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RESEARCH ARTICLE

Physio-Chemical Analysis of Water Taken from Wetland (Sapanmori and Hans Sarover) of Keoladeo National Park Bharatpur (Rajasthan)

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ABSTRACT

The ground water quality is determined in Sapa nmori and Hans sarover wetland that lays in Keoladeo national park bharatpur Rajasthan,where from each two sites water samples are under studied for physico-chemical status of water.In physico-chemical analysis carbonate and bicarbonate are measured present in ground water. It was recorded that Carbonate alkalinity was maximum (25.25 mg/lit and 28.5 mg/lit) in summer season and minimum (5.0 mg/lit and 6.0 mg/lit) in winter season. On the other hand Bicarbonate alkalinity was recorded maximum (228.75 mg/lit and 241.25 mg/lit) in summer season, and minimum (50.0 mg/lit and 52.5 mg/lit) in winter season.Also all parameters compared with ICMR standards of water quality.

Key Words: *Sapanmori, Hans Sarover, Physio-chemical analysis*

INTRODUCTION

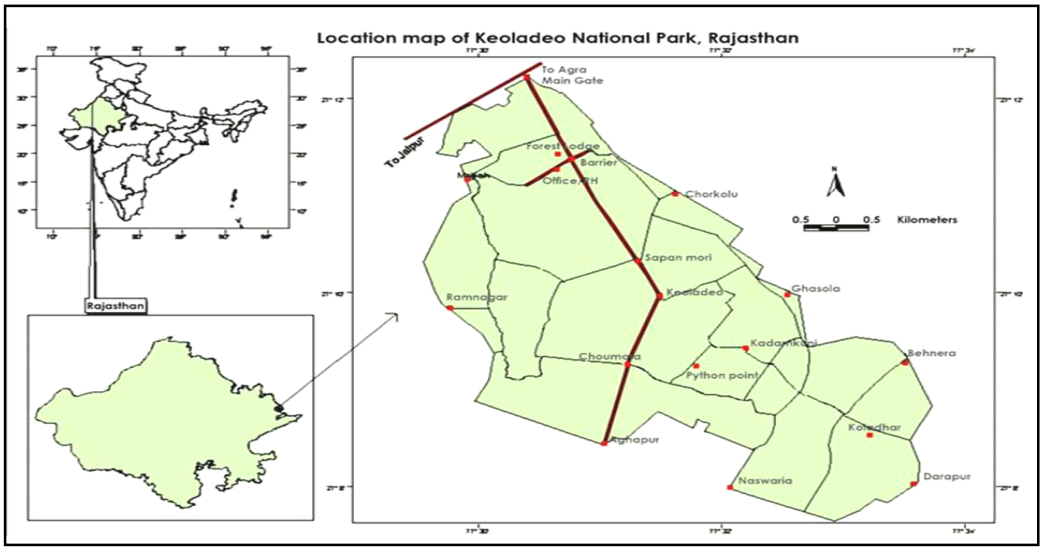
Keoladeo National Park, bharatpur district is located on the north eastern part of the Rajasthan state in the undulating flat Yamuna river flood plains. The district because of its topography is eroded with many natural depressions holding a large volume of rain water. However being flat in nature, the water does stored overflows into flatters surroundings areas. The natural depression wetlands however are short lived as the water gets evaporated in the extreme hot and arid climate. The wetland compartments are surrounded by terrestrial habitats of about 2000ha except in a small area on the northwest, which is contiguous with the agricultural fields of nearby villages (Ali 1953). The only the largest bird sanctuary in World and is reserved for its high level of biodiversity. The main source of water to fill the various lakes, ponds of this park, is Ajan Bandh which is fed by the river Gambhir. Due to the large production of flora and fauna, some migratory birds especially Siberia etc habitual to feed upon them thus it become a centre for attraction (Anon 1981, Ali and Ripley 1983). In spite of micro invertebrates (worms, insects, molluscs etc) some vertebrates (fishes, birds, reptiles and some mammalian species) were also found in this park (Bhupathy 1991). Water is life. All living beings depend on water to carry out complex biochemical processes which aid in the sustenance of life on earth (Reza *at al.,* 2009 and Goncharuk 2012). In the many blocks of park, two blocks were select; first- Sapanmori which is famous for birds Heron**,** second- Hans Sarover contains a large variety of microphysics- Ipomea, Potamogeton and Hydrilla. Some biotic and abiotic factors (like- alkalinity, acidity, B.O.D., C.O.D., etc) influencing this wetland ecosystem (Holffmann 1977). So, the present investigation was carried out to study the alkalinity of water at selected sites; Sapanmori and Hans Sarover in the wetland area of Keoladeo National Park (Map 1).

MATERIAL AND METHOD

The present study was carried out for Sapanmori and Hans Sarover wetland Keoledeo National Park bharatpur Rajasthan In the present study the sampling was done during morning hour. The water samples were collected in the polyethylene bottles. The closed bottle was dipped in the lake at the depth of 0.9 to 1.0 m, and then a bottle was opened inside and was closed again to bring it out at the surface. The samples were collected from five

different points and were mixed together to prepare an integrated sample. From the time of sample collection to the time of actually analyses, many physical and chemical reactions would change the quality of the water sample; therefore to minimize this change the sample were preserved soon after the collection. The water samples were preserved by adding chemical preservatives and by lowering the temperature. The water temperature, pH, DO, and TDS were analyzed immediately on the spot after the collection, whereas the analyses of remaining parameters were done in the Environmental Research laboratory, Zoology Department, Agra College Agra. The study was carried for a period of 2 year (Jan. 2012 to Dec. 2013). Monthly data was collected, but results were represented season wise. Four month make one season (March to June summer season, July to October monsoon season, and November to February winter season).The collected water samples were brought to the laboratory and relevant analysis was performed, carbonate and bi carbonate was determined by APHA.

Map 1: Keoladeo National Park (Bharatpur) study site being showing in Map



RESULTS AND DISCUSSION

Table 1 and Fig. 1 & 2 reveal that the carbonates vary from a minimum of (15.0 mg/lit) to a maximum of (28.0 mg/lit) during February and June 2012. In year 2013, the minimum was (21.0 mg/lit) in March and maximum (31.0 mg/lit) in the month of June. Seasonally, it was detected only in two season in 2012, the lowest (5.0 mg/litre) in winter season and highest (25.75 mg/lit) in summer season, while in the year 2013, it was detected only in summer season (lowest 25.25 mg/lit and highest 28.5 mg/lit) as present in Table 2 and Fig. 3 & 4.

Considering the sites, the minimum concentration (15.0 mg/lit) were observed at site A followed by site B (18.0 mg/lit) in the month of February and maximum (28.0 mg/lit) at site B followed by site A (26.0 mg/lit) in the month of June 2012, respectively; while in year 2013, the minimum concentration was recorded (21.0 mg/lit) at site A followed by site B (27.0 mg/lit) in the month of March and the maximum value was noted to (31.0 mg/lit) at site B followed by site A (30.0 mg/lit) in the month of June respectively. Table 3 and Fig. 5 & 6 show that bicarbonates were detected only in five months, the minimum was recorded (170 mg/lit) during May and maximum (270 mg/lit) during March 2012. In year 2013, the highest concentration was observed (285 mg/lit) in the month of March and lowest was noted (150 mg/lit) during May.

Bicarbonates were fluctuating from a maximum of (270 mg/lit) at site B followed by site A (260 mg/lit) during March to a minimum of (170 mg/lit) at site A followed site B (190 mg/lit) in the month of May 2013. In year 2013, the fluctuations were recorded to be minimum of (150 mg/lit) at site A followed by site B (200 mg/lit) during May to a maximum

of (285 mg/lit) at site B followed by site A (280 mg/lit) in the same month (March) as present in Table 3 and Fig. V & VI. Bicarbonates were found only in two seasons in 2012. Highest were noted in summer season (228.75 mg/lit) and lowest in winter season (57.5 mg/lit). While, in year 2013, highest were noted in summer season (241.75 mg/lit) and lowest in winter season (50.0 mg/lit) as represent in the Table 4 and Fig. 7 & 8.

Total alkalinity of water is mainly caused by carbonates and bicarbonates (Benson *et al.*, 1999 and Jan 2012). According to Kim and Lee (2009) high alkalinity is indicative of eutrophic nature of lake. Patnaik *et al.* (2002) suggested that any water body with alkaline value> 100 mg/litre is nutritionally rich. During the process of photosynthesis the plants use free CO_2, when it is consumed, the half– bound CO_2 (bicarbonate) is available (Rana 1991 and Bath and Kaur 1999). When both the sources are exhausted the fully bound CO_2 (monocarbonates) may also be utilized. Therefore, it is normally expected that with the rise in carbonates, the bicarbonates will decrease and vice-versa. In other words, there will exist an inverse correlationship in these two factors of water (Chatterjee 1990). The carbonates were found minimum (150.0 ppm) in the month of February and maximum (31.0 ppm) in June and bicarbonates were found minimum (15.0 ppm) in the month of February and maximum (31.0 ppm) in June and bicarbonates were noted between 150 ppm to 285 ppm in both years, respectively in conformity of Cai and Hu *et al.* (2010). The carbonates and bicarbonates were absent from July onwards till the end of the year. According to Tanriverdi *et al.* (2010), no carbonate is present when pH is less than 8.3 or more than 4.5 but free CO_2 and bicarbonates may be present; while in present case bicarbonates and carbonates are totally absent when pH is less than 7.

In present investigation carbonates and bicarbonates were observed only in summer and winter season; while in monsoon and autumn season they were totally absent. Thus, present findings corroborate with the findings of Azeez *et al.* 2009. According to them absence of carbonates in monsoon season, may be due to excess of CO_2 received from the rain water in the form of carbonic acid which facilitates formation of stable bicarbonates from carbonates. Carbonate alkalinity was observed only in summer and winter months. It fluctuated between 15.0 mg/lit to 31.0 mg/lit in both the years of investigation. Seasonally, it was maximum (25.25 mg/lit and 28.5 mg/lit) in summer season and minimum (5.0 mg/lit and 6.0 mg/lit) in winter season. Regarding, all the sites, it was fairly high at site B (31.0 mg/lit), followed by site A (30.0 mg/lit). Bicarbonate alkalinity was only observed in summer and winter months. It ranged from 175.0 mg/lit to 285 mg/lit in the investigation period. Seasonally, it was maximum (228.75 mg/lit and 241.25 mg/lit) in summer season, and minimum (50.0 mg/lit and 52.5 mg/lit) in winter season. Regarding the sites, fairly high concentration was observed at site B (285.0 mg/lit) followed by site A (280.0 mg/lit).

Table 1: Monthly variations in carbonates (mg/lit) at two sites in the wetland area of Keoladeo National Park

Months	Sapanmori (Site- A)		Hans Sarovar (Site B)	
	2012	2013	2012	2013
January	-	-	-	-
February	15.0	-	18.0	-
March	19.0	21.0	23.0	27.0
April	23.0	23.0	25.0	27.0
May	24.0	27.0	27.0	29.0
June	26.0	30.0	28.0	31.0
July	-	-	-	-
August	-	-	-	-
September	-	-	-	-
October	-	-	-	-
November	-	-	-	-
December	-	-	-	-

Table 2: Seasonal variations in carbonate (mg/lit) at two sites in the wetland area of Keoladeo National Park

Seasons	Sapanmori (Site- A)		Hans Sarovar (Site B)	
	2012	2013	2012	2013
Summer	23.0	25.25	25.75	28.5
Monsoon	-	-	-	-
Autumn	-	-	-	-
Winter	5.0	-	6.0	-

Table 3: Monthly variations in bicarbonates (mg/litre.) at two sites in the wetland area of Keoladeo National Park

Months	Sapanmori (Site- A)		Hans Sarovar (Site B)	
	2012	2013	2012	2013
January	-	-	-	-
February	230	200	240	210
March	260	280	270	285
April	210	250	260	270
May	170	150	190	200
June	255	175	195	210
July	-	-	-	-
August	-	-	-	-
September	-	-	-	-
October	-	-	-	-
November	-	-	-	-
December	-	-	-	-

Table 4: Seasonal variations in bicarbonate (mg/lit) at two sites in the wetland area of Keoladeo National Park

Seasons	Sapanmori (Site- A)		Hans Sarovar (Site B)	
	2012	2013	2012	2013
Summer	223.75	213.75	228.75	241.25
Monsoon	-	-	-	-
Autumn	-	-	-	-
Winter	57.5	50.0	60.0	52.5

Fig. 1: Monthly variations in carbonate in two sites in the lake of Keoladeo National Park during first experimental year from Jan. 2012 to Dec. 2012

Fig. 2: Monthly variations in carbonate in two sites in the lake of Keoladeo National Park during second experimental year from Jan. 2013 to Dec. 2013

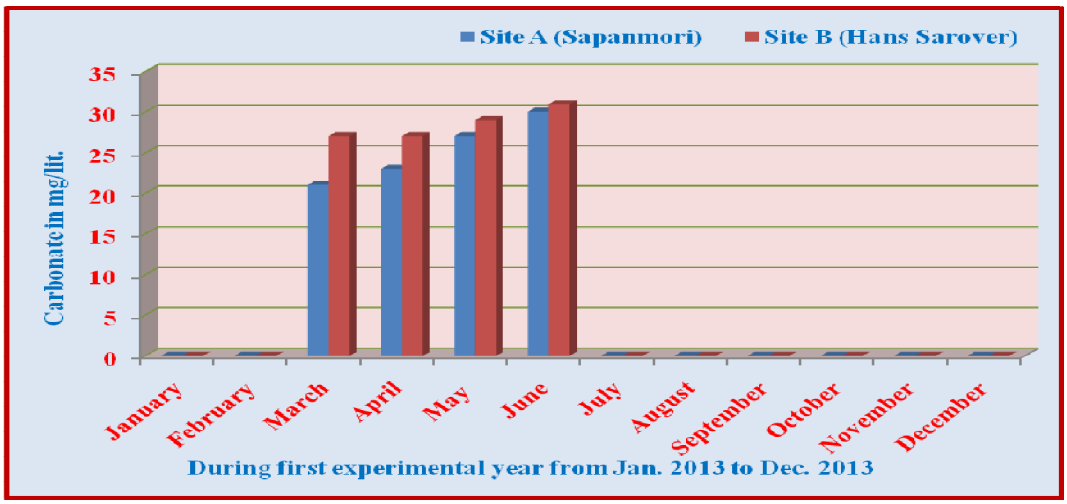


Fig. 3: Seasonal variation in carbonates (mg/lit) in two sites in the lake of Keoladeo National Park during first experimental year from Jan. 2012 to Dec. 2012

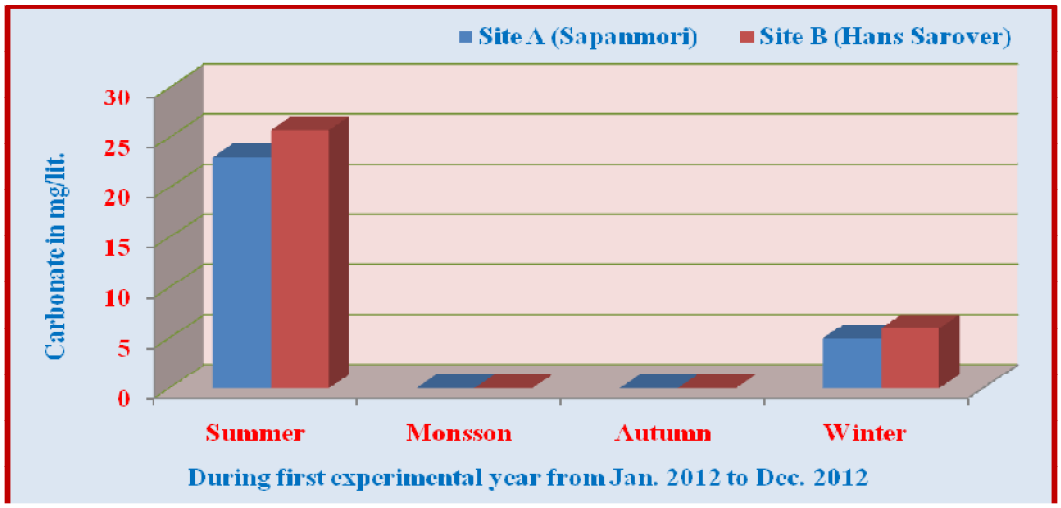


Fig. 4: Seasonal variation in carbonates (mg/lit) in two sites in the lake of Keoladeo National Park during second experimental year from Jan. 2013 to Dec. 2013

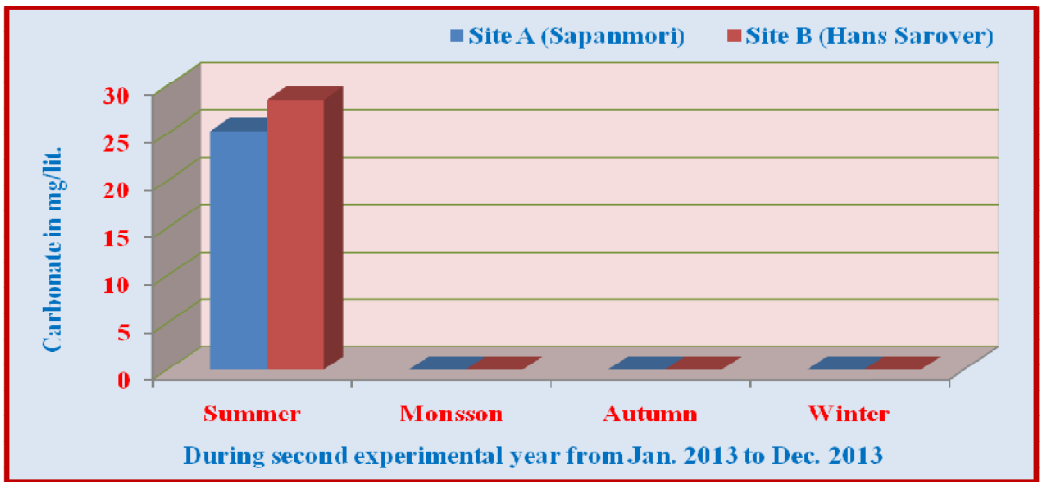


Fig. 5: Monthly variations in bicarbonate in two sites in the lake of Keoladeo National Park during first experimental year from Jan. 2012 to Dec. 2012

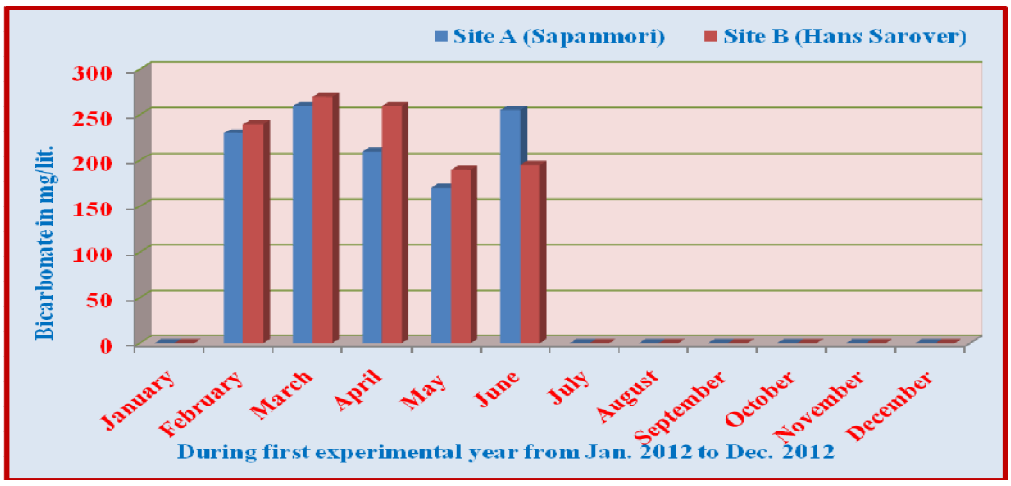


Fig. 6: Monthly variations in carbonate in two sites in the lake of Keoladeo National Park during second experimental year from Jan. 2013 to Dec. 2013

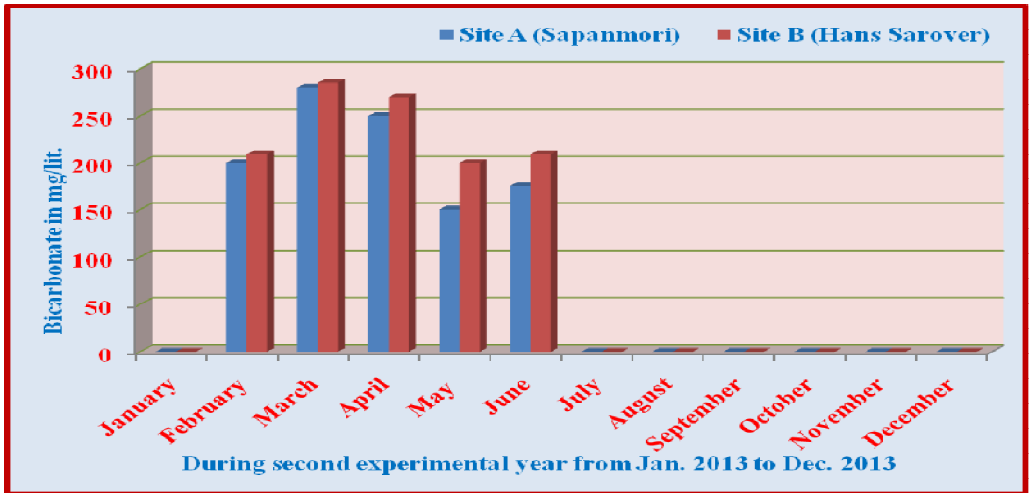


Fig. 7: Seasonal variation in bicarbonates (mg/lit) in two sites in the lake of Keoladeo National Park during first experimental year from Jan. 2012 to Dec. 2012

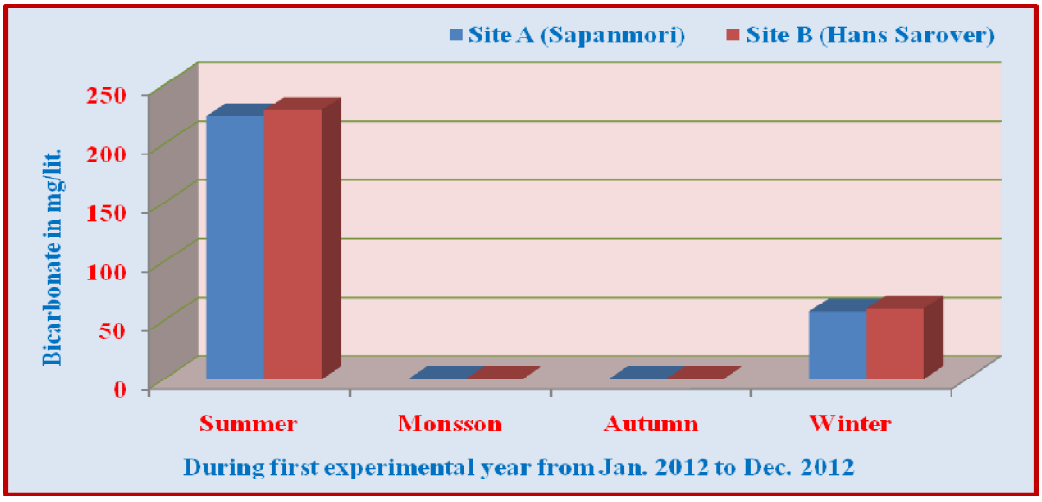
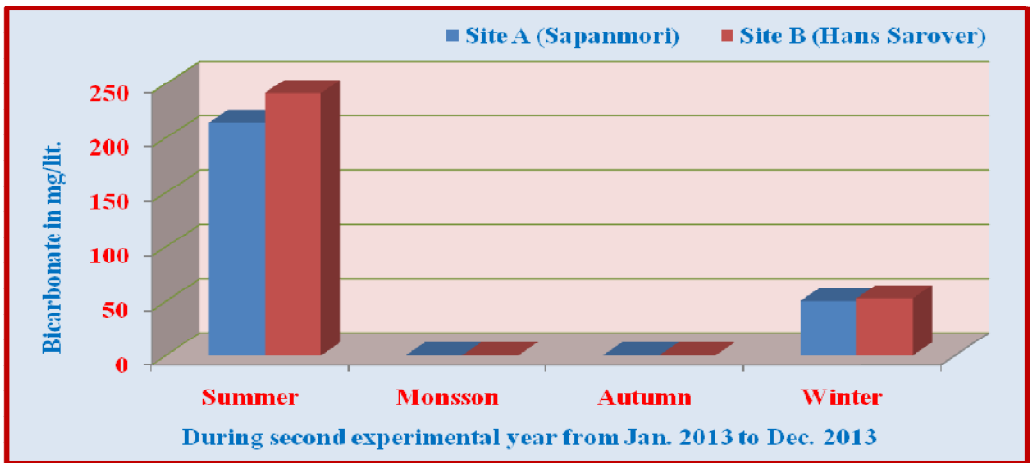


Fig. 8: Seasonal variation in bicarbonates (mg/lit) in two sites in the lake of Keoladeo National Park during second experimental year from Jan. 2013 to Dec. 2013



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