.5	24	23.5	24	25
DEC	21.5	21	21.1	22.5	22	23
JAN	20	21	20.5	22	22	22
FEB	18	18	28	25	25	25
MAR	28	28	28	24	24	24
APR	27	27	27	28	28	28
MAY	24	24	24	28	28	28
JUNE	24	24	24	29	29	29
JULY	29	29.5	29	29	29	29
AUG	30	30	30	28	28	28
SEPT	30	30	29	26	28	28
OCT	27	27	28	26	26	26
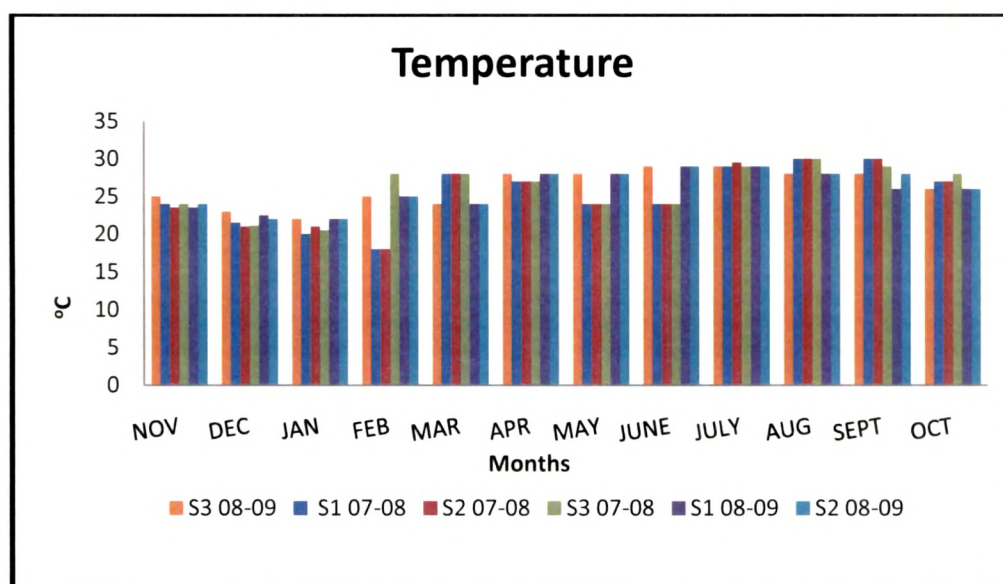
Fig- 3.2:   Variation in the Temperature for year 2007 - 08 and 2008 – 09

Table -3.3:   Acidity for year 2007 – 2009.

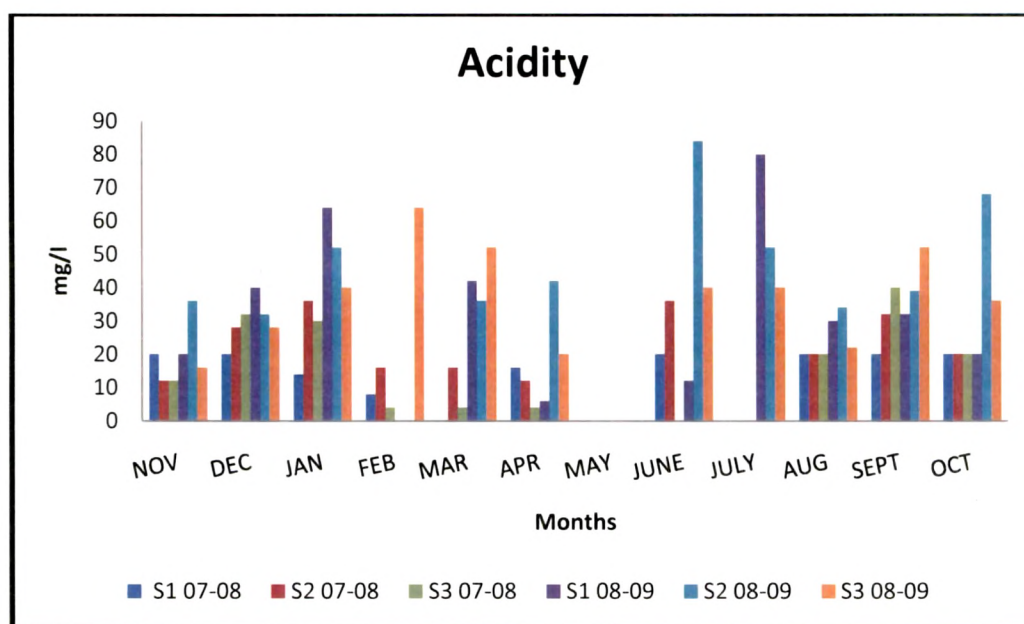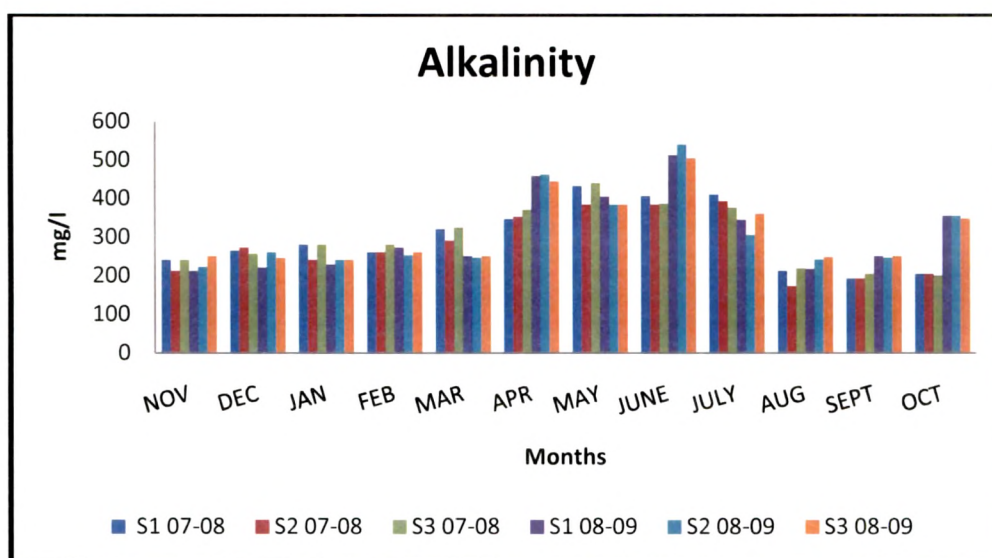| YEARS	2007 – 2008			2008 – 2009		
MONTHS	S1	S2	S3	S1	S2	S3
NOV	20	12	12	20	36	16
DEC	20	28	32	40	32	28
JAN	14	36	30	64	52	40
FEB	8	16	4	0	0	64
MAR	0	16	4	42	36	52
APR	16	12	4	6	42	20
MAY	0	0	0	0	0	0
JUNE	20	36	0	12	84	40
JULY	0	0	0	80	52	40
AUG	20	20	20	30	34	22
SEPT	20	32	40	32	39	52
OCT	20	20	20	20	68	36

Fig- 3.3:   Variation in the Acidity for year 2007 - 08 and 2008 – 09.
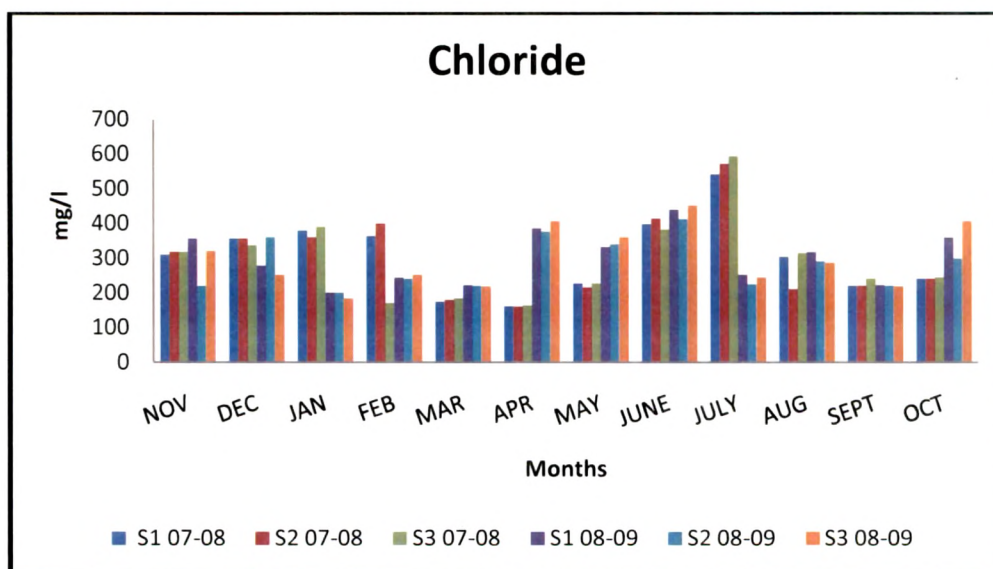
Table -3.4:   Alkalinity for year 2007 – 2009.

YEARS	2007-2008			2008-2009		
MONTHS	S1	S2	S3	S1	S2	S3
NOV	240	212	240	212	222	250
DEC	264	272	256	220	260	245
JAN	280	240	280	228	240	240
FEB	260	260	280	272	252	260
MAR	320	290	324	250	246	250
APR	346	352	370	458	462	444
MAY	432	384	440	404	384	384
JUNE	406	384	386	512	540	504
JULY	410	392	376	344	304	360
AUG	212	172	218	216	241	247
SEPT	192	192	204	250	246	250
OCT	204	204	200	354	354	347

Fig- 3.4:   Variation in the Alkalinity for year 2007 - 08 and 2008 – 09.

Table- 3.5: Chloride for year 2007 – 2009.

YEARS	2007-2008			2008-2009		
MONTHS	S1	S2	S3	S1	S2	S3
NOV	310	318	318	357	220	320
DEC	357	357	337	278	360	252
JAN	380	360	390	200	200	184
FEB	364	400	170	244	240	252
MAR	174	179	184	222	220	218
APR	161	160	163	386	376	406
MAY	227	215	227	332	340	360
JUNE	398	414	382	440	412	452
JULY	542	572	594	252	224	244
AUG	304	210	314	317	290	286
SEPT	220	220	240	222	220	218
OCT	240	240	244	359	298	406

Fig -3.5: Variation in the Chloride for year 2007 - 08 and 2008 – 09.

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 53

Table- 3.6:   Total Hardness (TH) for year 2007 – 2009.

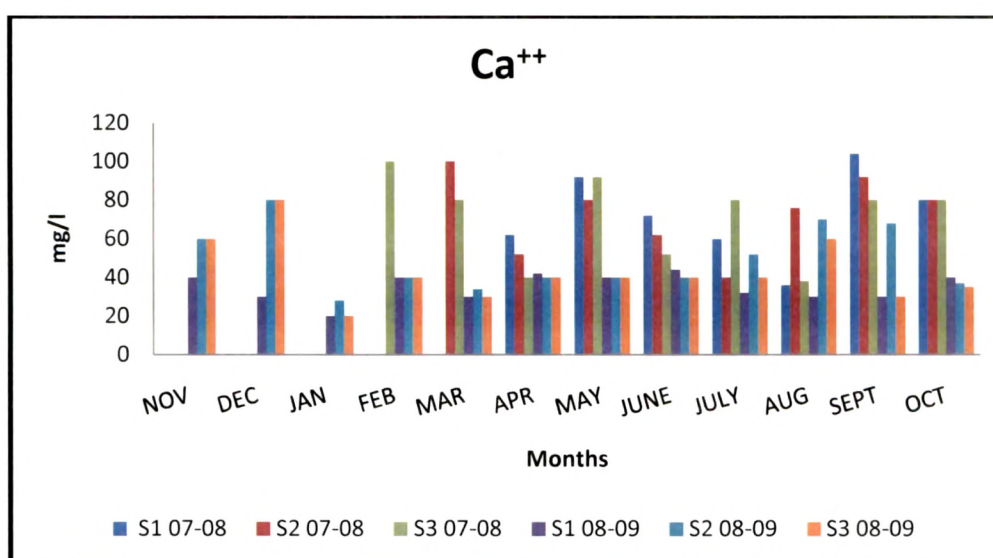| YEARS	2007-2008			2008-2009		
MONTHS	S1	S2	S3	S1	S2	S3
NOV	124	140	136	120	152	136
DEC	144	152	120	142	140	120
JAN	116	140	122	164	160	122
FEB	120	140	152	144	152	152
MAR	136	136	140	154	156	140
APR	102	102	140	156	162	140
MAY	92	120	120	100	100	120
JUNE	100	100	92	212	224	92
JULY	40	80	80	184	160	80
AUG	122	114	110	156	146	110
SEPT	132	128	132	154	156	132
OCT	176	144	144	128	159	144
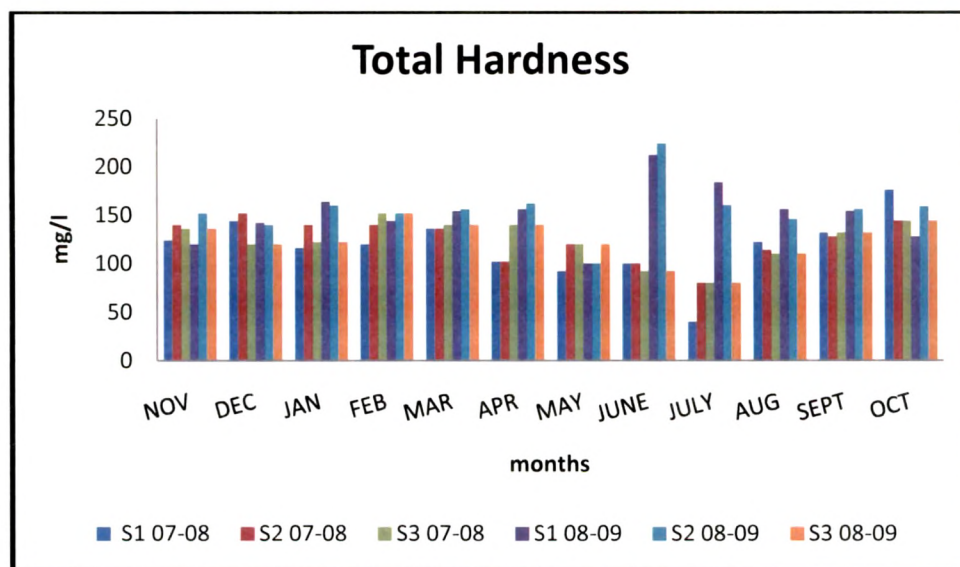
Fig -3.6: Variation in the Total Hardness for year 2007 - 08 and 2008 – 09.

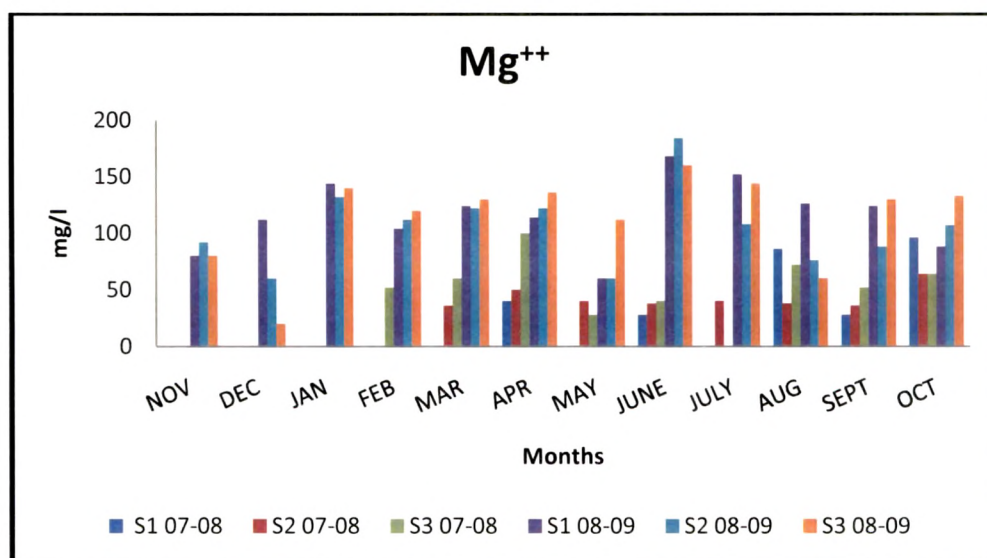## Table- 3.7: Calcium Hardness (Ca++) for year 2007 – 2009.

YEARS	2007-2008			2008-2009		
MONTHS	S1	S2	S3	S1	S2	S3
NOV	-	-	-	40	60	60
DEC	-	-	-	30	80	80
JAN	-	-	-	20	28	20
FEB	-	-	100	40	40	40
MAR	-	100	80	30	34	30
APR	62	52	40	42	40	40
MAY	92	80	92	40	40	40
JUNE	72	62	52	44	40	40
JULY	60	40	80	32	52	40
AUG	36	76	38	30	70	60
SEPT	104	92	80	30	68	30
OCT	80	80	80	40	37	35

Fig- 3.7: Variation in the Calcium Hardness for year 2007 - 08 and 2008 – 09.

Table-3.8:   Magnesium Hardness (Mg^{++}) for year 2007 – 2009.

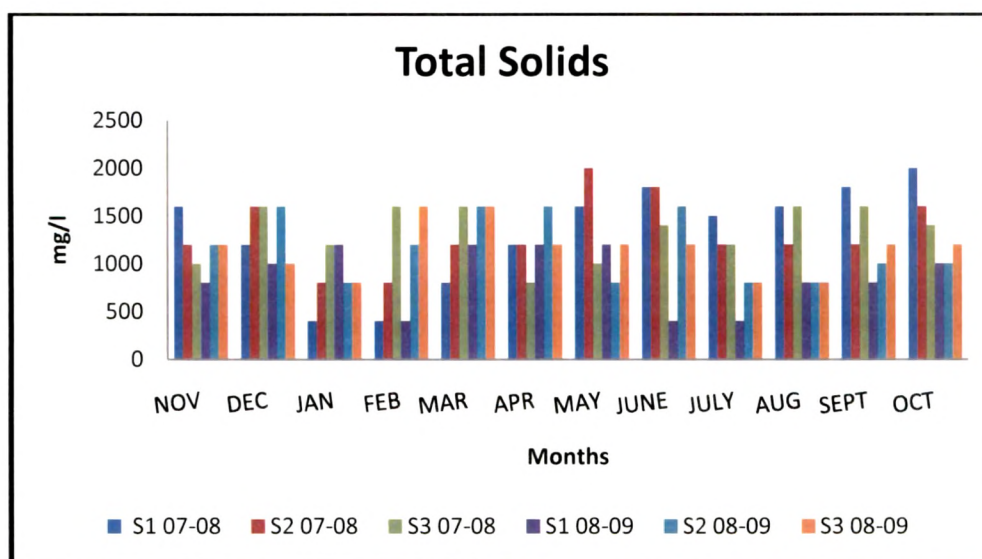| YEARS	2007-2008			2008-2009		
MONTHS	S1	S2	S3	S1	S2	S3
NOV	-	-	-	80	92	80
DEC	-	-	-	112	60	20
JAN	-	-	-	144	132	140
FEB	-	-	52	104	112	120
MAR	-	36	60	124	122	130
APR	40	50	100	114	122	136
MAY	0	40	28	60	60	112
JUNE	28	38	40	168	184	160
JULY	0	40	0	152	108	144
AUG	86	38	72	126	76	60
SEPT	28	36	52	124	88	130
OCT	96	64	64	88	107	133

Fig -3.8: Variation in the Magnesium Hardness for year 2007 - 08 and 2008 – 09.

## Table- 3.9: Total Solids (TS) for year 2007 – 2009.

YEARS	2007-2008			2008-2009		
MONTHS	S1	S2	S3	S1	S2	S3
NOV	1600	1200	1000	800	1200	1200
DEC	1200	1600	1600	1000	1600	1000
JAN	400	800	1200	1200	800	800
FEB	400	800	1600	400	1200	1600
MAR	800	1200	1600	1200	1600	1600
APR	1200	1200	800	1200	1600	1200
MAY	1600	2000	1000	1200	800	1200
JUNE	1800	1800	1400	400	1600	1200
JULY	1500	1200	1200	400	800	800
AUG	1600	1200	1600	800	800	800
SEPT	1800	1200	1600	800	1000	1200
OCT	2000	1600	1400	1000	1000	1200

Fig- 3.9: Variation in the Total Solids for year 2007 - 08 and 2008 – 09.

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 57

Table- 3.10: Dissolved Oxygen (DO) for year 2007 – 2009.

YEARS	2007-2008			2008-2009		
MONTHS	S1	S2	S3	S1	S2	S3
NOV	3.2	0.8	1.6	6	5	6
DEC	4	8	5.6	6.2	6	6.2
JAN	8.4	6.4	9.2	6.5	6	6.5
FEB	8	10.4	4.5	8	8	0
MAR	5.1	6.1	5.2	6.2	7	8.2
APR	6.8	7.2	5	8.4	10	9
MAY	9.6	9.6	6.4	8.8	9.1	8
JUNE	10.4	7.2	8.5	8	11	10
JULY	8.2	8.2	9	8.8	8.8	8
AUG	10.5	9.5	9.5	8	8	8
SEPT	11.4	10	7.2	8.8	9.5	9.5
OCT	6	4	10	9	9.5	9
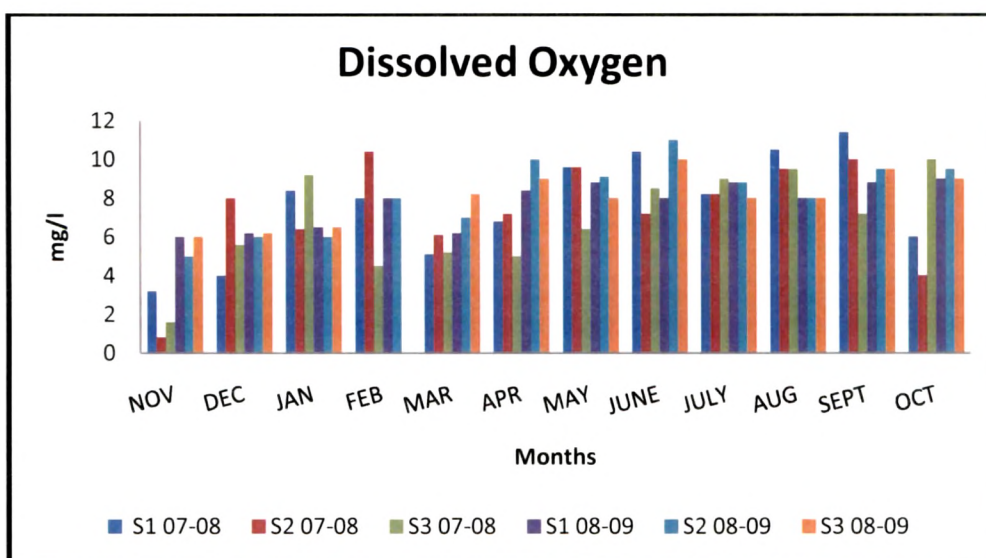
Fig -3.10: Variation in the Dissolved Oxygen for year 2007 - 08 and 2008 – 09.

Table -3.11: Nitrate (Nit) for year 2007 – 2009.

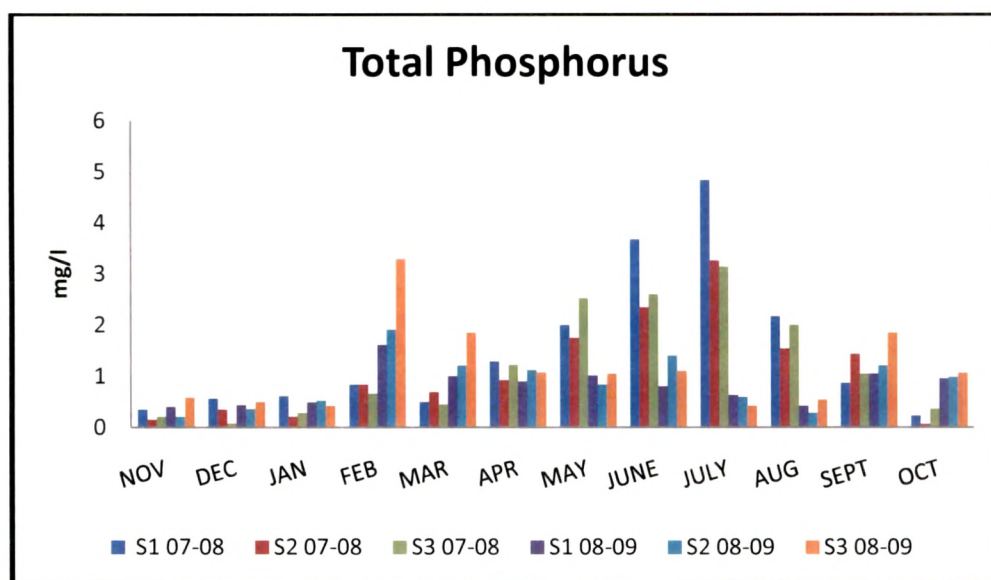| YEARS	2007-2008			2008-2009		
MONTHS	S1	S2	S3	S1	S2	S3
NOV	-	-	-	4.2	1.12	0.64
DEC	-	-	-	3.5	1	0.86
JAN	-	-	-	2.8	1.92	1.08
FEB	-	-	5	1.26	0.84	2.11
MAR	4.2	8.4	5	4.4	3	1.59
APR	8.2	9.6	9.2	5.6	3.1	3.55
MAY	2	1.7	0.84	3.38	2.95	2.5
JUNE	2.5	1.85	1.3	8	3.3	4.6
JULY	5.1	4.2	4.1	2.9	1.26	1.69
AUG	0.82	0.42	6.5	3.8	1.06	0.75
SEPT	0.84	0.42	5	2	1.38	1.59
OCT	2.1	0.32	4.5	5	3	2.57
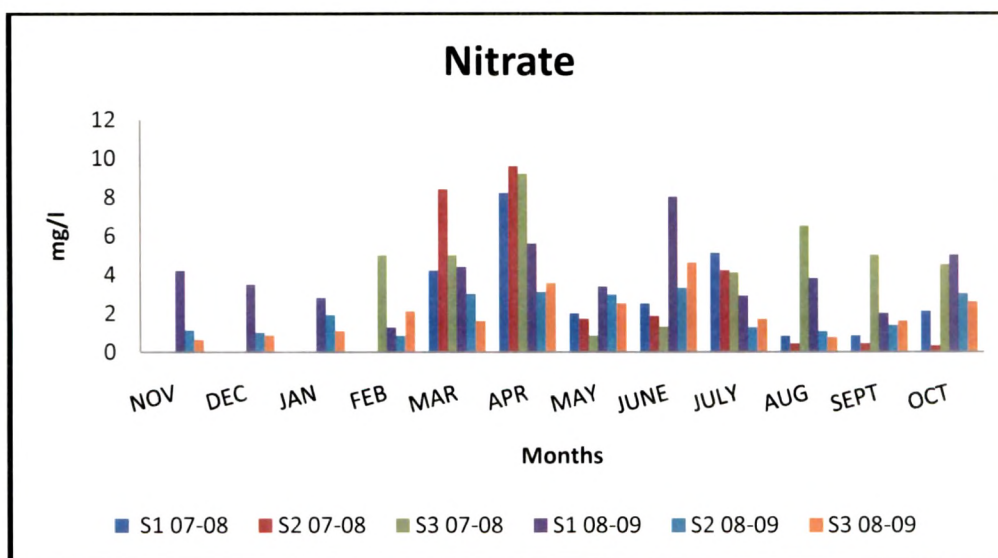
Fig- 3.11:   Variation in the Nitrate for year 2007 - 08 and 2008 – 09.

Table- 3.12: Total Phosphorus (TP) for year 2007 – 2009.

YEARS	2007-2008			2008-2009		
MONTHS	S1	S2	S3	S1	S2	S3
NOV	0.35	0.15	0.21	0.4	0.21	0.58
DEC	0.56	0.35	0.08	0.44	0.36	0.5
JAN	0.61	0.21	0.28	0.49	0.52	0.42
FEB	0.84	0.84	0.66	1.61	1.91	3.29
MAR	0.5	0.69	0.45	1	1.21	1.85
APR	1.29	0.92	1.22	0.9	1.12	1.07
MAY	2	1.75	2.52	1.01	0.84	1.05
JUNE	3.67	2.34	2.6	0.8	1.4	1.1
JULY	4.83	3.26	3.14	0.63	0.59	0.42
AUG	2.17	1.54	2	0.42	0.28	0.54
SEPT	0.87	1.43	1.05	1.05	1.21	1.85
OCT	0.23	0.06	0.36	0.95	0.98	1.06

Fig- 3.12: Variation in the Total Phosphorus for year 2007 - 08 and 2008 – 09.

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 60

For each site Statistical Correlation, Standard Deviation and Average values for various parameters were calculated to understand the interrelationship within various physico-chemical parameters.

In first year (2007-2008) positive significant correlation was observed between alkalinity and Total Phosphorus. Inverse significant relationship was observed between Total Hardness and alkalinity. However, in present observations lowest positive correlation is observed between temperature and DO. Nutrients like Phosphates and Nitrates released due to trophic level interactions shows increasing trend annually, but negative correlation between them. The highest positive correlation has been observed for Total Phosphorus and Total Hardness at all the three sites. Acidity shows positive correlation with Total Hardness and nitrate and negative correlation with most of other parameters.

In the second year i.e. 2008-2009, pH shows negative correlation with acidity and Total Hardness at all the sites. Temperature shows positive relationship with DO. Acidity shows negative correlation with most of the parameters. Alkalinity shows strong positive correlation with chloride at all the sites. Chloride shows negative correlation with phosphorus at site-1 and site-3 and positive at site-2. TH shows lowest positive correlation with DO at site-1. TS show negative correlation with DO at site-1 and site-3. Highest positive correlation was observed between TS and Phosphorus at site-3. DO show lowest negative correlation with nitrate at site-1 and positive relationship with most of the parameters. Nitrate shows negative relation with Total Phosphorus at site-1 and positive at site-2 and site-3.

Table- 3.13:   Results of Pearson's correlation of some physico-chemical parameters of the Sama pond (site-1) for the year Nov.2007-Oct.2008.

	pH	Temp	Aci	Alk	Chl	TH	TS	DO	Nit	PO4⁻
pH		0.47	-0.32	0.61	0.20	-0.40	0.24	0.54	-0.39	0.30
Temp			-0.06	0.06	-0.12	0.12	0.30	0.07	o.43	0.33
Aci				-0.80	-0.21	0.43	-0.23	-0.07	0.25	-0.48
Alk					0.31	-0.73	0.41	0.28	-0.18	0.65
Chl						-0.56	0.37	0.30	-0.28	0.70
TH							-0.32	-0.37	-0.09	-0.71
TS								0.23	-0.30	0.63
DO									-0.37	0.59
Nit										-0.18

Table -3.14:   Results of Pearson's correlation of some physico-chemical parameters of the Sama pond (site-2) for the year Nov.2007-Oct.2008.

	pH	Temp	Aci	Alk	Chl	TH	TS	DO	Nit	PO4⁻
pH		-0.47	0.08	0.56	0.14	-0.21	0.31	0.30	-0.05	0.30
Temp			-0.19	-0.06	-0.30	-0.50	0.11	0.04	-0.01	0.41
Aci				-0.40	-0.02	0.35	-0.13	0.008	-0.33	-0.30
Alk					0.34	-0.64	0.42	0.20	0.43	0.61
Chl						-0.30	-0.14	0.04	-0.16	0.46
TH							-0.13	-0.27	-0.20	-0.88
TS								-0.01	-0.40	0.24
DO									-0.26	0.49
Nit										-0.13

Table- 3.15: Results of Pearson's correlation of some physico-chemical parameters of the Sama pond (site-3) for the year Nov.2007-Oct.2008.

	pH	Temp	Aci	Alk	Chl	TH	TS	DO	Nit	PO$_4^-$
pH		-0.54	-0.26	0.70	0.19	-0.48	-0.35	0.10	-0.64	0.50
Temp			-0.18	-0.18	-0.16	0.07	0.27	0.17	0.63	0.30
Aci				-0.76	-0.008	0.18	0.39	0.20	0.27	-0.53
Alk					0.13	-0.41	-0.51	-0.05	-0.39	0.64
Chl						-0.85	-0.06	0.42	-0.30	0.46
TH							0.04	-0.50	0.43	-0.77
TS								0.25	-0.11	-0.20
DO									-0.24	0.40
Nit										-0.46

Table- 3.16: Results of Pearson's correlation of some physico-chemical parameters of the Sama pond (site-1) for the year Oct.2008-Nov.2009.

	pH	Temp	Aci	Alk	Chl	TH	TS	DO	Nit	PO4$^-$
pH		0.008	-0.93	0.22	0.31	0.51	0.24	0.14	0.064	0.62
Temp			-0.22	0.72	0.52	0.32	-0.38	0.79	0.37	0.16
Aci				-0.39	-0.58	0.39	-0.03	-0.24	-0.25	-0.51
Alk					0.69	0.32	-013	0.56	0.66	0.27
Chl						0.06	-0.11	0.24	0.81	-0.12
TH							-0.51	0.05	0.39	-0.12
TS								-0.26	0.02	-0.17
DO									-00.3	0.43
Nit										-0.24

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 63

Table- 3.17: Results of Pearson's correlation of some physico-chemical parameters of the Sama pond (site-2) for the year Oct.2008-Nov.2009.

	pH	Temp	Aci	Alk	Chl	TH	TS	DO	Nit	PO4⁻
pH		-0.23	-0.52	0.021	0.37	-0.40	0.26	0.06	0.10	0.36
Temp			0.17	0.57	0.34	0.19	-0.19	0.84	0.27	0.25
Aci				0.42	0.20	0.80	.0.18	0.31	0.38	
Alk					0.81	0.46	0.35	0.77	0.74	0.36
Chl						0.21	0.48	0.52	0.48	0.11
TH							0.43	0.36	0.25	0.32
TS								0.04	0.31	0.33
DO									0.34	0.33
Nit										0.33

Table-3.18: Results of Pearson's correlation of some physico-chemical parameters of the Sama pond (site-3) for the year Oct.2008-Nov.2009.

	pH	Temp	Aci	Alk	Chl	TH	TS	DO	Nit	PO4⁻
pH		0.10	-0.66	-0.05	0.14	-0.40	-0.01	-0.24	-0.13	0.005
Temp			-0.21	0.65	0.52	0.47	-0.11	0.48	0.53	-0.02
Aci				-0.26	-0.44	0.31	0.38	-0.32	0.02	0.64
Alk					0.82	0.68	0.01	0.46	0.91	-0.10
Chl						0.37	0.12	0.38	0.76	-0.11
TH							0.20	0.28	0.78	0.21
TS								-0.32	0.30	0.83
DO									0.33	-0.52
Nit										0.22

Table-3.19: Average and Standard Deviation of some physico-chemical parameters of the Sama pond for the year 2007-2008.

YEAR	2007-2008		
SITES	S1	S2	S3
pH	9.0± 1.037	9.0 ± 1.02	8.8±1.09
Temp	25±3.95	25±3.95	26±3.21
Aci	13±8.71	19±12.31	13±12.31
Alk	297±84.58	279±80.52	297±80.04
Chl	306±109.56	303±121.93	296±122.19
TH	117±32.95	124±21.78	124±21.52
Ca^{++}	72±22.46	72±22.46	71±22.41
Mg^{++}	39±38.16	39.71±38.16	52±28.14
TS	1325±537.88	1215±366.3	1333±287.10
DO	7.6±2.65	7.2±2.75	6.81±2.54
Nit	3.22±2.5	3.36±3.71	4.6±2.51
PO_4^-	1.49±1.44	1.12±0.97	1.21±1.08

Table-3.20: Average and Standard Deviation of some physico-chemical parameters of the Sama pond for the year 2008-2009.

YEAR	2008-2009		
SITES	S1	S2	S3
pH	8.5±0.322	8.4±0.442	8.2±0.27
Temp	25±2.51	26±2.60	26±2.42
Aci	28±24.84	39±24.01	34±17.88
Alk	310±102.93	312±102.17	315±90.96
Chl	300±75.75	283±73.15	299±87.60
TH	151±29.02	155±27.341	156±27.01
Ca^{++}	34±7.15	49±16.588	42±16.30
Mg^{++}	116±30.73	105±34.322	113±40.45
TS	866±322.86	1166±349.89	1150±271.36
DO	7.7±1.16	8.15±1.83	7.3±2.6
Nit	3.9±1.77	1.99±0.98	1.96±1.20
PO_4^-	0.80±0.35	0.88±0.51	1.14±0.84

Table-3.21: Results of co-variance of some physico-chemical parameters of the Sama pond (site-1) for the year Oct.2007-Nov.2008.

	pH	Temp	Aci	Alk	Chl	TH	TS	DO	Nit	PO$_4^-$
pH		-1.71	-2.44	60.86	32.86	-18.33	-52.06	1.05	0.14	0.67
Temp			0.26	-20.41	-107.21	-11.54	1207.29	2.41	-0.47	1.53
Aci				-421.36	-85.49	140.83	1554.17	-0.47	-6.59	-3.59
Alk					2159.35	-1924.83	-595.83	32.56	99.24	75.87
Chl						-1815.25	-5218.75	28.44	-11.78	90.71
TH							708.33	-27.48	-33.99	-36.43
TS								254.17	-504	213.75
DO									-3.00	1.73
Nit										0.42

Table3.22: Results of co-variance of some physico-chemical parameters of the Sama pond (site-2) for the year Oct.2007-Nov.2008.

	pH	Temp	Aci	Alk	Chl	TH	TS	DO	Nit	PO$_4^-$
pH		-1.77	0.97	43.13	16.35	-4.37	107.84	0.80	-0.20	0.28
Temp			-8.91	-18.87	-135.35	-40.16	154.16	0.40	-0.12	1.47
Aci				-367.83	-29.58	87.33	-550	0.25	-14.12	-3.38
Alk					3121.04	-1030.33	11391.67	41.35	133.85	44.62
Chl						-745.16	-5837.5	13.39	-75.38	50.35
TH							-1011.11	-15.40	-14.22	-17.25
TS								-9.72	-432.0	80.69
DO									-1.74	1.23
Nit										-0.43

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 67

Table-3.23: **Results of co-variance of some physico-chemical parameters of the Sama pond (site-3) for the year Oct.2007-Nov.2008.**

|	pH	Temp	Aci	Alk	Chl	TH	TS	DO	Nit	PO$_4^-$
pH		-1.74	-3.70	56.33	23.31	-10.50	-101.56	0.27	-1.75	0.55
Temp			-7.84	-42.93	-59.29	4.88	230.00	1.32	3.04	0.95
Aci				-796.0	-13.3	53.0	1488.9	6.8	8.1	-7.5
Alk					1252.15	-653.00	-10877.78	-10.32	-78.80	50.59
Chl						-2072	-2172.22	121.6	-95.85	55.7
TH							266.67	-25.12	23.16	-16.42
TS								167.22	-59.36	-57.39
DO										-1.05
Nit										-2.30

Table-3.24: **Results of co-variance of some physico-chemical parameters of the Sama pond (site-1) for the year Oct.2008-Nov.2009.**

	pH	Temp	Aci	Alk	Chl	TH	TS	DO	Nit	PO$_4^-$
pH		0.0	-6.9	6.8	7.1	-18.3	23.3	0.0	0.0	0.1
Temp			-29.6	170.8	91.1	21.5	-286.1	2.1	1.5	0.1
Aci				-929.7	-1010.5	259.0	-255.6	-6.4	-10.2	-4.2
Alk					4955.3	883.0	-4033.3	62.2	111.3	9.2
Chl						128.0	-2633.3	19.7	100.6	-3.2
TH							-4444.4	1.7	18.4	-1.2
TS								-91.7	15.4	-18.7
DO									0.0	0.2
Nit										

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 68

Table-3.25: Results of co-variance of some physico-chemical parameters of the Sama pond (site-2) for the year Oct.2008-Nov.2009.

	pH	Temp	Aci	Alk	Chl	TH	TS	DO	Nit	PO$_4^-$
pH		-0.25	-5.15	0.89	11.0	-4.52	36.9	0.051	0.041	0.07
Temp			9.86	141.4	59.7	13.0	-163.8	3.70	0.65	0.30
Aci				966.9	327.3	482.1	1402.7	12.57	8.30	-1.03
Alk					5550.5	1193.5	11719.4	133.64	68.83	17.3
Chl						394.8	11277.7	64.98	32.27	3.97
TH							3802.7	16.57	6.25	4.13
TS								25.27	100.47	55.0
DO									0.91	0.48
Nit										0.15

Table-3.26: Results of co-variance of some physico-chemical parameters of the Sama pond (site-3) for the year Oct.2008-Nov.2009.

	pH	Temp	Aci	Alk	Chl	TH	TS	DO	Nit	PO$_4^-$
pH		0.06	-2.95	-1.17	3.23	-2.72	-0.83	-0.16	-0.04	0.00
Temp			-8.54	132.65	102.38	28.17	-70.83	2.83	1.41	-0.05
Aci				-393.18	-643.97	137.89	1708.33	-14.19	0.47	8.85
Alk					6035.51	1552.61	437.50	103.14	91.64	-7.69
Chl						819.44	2658.33	81.64	73.41	-7.94
TH							1366.67	18.89	22.16	4.49
TS								-211.67	89.71	174.21
DO									0.97	-1.07
Nit										0.21

Water Quality Parameters of Harni pond:

The pH remained alkaline throughout the study period (Table-3.27, Fig-3.27). Its value ranged from 6.7-8.6.During the study period the temperature fluctuated from 20^0C to 30^0C (Table-3.28, Fig-3.28). The acidity ranged from 12 to 60 mg/l which was lowest in winter and highest in monsoon (Table-3.29, Fig-3.29). The alkalinity ranged from 120mg/l to 216mg/l which reflects good productivity of water body. Its minimum value was found in winter and maximum in summer (Table-3.30, Fig-3.30). Chloride value ranged from 64 to 124 mg/l Chloride content was found to be high during summer. Total solids ranged from 300 to 1200 mg/l and were recorded minimum in winter months and maximum in summer months (Table-3.36, Fig-3.36). The value of DO ranged from 4-12 mg/l with highest concentration in May (11.4) and lowest in June (4.6) (Table-3.37, Fig-3.37).

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 70

Table-3.27:   pH for year 2008 – 2009.

Month	pH
NOV	7.1
DEC	6.7
JAN	6.8
FEB	7.2
MAR	7
APR	7.9
MAY	8
JUNE	8.6
JULY	7.6
AUG	6.7
SEPT	7
OCT	6.8

pH
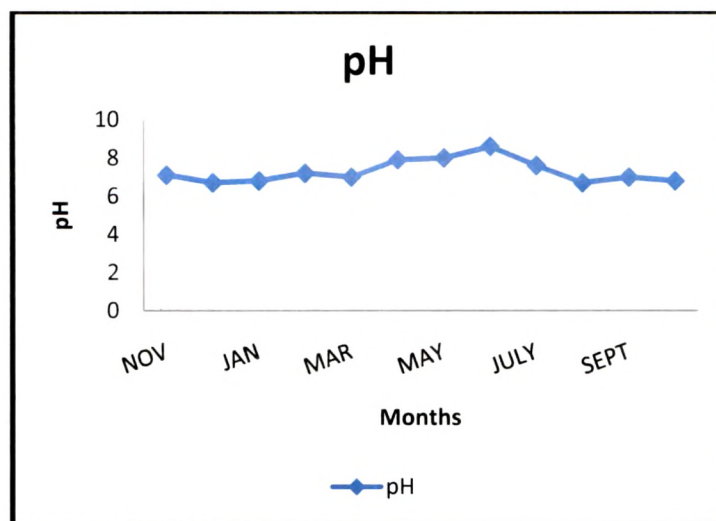
Fig-3.27:   Variation in pH for year 2008 – 09

Table-3.28:   Temperature (Temp) for year 2008 – 2009.

Month	Temperature
NOV	29
DEC	29
JAN	30
FEB	30
MAR	20
APR	19
MAY	27
JUNE	30
JULY	28
AUG	30
SEPT	30
OCT	28
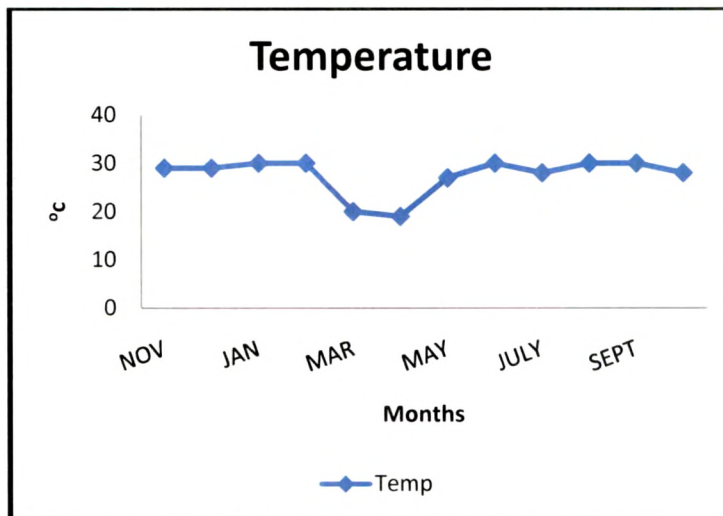
Temperature

Fig-3.28:   Variation in the Temperature for year 2008 – 09.

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 71

Table-3.29:   Acidity (Aci) for year 2008 – 2009.

Month	Acidity
NOV	12
DEC	12
JAN	20
FEB	20
MAR	40
APR	60
MAY	40
JUNE	60
JULY	48
AUG	16
SEPT	16
OCT	12
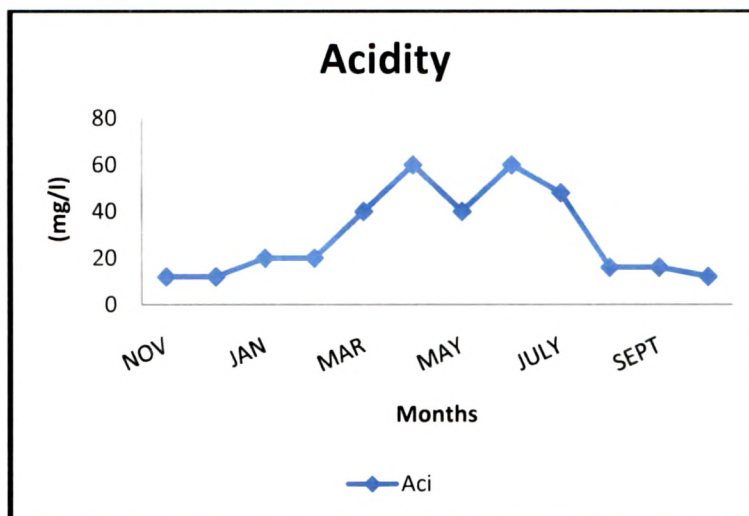
Fig-3.29:   Variation in the Acidity for year 2008 – 09.

Table-3.30:   Alkalinity (Alk) for year 2008 – 2009.

Month	Alkalinity
NOV	120
DEC	148
JAN	160
FEB	172
MAR	180
APR	180
MAY	216
JUNE	216
JULY	200
AUG	148
SEPT	160
OCT	160
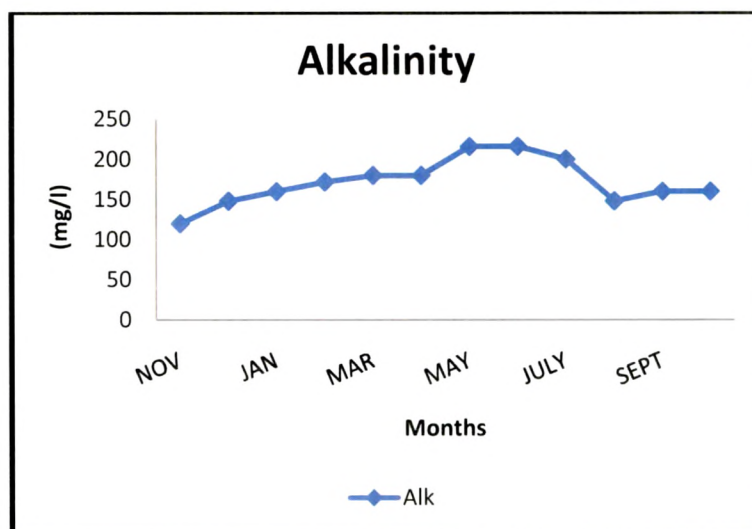
Fig-3.30: Variation in the Alkalinity for year 2008 – 09.

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 72

Table-3.31:   Chloride (Chl) for year 2008 – 2009.

Month	Chloride
NOV	100
DEC	104
JAN	64
FEB	116
MAR	124
APR	100
MAY	120
JUNE	120
JULY	112
AUG	116
SEPT	112
OCT	104
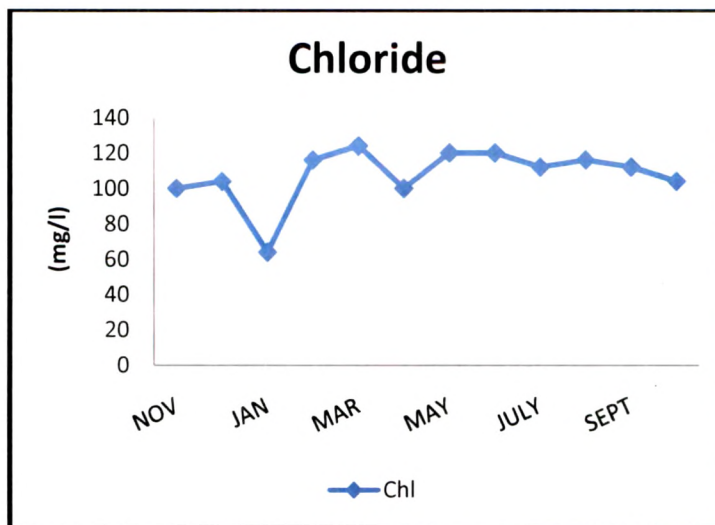
Chloride

Fig-3.31:   Variation in the Chloride for year 2008 – 09.

Table-3.33:   Total Hardness (TH) for year 2008 – 2009.

Month	TH
NOV	104
DEC	128
JAN	114
FEB	114
MAR	184
APR	164
MAY	160
JUNE	184
JULY	204
AUG	120
SEPT	204
OCT	104

Total Hardness

Fig-3.33: Variation in the Total Hardness for year 2008 – 09.

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 73
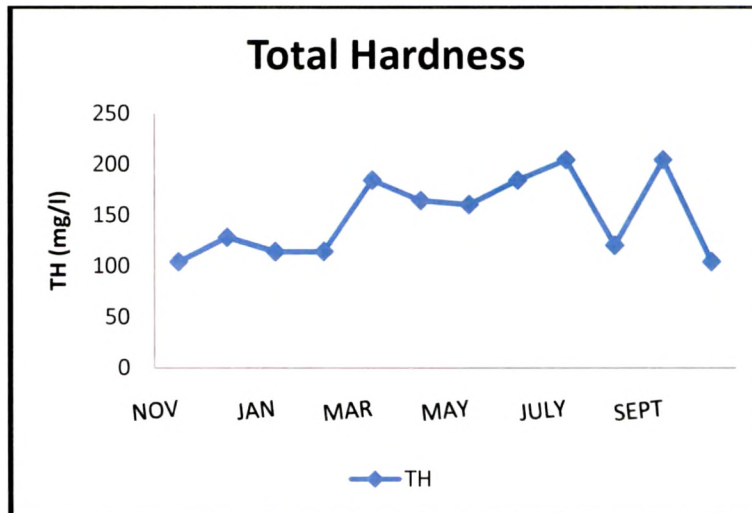
Table-3.34: Calcium Hardness (Ca^{++}) for year 2008 – 2009.

Month	CA++
NOV	60
DEC	40
JAN	92
FEB	100
MAR	120
APR	72
MAY	40
JUNE	80
JULY	72
AUG	40
SEPT	72
OCT	60
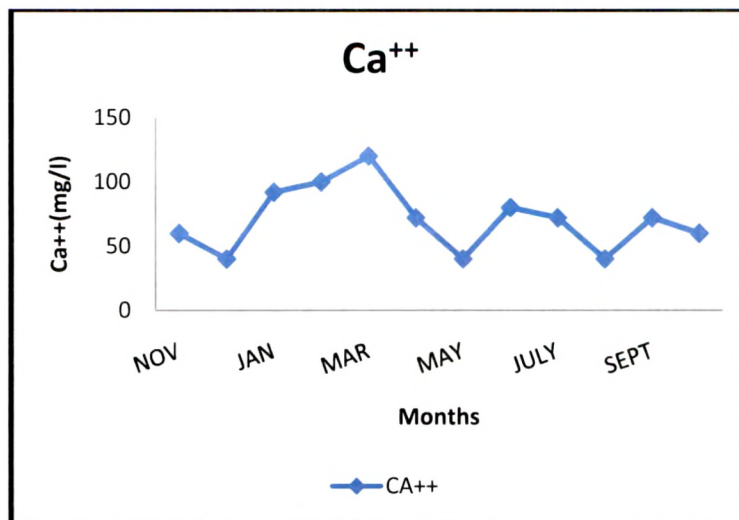
Fig-3.34: Variation in the Calcium Hardness for year 2008 – 09.

Table-3.35: Magnesium Hardness (Mg^{++}) for year 2008 – 2009.

Month	Mg++
NOV	44
DEC	88
JAN	52
FEB	60
MAR	64
APR	92
MAY	120
JUNE	104
JULY	132
AUG	80
SEPT	132
OCT	44

Fig-3.35: Variation in the Magnesium Hardness for year 2008 – 09.

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 74
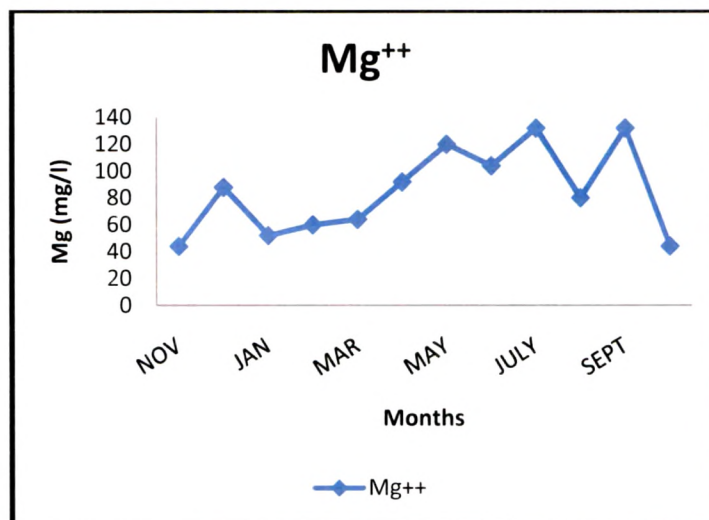
Table-3.36:   Total Solids (TS) for year 2008 – 2009.

Month	Total Solids
NOV	1200
DEC	1200
JAN	800
FEB	400
MAR	400
APR	1200
MAY	800
JUNE	800
JULY	800
AUG	1200
SEPT	1200
OCT	1200
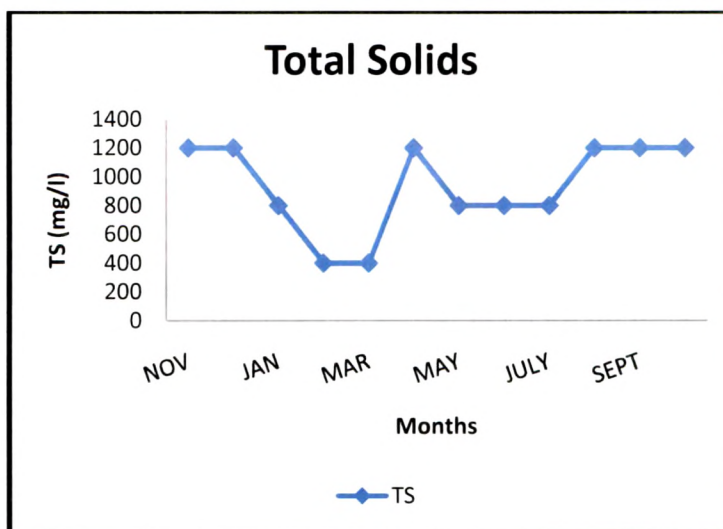
Fig-3.36: Variation in the Total Solids for year 2008 – 09.

Table-3.37:   Dissolved Oxygen (DO) for year 2008 – 2009.

Month	DO
NOV	9
DEC	4
JAN	4
FEB	5.6
MAR	8
APR	8.8
MAY	11.4
JUNE	7.2
JULY	8
AUG	8.6
SEPT	9.1
OCT	9
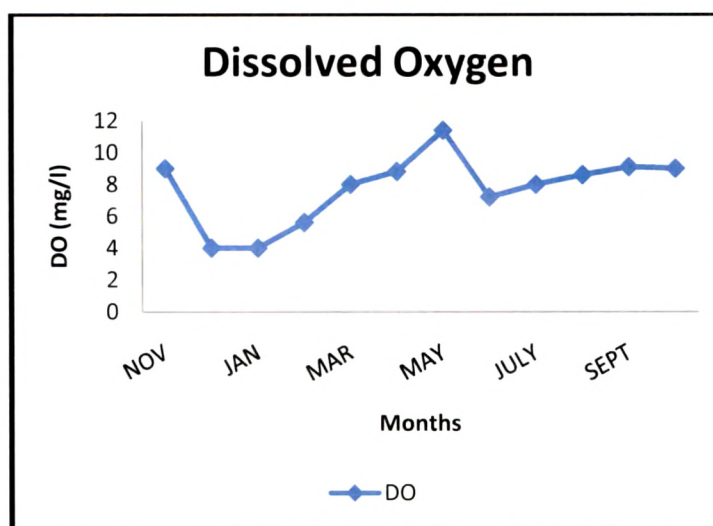
Fig-3.37: Variation in the Dissolved Oxygen for year 2008 – 09.

Table-3.38:   Nitrate (Nit) for year 2008 – 2009.

Month	Nitrate
NOV	0.84
DEC	2.1
JAN	2.1
FEB	1.26
MAR	1.2
APR	1.22
MAY	4
JUNE	5
JULY	5
AUG	0.84
SEPT	2.1
OCT	2.1
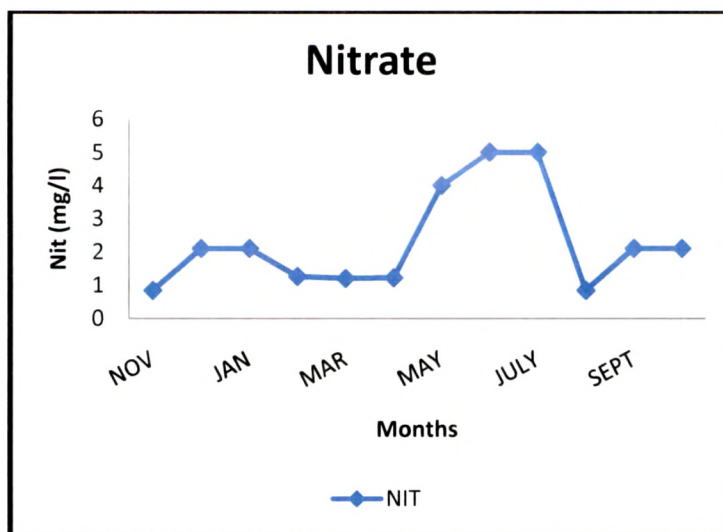
Fig-3.38: Variation in the Nitrate for year 2008 – 09.

Table-3.39:   Total Phosphorus (TP) for year 2008 – 2009.

Month	TP
NOV	0.77
DEC	0.98
JAN	0.34
FEB	0.63
MAR	0.91
APR	0.51
MAY	0.73
JUNE	0.38
JULY	0.91
AUG	0.77
SEPT	0.91
OCT	0.77
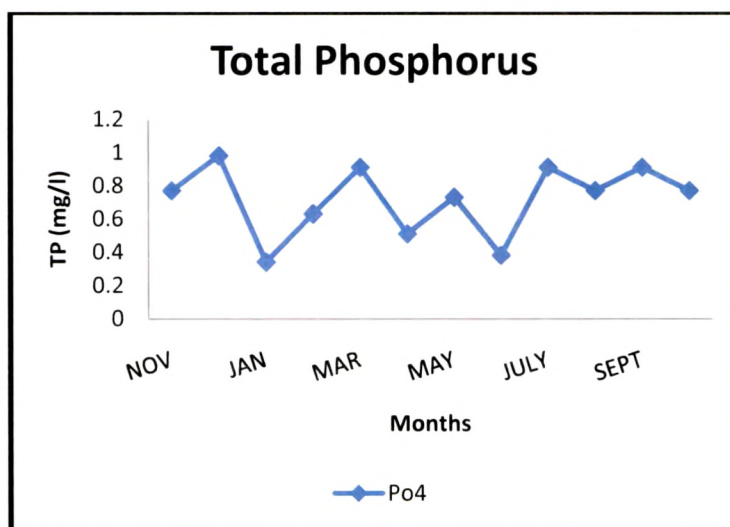
Fig-3.39: Variation in the Total Phosphorus for year 2008 – 09.

Positive correlation of higher magnitude has been observed between pH and acidity. Temperature showed negative correlation with DO and also with most of the parameters. Acidity showed negative correlation with total Solids and Phosphorus and positive with most of the parameters. Alkalinity showed strong positive correlation with TH and nitrate. Chloride showed lowest negative correlation with Calcium hardness and positive with other parameters. Total hardness showed strong positive correlation with Magnesium and showed negative correlation with most of the parameters. Nitrate showed negative correlation with phosphorus and positive with most of the parameters.

Table-3.40: **Results of Pearson's correlation of some physico-chemical parameters of the Harni pond for the year Oct.2008-Nov.2009.**

	pH	Temp	Aci	Alk	Chl	TH	TS	DO	Nit	PO4⁻
pH		-0.19	0.86	0.79	0.34	0.51	-0.21	0.34	0.67	-0.45
Temp			-0.54	-0.21	-0.15	-0.30	0.15	-0.28	0.22	-0.05
Aci				0.80	0.28	0.65	-0.31	0.23	0.54	-0.36
Alk					0.41	0.63	-0.49	0.24	0.78	-0.26
Chl						0.45	-0.25	0.50	0.21	0.45
TH							-0.20	0.29	0.55	0.19
TS								0.21	-0.19	0.16
DO									0.11	0.22
Nit										-0.21

Table-3.41: **Average and Standard Deviation of some physico-chemical parameters of the Harni pond for the year Oct. 2008-Nov. 2009.**

Parameters	Average-Standard Deviation
pH	7.3±0.61
Temp	27.5±3.87
Aci	29.7±18.80
Alk	171.7±28.72
Chl	107.7±15.95
TH	148.7±38.88
Ca^{++}	70.7±25.03
Mg^{++}	84.3±32.47
TS	933.3±311.40
DO	7.7±2.20
Nit	2.3±1.52
PO_4^-	0.7±0.21

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 78

Table-3.42: **Co-Variance of some physico-chemical parameters of the Harni pond for the year Oct.2008-Nov.2009.**

	pH	Temp	Aci	Alk	Chl	TH	TS	DO	Nit	PO$_4^-$
pH		-0.42	9.03	12.79	3.06	11.18	-37.78	0.42	0.57	-0.05
Temp			-36.17	-22.17	-8.83	42.67	166.67	-2.19	2.24	-0.04
Aci				399.22	79.22	440.22	-1688.89	9.09	14.36	-1.35
Alk					173.22	650.22	-4088.89	14.34	31.23	-1.48
Chl						256.89	-1155.56	16.14	4.66	1.42
TH							-2288.89	23.45	30.06	1.47
TS								133.33	-83.78	10
DO									0.35	0.10
Nit										-0.04

Bacteriological Analysis of Sama and Harni pond:

Relative concentration of *E.coli* group in water is reliable parameter for determining the load of fecal matter. The total Coliforms of Sama pond showed increasing trend at all the 3 sites. The total Coliforms were highest in the month of September (Fig-3.40).The total Coliforms at Harni pond were highest in August (Fig-3.41). The total Coliforms were found more at Harni pond as compared to Sama pond (Fig-3.42).

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 79

Fig-3.40: Total Coliforms of Sama pond
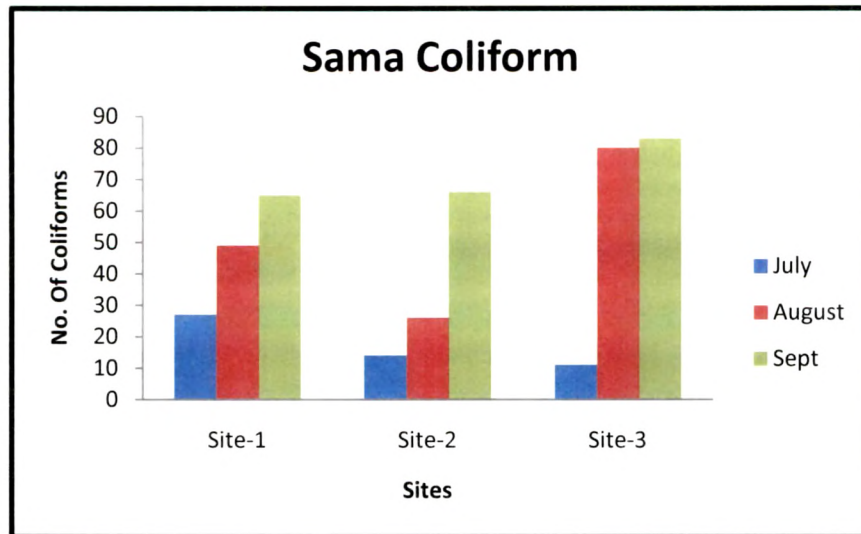
Fig-3.41: Total Coliforms of Harni pond
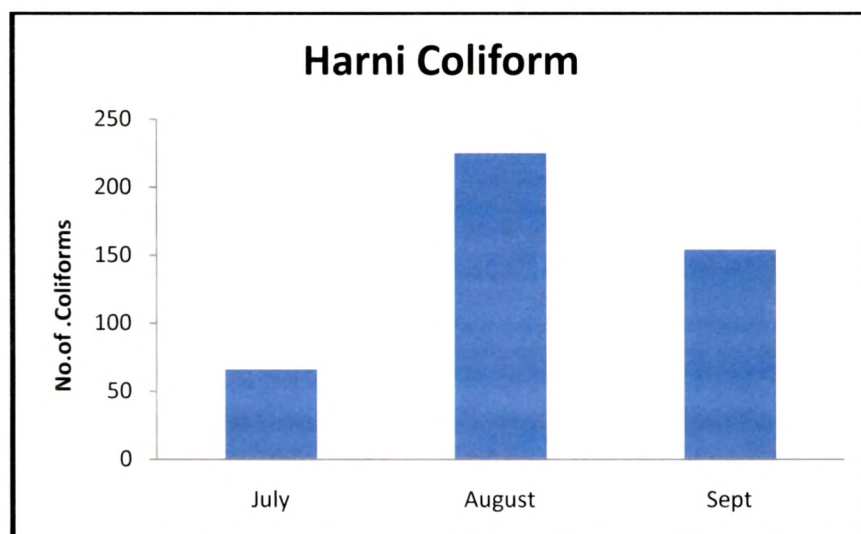
Fig-3.42: Comparative Total Coliforms of Sama and Harni pond

Comparision of Coliforms
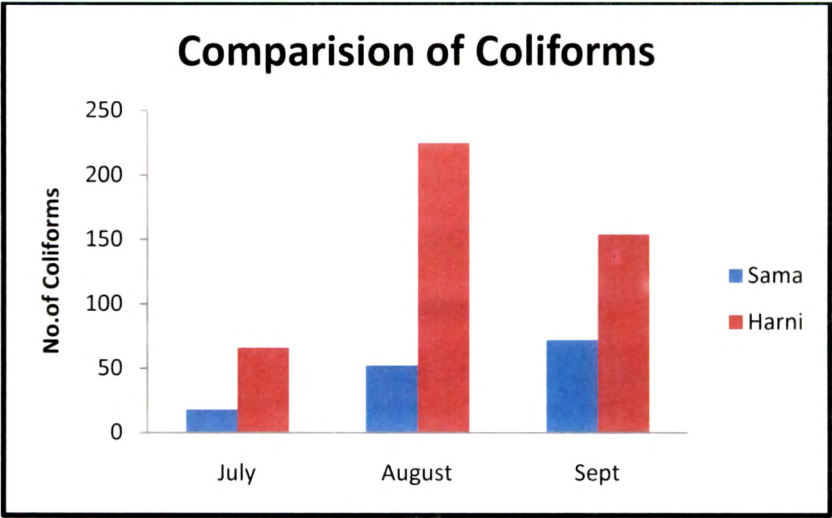
Sama Total Coliforms
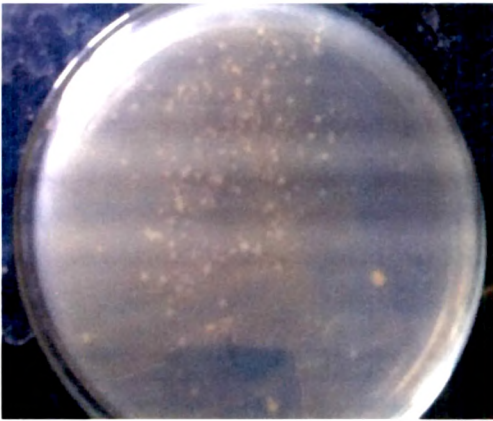
Harni Total Coliforms
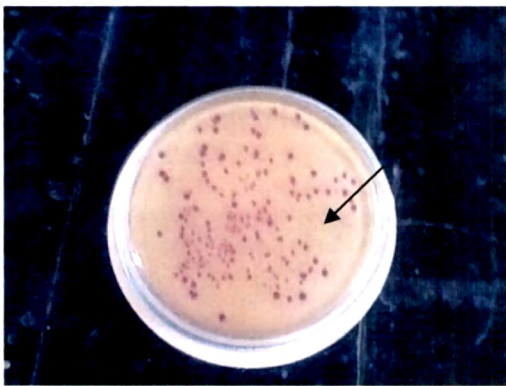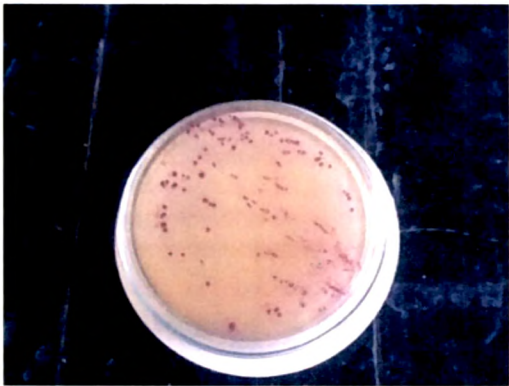
Mackonkey Agar plate showing E. coli (Sama pond and Harni pond)
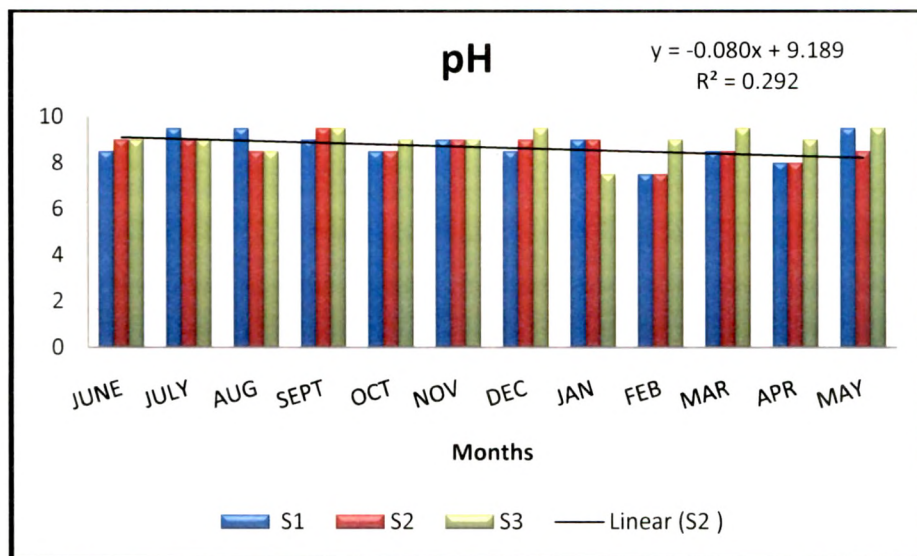
Soil Quality Parameters

Biotic factors like presence of organisms and productivity are regulated by physico-chemical status of water and soil. The soil plays vital role as sink and source for inorganic and organic salts and provide substratum for production of hydrophytes. Limmnological assessment of these ponds was carried out on the basis of quality analysis for the surface water and soil analysis by taking samples from periphery of the pond. Soil quality is very much important parameter for assessment of ecological state of the pond.

Soil Quality Parameters of Sama pond:

Soil samples collected from 3 different sites of Sama pond were analyzed for few essential physico-chemical parameters in the laboratory to understand general as well as site specific soil quality status. The quantitative values for the parameters were plotted on the graph to represent annual trend. The linear trend line is plotted for each parameter on the graph to understand the trend. The pH was alkaline throughout the study period and ranged from 8 to 9.5 for all the sites (Table-3.43, Fig-3.43). The water retention capacity ranged from 3 to 9 ml/dl and was highest in the month of June at site-1 and lowest in the month of August at site-2 and site-3 (Table-3.44, Fig-3.44). The organic matter ranged from 5.3 to 31.5 and maximum in the month of July at site-3 and minimum in the month of June at site-1 (Table-3.45, Fig-3.45). The value of Total Phosphorus ranged from 0.005 to 0.43 ppm and was highest in the month of March at site-2 and lowest in the month of May at site-1 (Table-3.46, Fig-3.46).

Table-3.43: pH for year 2008 – 2009.

Month	S1	S2	S3
JUNE	8.5	9	9
JULY	9.5	9	9
AUG	9.5	8.5	8.5
SEPT	9	9.5	9.5
OCT	8.5	8.5	9
NOV	9	9	9
DEC	8.5	9	9.5
JAN	9	9	7.5
FEB	7.5	7.5	9
MAR	8.5	8.5	9.5
APR	8	8	9
MAY	9.5	8.5	9.5

Fig-3.43   : Variation in the pH for year 2008 – 09.

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 83

Table-3.44:   Water Retention Capacity (WRC) for year 2008 – 2009.

Month	S1	S2	S3
JUNE	9	6.5	5.5
JULY	5	4	3
AUG	5	3	3
SEPT	8	7	5
OCT	4	7	6
NOV	7	5	4
DEC	7	6	4
JAN	8	8	6
FEB	6.5	7.5	9
MAR	7	6	7
APR	6	7	7
MAY	7	6	7
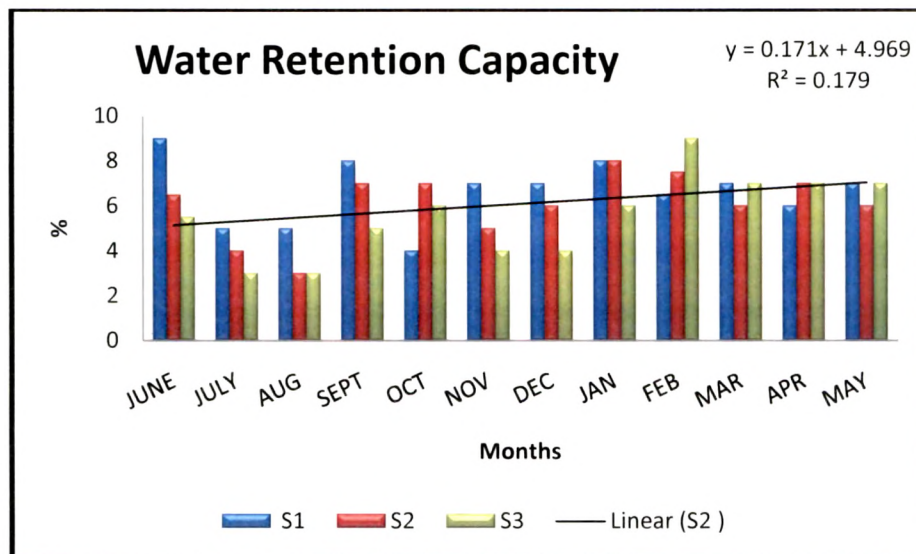
Fig-3.44:   Variation in the Water Retention Capacity for year 2008 – 09.

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 84

Table-3.45:   Organic Matter (OM) for year 2008 – 2009.

Month	S1	S2	S3
JUNE	5.3	7.3	10
JULY	7.3	16.7	31.5
AUG	7.3	16.7	14.7
SEPT	7.3	7.3	10
OCT	8.7	13.4	15.4
NOV	6.3	12	20.5
DEC	10.7	12	17.5
JAN	18.7	8	41
FEB	13.4	22.8	22.8
MAR	10.7	14.7	10.7
APR	16	18.7	20.5
MAY	11.4	26.1	8

Organic Matter

$y = 0.951x + 8.457$
$R^2 = 0.331$
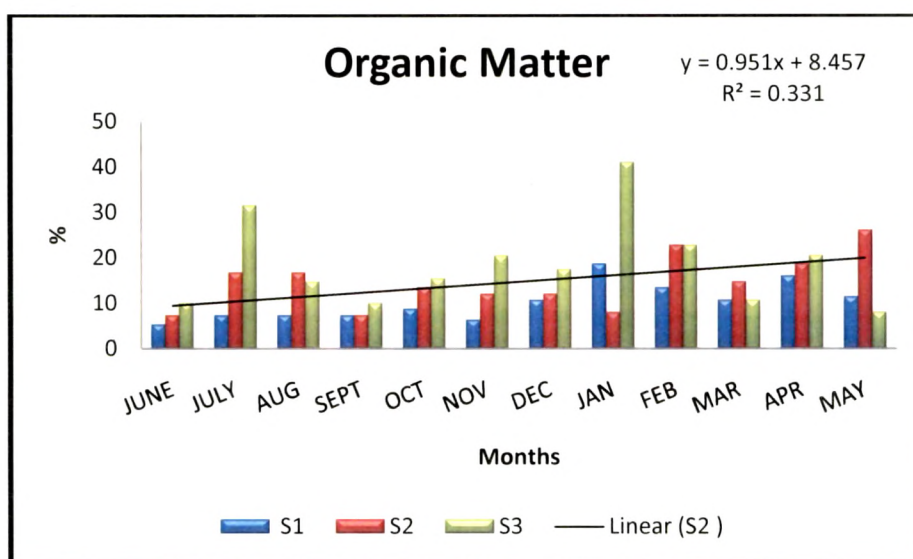
Fig-3.45:   Variation in the Organic Matter for year 2008 – 09.

Table-3.46:   Total Phosphorus (TP) for year 2008 – 2009.

Month	S1	S2	S3
JUNE	0.02	0.025	0.03
JULY	0.14	0.18	0.1
AUG	0.03	0.1	0.05
SEPT	0.05	0.02	0.01
OCT	0.04	0.06	0.03
NOV	0.04	0.04	0.06
DEC	0.05	0.03	0.02
JAN	0.08	0.02	0.01
FEB	0.03	0.04	0.05
MAR	0.1	0.43	0.04
APR	0.08	0.23	0.04
MAY	0.005	0.02	0.05
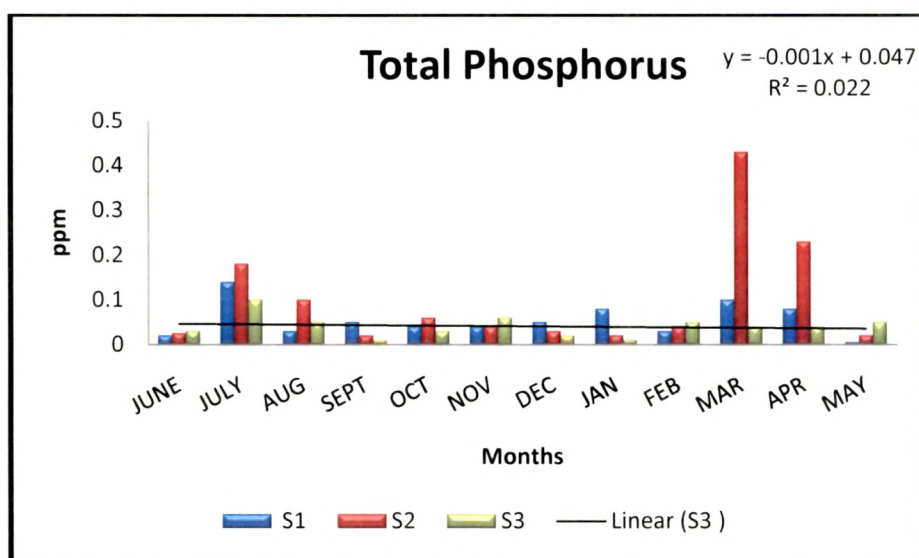
Fig-3.46:   Variation in the Total Phosphorus for year 2008 – 09.

Soil Quality Parameters of Harni pond:

The soil pH ranged from 6 to 9.5. It was minimum in the month of October and maximum in the month of February (Table-3.47, Fig-3.47). The water retention capacity ranged from 5 to 7 mg/dl (Table-3.48, Fig-3.48). The value of organic matter ranged from 6 to 28.8 percent and was recorded lowest in the month of October and highest in the month of January (Table-3.49, Fig-3.49). The value of Total Phosphorus ranged from 0.02 to 0.1 ppm and was recorded maximum in the month of November (Table-3.50, Fig-3.50).

Table-3.47: pH for year 2008 – 2009.

Months	pH
JUNE	9
JULY	9
AUG	7
SEPT	7.5
OCT	6.5
NOV	7
DEC	7.5
JAN	6.5
FEB	9.5
MAR	7
APR	9
MAY	7.5
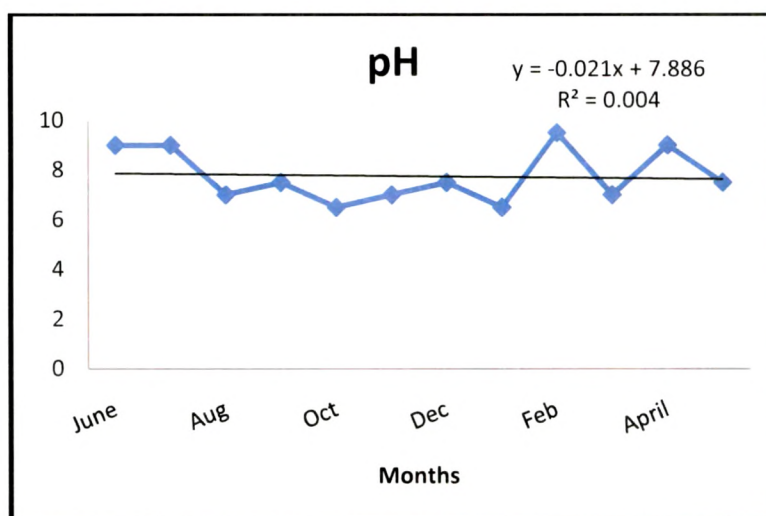
Fig-3.47: Variation in the pH for year 2008 – 09.

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 87

Table-3.48:   Water Retention Capacity (WRC) for year 2008 – 2009.

Months	Water Retention Capacity
JUNE	5
JULY	5
AUG	6
SEPT	5
OCT	6
NOV	7
DEC	6
JAN	6
FEB	6
MAR	7
APR	6
MAY	5

Water retention capacity $y = 0.069x + 5.378$
$R^2 = 0.123$
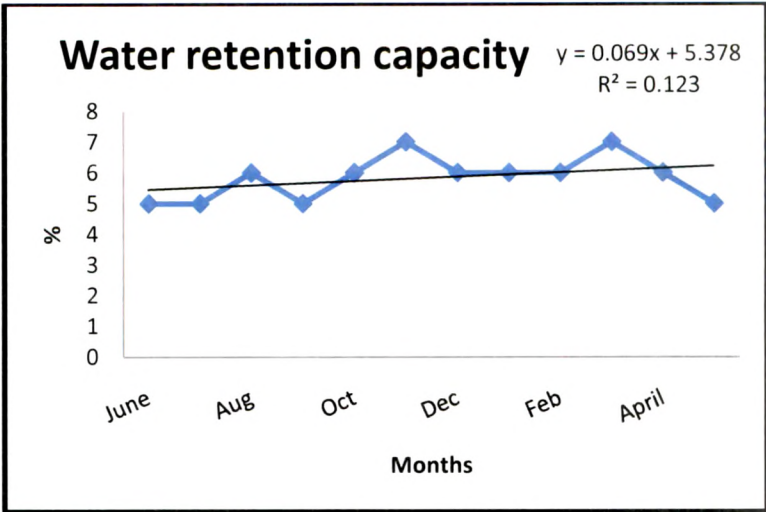
Fig-3.48: Variation in the Water Retention Capacity for year 2008 – 09.

Table-3.49:   Organic Matter (OM) for year 2008 – 2009.

Months	Organic Matter
JUNE	6.71
JULY	6.71
AUG	6
SEPT	8.3
OCT	25
NOV	33
DEC	22.8
JAN	28.8
FEB	10
MAR	16.1
APR	6.71
MAY	22.8

Organic matter

$y = 0.9x + 10.22$
$R^2 = 0.107$
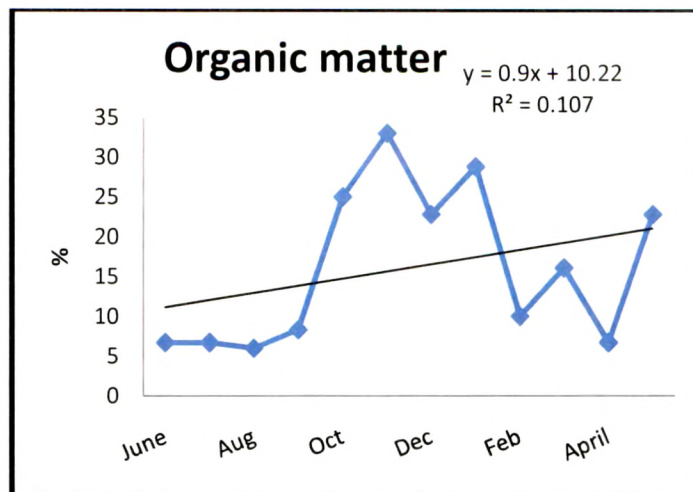
Fig-3.49:   Variation in the Organic Matter for year 2008 – 09.

Table-3.50:   Total Phosphorus (TP) for year 2008 – 2009.

Months	Total Phosphorus
JUNE	0.04
JULY	0.05
AUG	0.05
SEPT	0.02
OCT	0.09
NOV	0.1
DEC	0.03
JAN	0.02
FEB	0.02
MAR	0.03
APR	0.03
MAY	0.03

Total phosphorus

$y = -0.002x + 0.058$
$R^2 = 0.112$
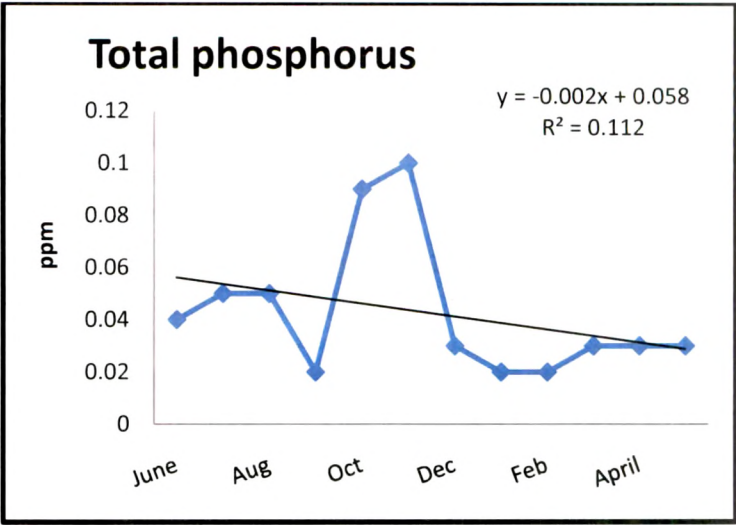
Fig-3.50: Variation in the Total Phosphorus for year 2008 – 09.

Biodiversity Status

The biodiversity account for the ponds was reported as taxonomy of various plankton and molluscans. Also population status of fishes was taken as an indicative point referenced to biodiversity of ichthyofauna.

Plankton Analysis:

Plankton are an important component of aquatic ecosystem and have diverse habitats. In the present study, 33 species of phytoplankton's, 14 species of zooplanktons were recorded from Sama pond (Table-3.51 and Table-3.52). Among this, in phytoplankton, chlorophyta is dominant group, while crysophyta and cyanophyta were subdominant. Chlorella, Navicula, Euglena and Oscillatoria species were also recorded. Other than Bacillophyaceae, Chlorophyaeae population was represented significantly. The study reveals the presence of zooplankton with copepods as dominating group. Largest contribution is of zooplankton, the crustacean is dominant species found in almost all the samples.

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 91

Table-3.51:   No. of Phytoplankton in Sama pond.

PHYTOPLANKTON	
Chlorideorophyta	Chlorideorella, Crucigenia, Chlorideococcum, Oedogonium, Clostridium, Spirogyra, Coelastrum, Sphaerocyctis, Tetraedron, Phytoconis, Tribonema, Oocystis, Ulothrix
Bacillariophyta	Cyclotella, Navicula, Synedra,
Crysophyta	Diatom, Biddulphia, Cyclotella, Cocconeis, Achnanthes, Coscinodiscus, Ankisrodesmus, Oikomonas,
Cyanophyta	Gomphospheria, Cymbella, Merismopedia, Oscillatoria, Aphanontheca, Arthrospira, Cymbella,

Plate-3.1: PHYTOPLANKTON

Oscillatoria
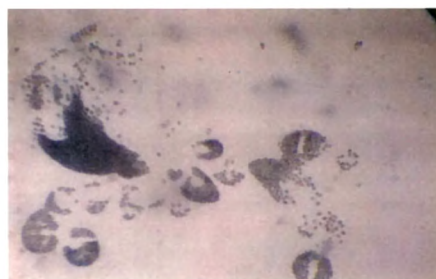
Ancystis

Staurastrum

Synedra

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 92
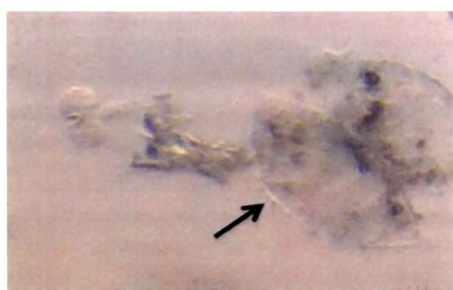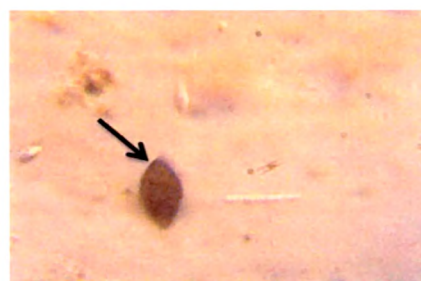
Plate-3.2:   ZOOPLANKTON

Brachionus calyciflorus

Brachionus rubens
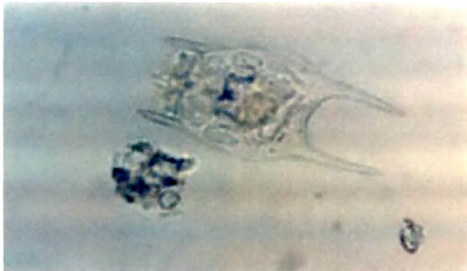
Brachionus forficula

Keratella hiemalis
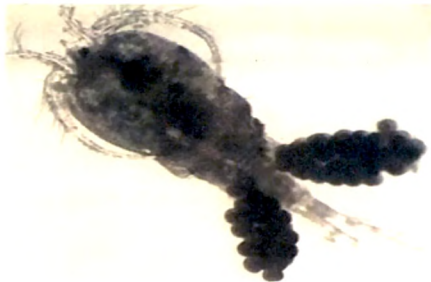
Macrocyclops albidus
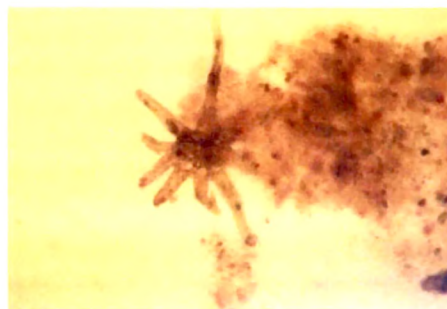

Cyclops (male)

Mesocyclops


Paracyclops fimbriatus
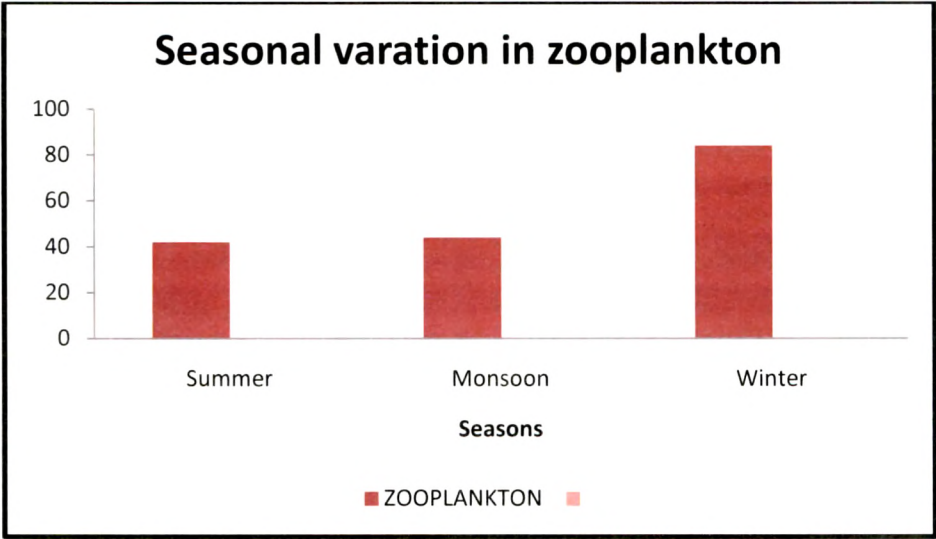
Branchionus quadridentatus

Amoeba radiosa

Table-3.52:   No. of Zooplankton in Sama pond

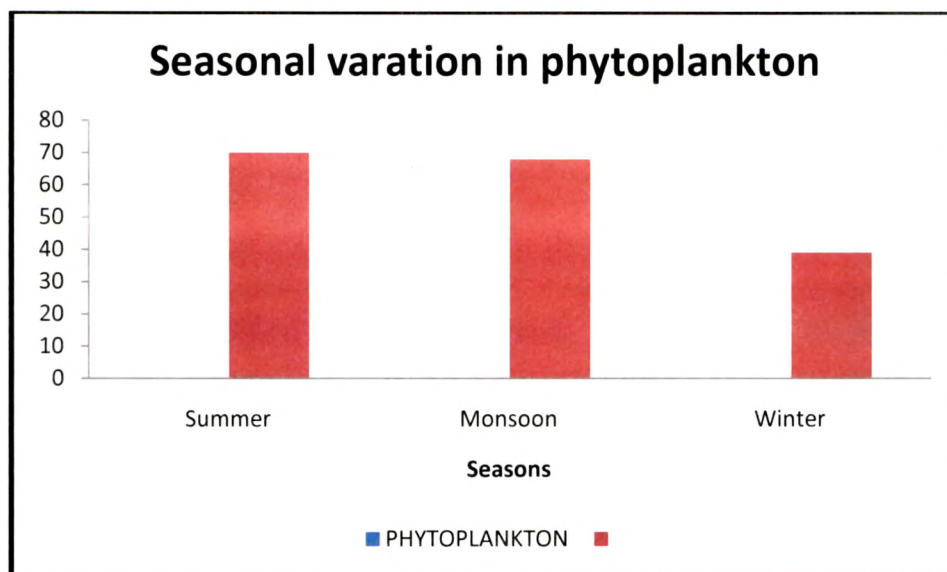| ZOOPLANKTON	
Protozoan's	Infosauria, Amoeba radiosa
Crustaceans	Mesoplankton hyalinus, Mesoplankton leuckarti, Paracyclops fimbriatus
Rotifera	Trichocerca, Branchionus forficua, Branchionus rubens, Branchionus calyciflorus, Branchionus quadridentatus, Branchionus bidentatus, Branchionus ibericus, Branchionus hiemalis
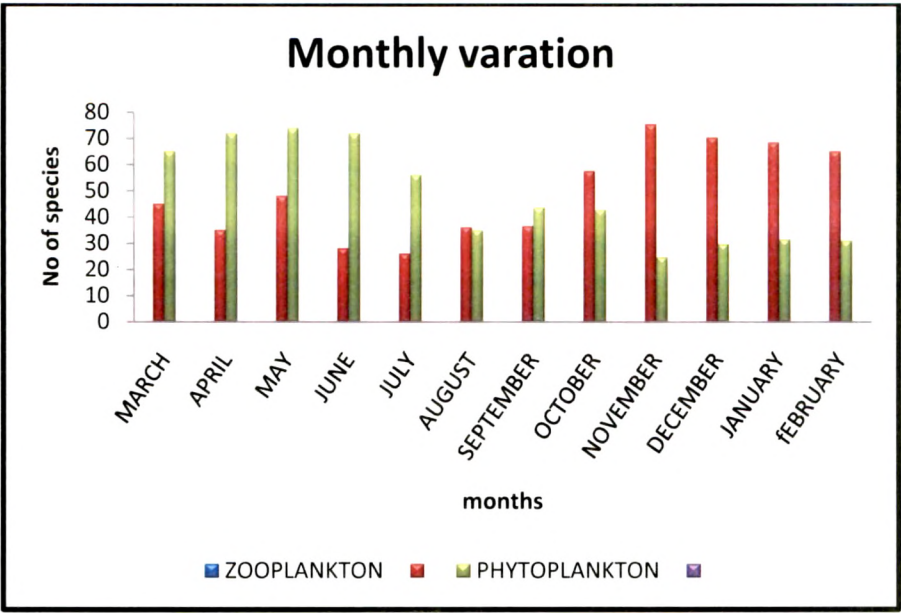
Fig-3.51: **Graph showing monthly variation in plankton**

Fig-3.52: Graph Showing Seasonal variation in zooplankton

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 95

Seasonal varation in phytoplankton

Fig-3.53: Graph showing seasonal variation in phytoplankton

Biodiversity of Mollusca:

Molluscan diversity was studied by identification of the collected specimen or shells, class gastropoda and class bivalvia were observed. The gastropods species were more in number than bivalves. A total of 11 species of molluscan varieties were found. At each site the number of individuals varied from 0 to 35 of different species (Table-3.53, Plate-3.3). Out of 11 species of fresh water molluscan 3 species were identified to act as intermediate hosts in several diseases (Table-3.54). The common species found at both the ponds were *Planorbis planorbis, Bellamya bengalensis (f. mandienensis)*,   *B. variata* (B. dismilis).

TABLE-3.53: List of identified molluscan from the different sites.

Class	Family	Species	No. of individuals	Site
Bivalvia	Unionidae	*Parreysia favidens*	4	Sama
	Corbiculadae	*Corbiculla striatella*	2	Sama
Gastropoda	Lymnaedae	*Lymnae andersonia*	2	Sama
	Planorbidae	*Planorbis planorbis*	4	Sama, Harni
	Stenothyridae	*Gangetia miliacea* (var.subangulata)	2	Sama
	Thiaridae	*Thiara pyramis*	2	Sama
	Viviparidae	*Bellamya bengalensis* (*f. mandienensis*)	35	Sama, Harni
		B. bengalensis (f.balteata)	14	Sama
		B. bengalensis (f.colairnensis)	33	Sama
		B.bengalensis (f.typica)	10	Sama
		B. variata (B. dismilis)	4	Sama, Harni

TABLE-3.54: Molluscan species that acts as an intermediate hosts for diseases.

NO.	SPECIES	INTERMIDIATE HOST FOR	DISEASES
1	*Lymnae andersonia*	*Fasicola hepatica*	Fascolisis
2	*Thiara pyramis*	*Paragominis westermani* (human lung fluke)	Paragonimiasis
3	*Planorbis planorbis*	Blood fluke	Schistosomiasis

**Plate 3.3 : Representative molluscs from the study sites;** *(a) Parreysia favidens, (b) Corbiculla striatella, (c) Lymnae andersonia, (d) Planorbis planorbis, (e) Gangetia miliacea* (var.subangulata)*, (f) Thiara pyramis, (g) Bellamya bengalensis (f. mandienensis), (h) B. bengalensis* (f.balteata)*, (i) B. bengalensis* (f.colairnensis), *(j) B.bengalensis* (f.typica), *(k) B. variata* (B. dismilis).
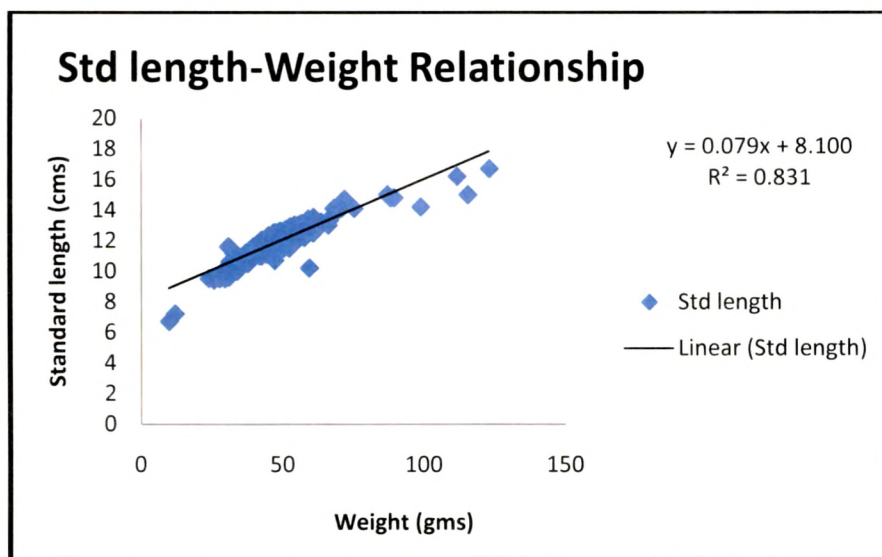
Fish Data Analysis:

The length - weight relationship is an important parameter in fish biology for physiology; ecology and fisheries assessment. A length-weight relationship gives information on the condition and growth patterns of fish. Fishes are said to exhibit isometric growth i.e. where length increases in equal proportions with body weight for constant specific gravity. The regression co-efficient for isometric growth of fish is 03, values greater or lesser than 03 indicates allometric growth. When "b" is greater than 3 it denotes the stoutness, which would indicate that the growth is allometric.

Average of total length and standard length of fish population of Sama ponds is 14.5 and 11.9 cm respectively (Fig-3.54). Correlation between total length and weight and standard length and weight of fish population of Sama is 0.90 and 0.91. These values indicate that there is a positive correlation between two variables. Where, when length will increase weight will also increase. Condition factor of fish population is 1.5. As the value is less than 3, t indicates that the growth pattern of fishes of Sama pond is allometric.

Fig-3.54:   Total Length-Weight Relationship of fishes of Sama pond:

Total Length-Weight Relationship

$y = 8.800x - 79.46$
$R^2 = 0.806$

- Weight
- Linear (Weight)

weight(gm) vs Total Length(cm)
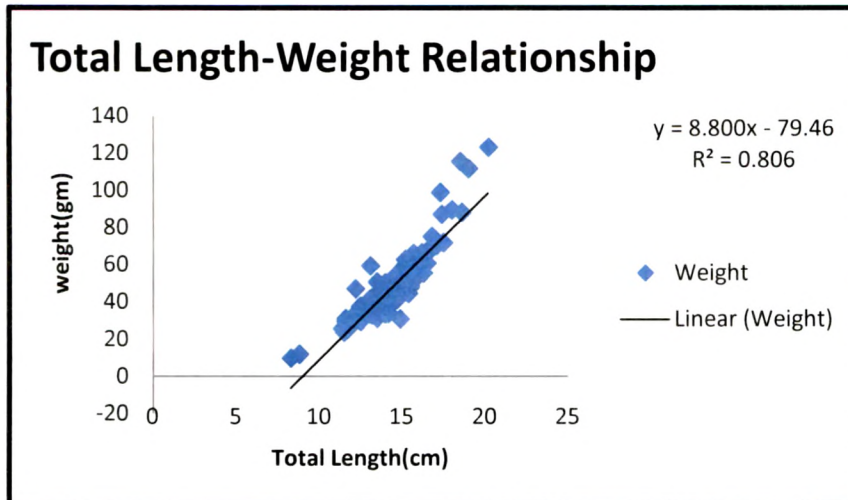
Fig-3.55:   Standard Length-Weight Relationship of fishes of Sama pond:

Std length-Weight Relationship

$y = 0.079x + 8.100$
$R^2 = 0.831$

- Std length
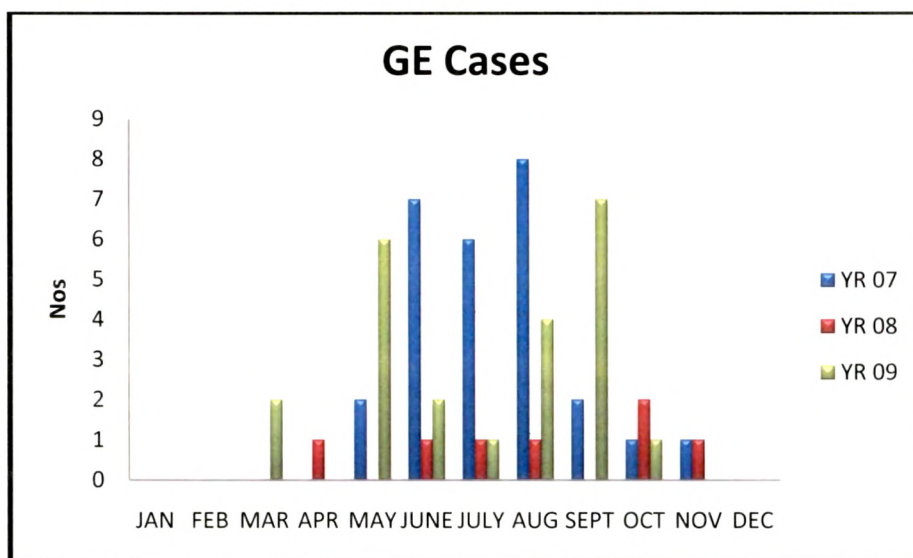- Linear (Std length)

Standard length (cms) vs Weight (gms)

Health Data Analysis:

During the socio-economic survey it was revealed that the local population residing near the ponds was prone to diseases like malaria, cholera, Gastroenteritis (GE) and skin diseases. Gastroenteritis was common and every month some or other one was infected in every house. Other common disease prevailing among the residents around the urban pond were skin diseases. Residents complained of severe itching after the water was used for washing utensils or clothes and bathing. The people who could not afford pipeline connection in home were forced to use pond water for their domestic uses. During the survey the GE cases were reported more at Harni pond as compared to Sama pond especially during summer and monsoon seasons (Table-3.55 and Fig-3.55; Table-3.56 and Fig-3.56). The skin diseases were commonly recorded in the slums around both Sama and Harni pond. (Table-3.57 and Fig-3.57; Table-3.58 and Fig-3.58).

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 101

Table-3.55: GE cases of Sama pond (2007-2009)

MONTHS	YR 07	YR 08	YR 09
JAN	0	0	0
FEB	0	0	0
MAR	0	0	2
APR	0	1	0
MAY	2	0	6
JUNE	7	1	2
JULY	6	1	1
AUG	8	1	4
SEPT	2	0	7
OCT	1	2	1
NOV	1	1	0
DEC	0	0	0

Fig-3.55: Variation in GE cases (2007-2009) at Sama pond

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 102

Table-3.56:   GE cases of Harni pond (2007-2009)

MONTHS	YR 07	YR 08	YR 09
JAN	2	6	7
FEB	3	2	7
MAR	12	5	9
APR	10	15	25
MAY	30	17	16
JUNE	27	11	11
JULY	19	11	21
AUG	16	9	19
SEPT	3	5	13
OCT	15	5	16
NOV	9	8	5
DEC	5	6	13
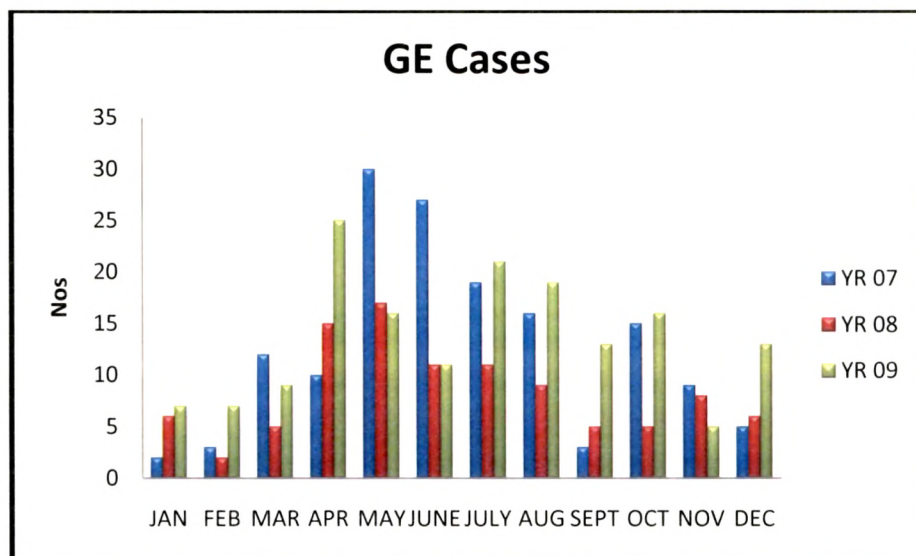
Fig-3.56:   Variation in G.E cases (2007-2009) at Harni pond

Table-3.57: Skin diseases of Sama pond (2007-2009)

MONTHS	YR 07	YR 08	YR 09
JAN	10	10	11
FEB	12	10	15
MAR	13	14	20
APR	12	11	4
MAY	10	10	13
JUNE	20	27	14
JULY	24	24	16
AUG	20	14	25
SEPT	10	21	16
OCT	12	10	19
NOV	11	15	10
DEC	12	10	16
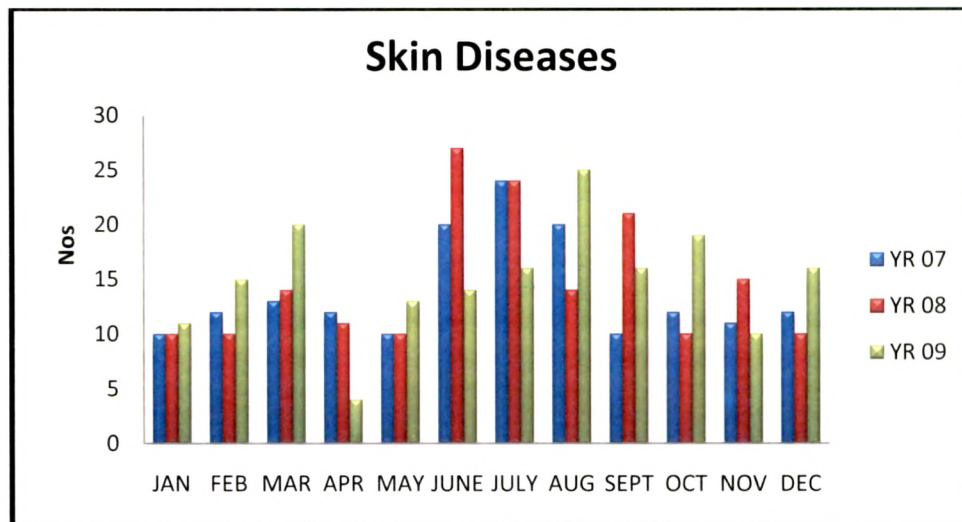
Fig-3.57: Variation in Skin diseases (2007-2009) at Sama pond

Ph. D. Thesis - A. N. Parikh: "Assessment of Urban Ponds with Special Reference to Anthropogenic Activities."

Page 104

Table-3.58:   Skin diseases of Harni pond (2007-2009)

MONTHS	YR 07	YR 08	YR 09
JAN	2	6	1
FEB	9	3	0
MAR	11	9	14
APR	9	7	4
MAY	4	11	7
JUNE	15	22	25
JULY	38	44	23
AUG	14	33	21
SEPT	11	23	19
OCT	15	7	9
NOV	6	17	8
DEC	1	8	4
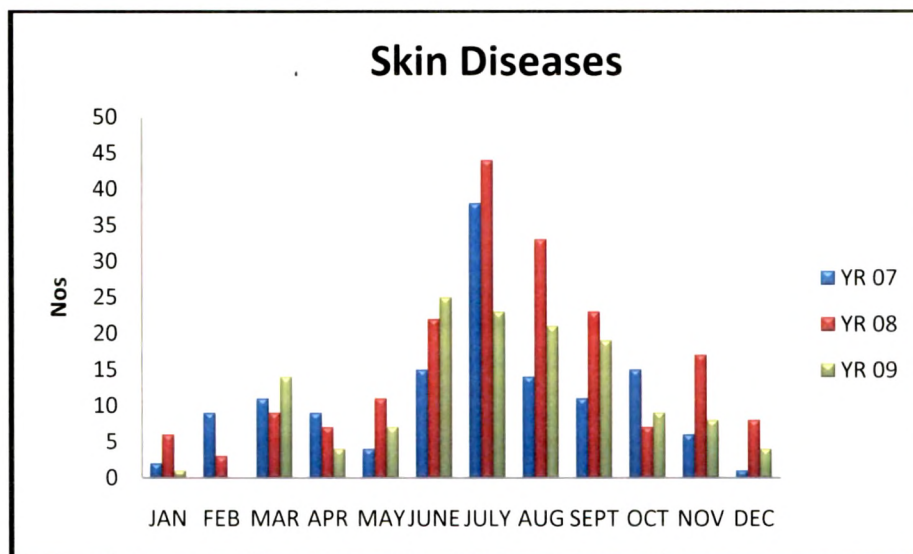
Fig-3.58:   Variation in Skin diseases (2007-2009) at Harni pond