

# Temporal variation in physico-chemical properties of Basapur Handia wetland, Allahabad

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**Article Chronicle :**

**Received :**  
01.11.2013;  
**Revised :**  
10.11.2013;  
**Accepted :**  
28.11.2013

**SUMMARY :** The temporal variations in physico-chemical parameters of Basapur Handia wetland in Allahabad, like temperature, pH, D.O., B.O.D., total alkalinity, turbidity, chlorides contents and electrical conductivity were analyzed from (Sep. 2009-Aug. 2010). All these parameters were found to be higher in cooler season compared to other season, which may be due to the temperature changes which showed inverse relationship with water temperature. The water was alkaline during entire study period and alkalinity was found highest in the month of June and lowest in the month of August. The study revealed the changes in physico-chemical characteristics of this wetlands, which will be a beneficial study to monitor the environmental changes of such water bodies.

**HOW TO CITE THIS ARTICLE :** Mohan, Anand and Misra, D.R. (2013). Temporal variation in physico-chemical properties of Basapur Handia wetland, Allahabad. *Asian J. Environ. Sci.*, 8(2): 117-121.

**Key Words :**

Wetland, D.O.,  
Turbidity, Water  
quality

According to Ramsar Convention (1971): “Wetland are areas of marsh, for peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters.” Total global wetland area is about 530 million hectares of which 78% are in tropical countries (Shukla, 1998). Wetlands of India are estimated to be covering an area of 58.2 million hectares (Prasad and Ramchandra, 2002), of which Uttar Pradesh has 12832 ha (MOEF-India 1990). Wetlands are important in many ways, such as flood control, recharge and de-charge of ground water, shoreline stabilization, climate stabilization and carbon sequestrations (Day *et al.*, 1998). The driving forces and mechanism of seasonal changes are acknowledged to be related to variations in physical, chemical and biotic environment of any ecosystem (Muhammad *et al.*, 2005). Different causal influences, which determine the quality of water, show a characteristic change from season to season (Islam, 2007). Wetlands have been paid attention because of its high biodiversity and

special environment that human being relies on. Wetland ecosystem is a nutritional sink that deposits organic matters (Cunqi *et al.*, 2007). Therefore, there is a pressing need to gain knowledge about tropical lentic ecosystem from properly recorded water quality data. The aim of the present study was to quantify physico-chemical properties of Basapur wetland and to understand its regular temporal variations.

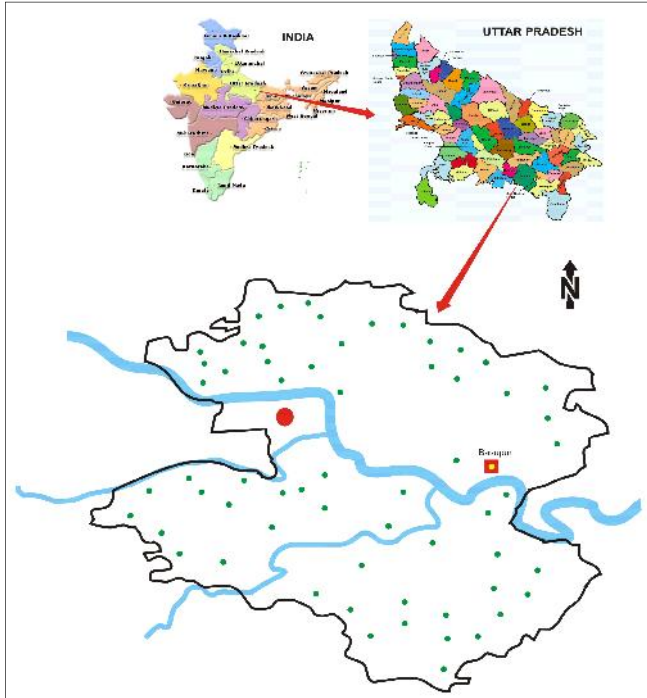
**Study area :**

The district Allahabad of Uttar Pradesh lies between 24°47' and 25° N latitude and 81°9' and 82°21'E longitude. About 1.25% of total area of Allahabad district is covered by 64 wetlands (ENVIS, U.P.). Basapur wetland is located 40 km away from Allahabad, U.P. on the side of NH-2. This wetland receives rainwater. The maximum area of wetland is about 8000 m<sup>2</sup>. The floating hydrophytes are dominant in this wetland. The wetland experiences tropical climate. The summer is extremely hot and dry with daytime temperature around 45°C and night temperature goes down up to 27°C. The summer season extends from March to second week of June. The monsoon

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season lasts till last week of September. Humidity is very high around 65% to 75%. Most of rainfall occurs in this season. The winter is cooler, pleasant and dry with sunny days and chilled nights (24°C average day temperature and 7°C average night temperature). Site selected for the present study is shown in Fig. A and B.



**Fig. A :** Map of Allahabad showing wetlands of the districts and the study site, of Basapur Handla



**Fig. B :** Photograph showing study site

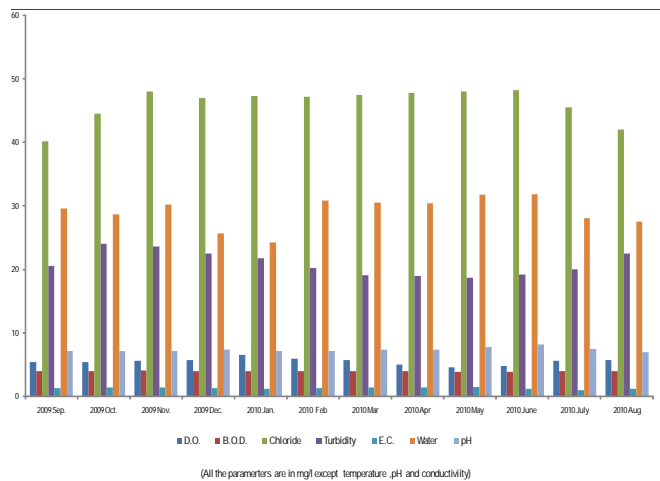
## EXPERIMENTAL METHODOLOGY

For the present study, the water was sampled on monthly basis, between 10.00AM to 4.00P.M., from September 09 to

August, 2010. The physico-chemical parameters such as temperature, pH were measured on the site. Dissolved oxygen was measured by the Winkler's method (Fevre, 1999). The surface water was sampled in water sampler (300 ml). The parameters like total alkalinity, electrical conductivity, chloride content, B.O.D. were analyzed in the laboratory, following the methods of APHA (2000).

## EXPERIMENTAL FINDINGS AND DISCUSSION

The mean values of temporal variations physico-chemical properties of Basapur wetland is shown in Table 1 and Fig. 1. The temperature of water varied from 24.2°C to 31.8°C (Fig. 2f). The temperature of surface water was lowest in January (24.2°C) and highest in June (31.80°C). High surface water temperature is a permanent feature of many Asian tropical lakes and reservoirs (Gonzalez *et al.*, 2004) which is totally dependent on atmospheric temperature. The temperatures showed a gradual increase from the month of March till the onset of rainy season in June and gradually decreased from the rainy season to the winter season. The rise in temperature could be due to the fact that in winter photoperiod was shorter and less intense than summer (Salam *et al.*, 2000).



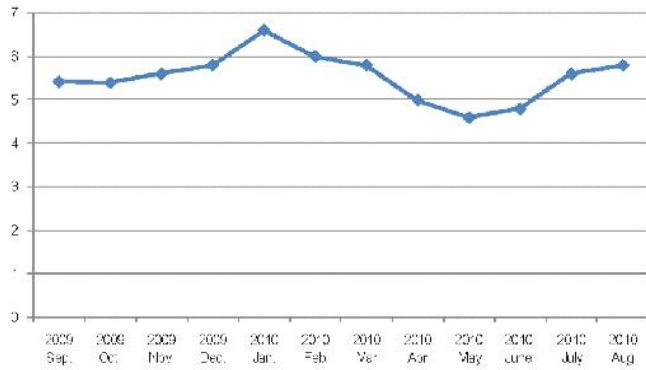
**Fig. 1 :** Variations in different physico-chemical properties of Basapur wetland

Turbidity of water ranged from 18.70-24 cm (Fig. 2d) in study site. The minimum average turbidity observed was 18.70 cm in May and maximum was 24 cm in October.

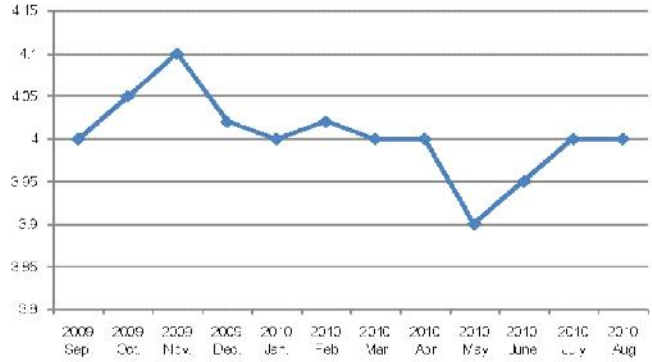
Electrical conductivity of water ranged from 1 to 1.5mho (Fig. 2e). The minimum conductivity was observed in July and maximum was in May.

The water was slightly alkaline during the entire study period. In the present investigation, maximum pH range was in the month of June (8.2) and lowest in August (7.00) Fig. 2(g). The low values were observed during the rainy months (July and Aug.) This might be due to constant water in flow which is

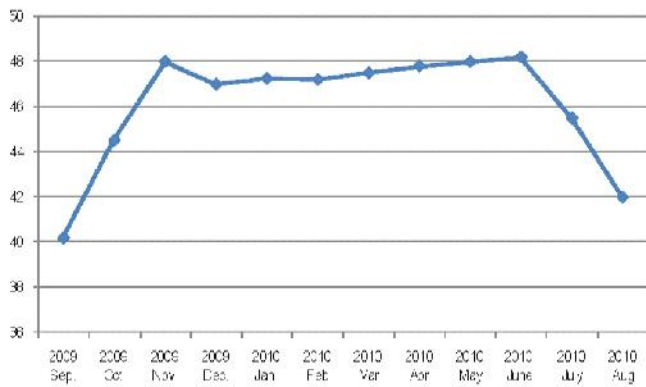
TEMPORAL VARIATION IN PHYSICO-CHEMICAL PROPERTIES OF BASUPUR HANDIA WETLAND



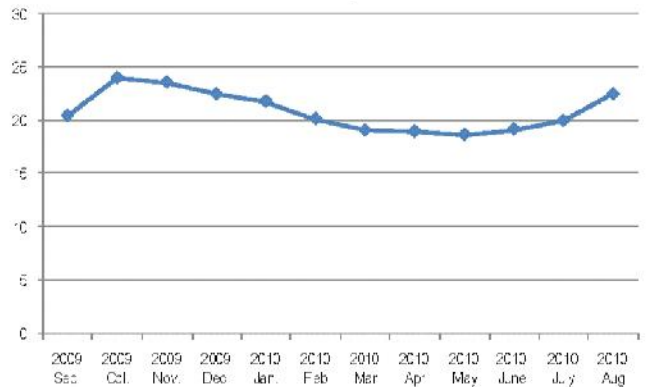
(a) D.O.



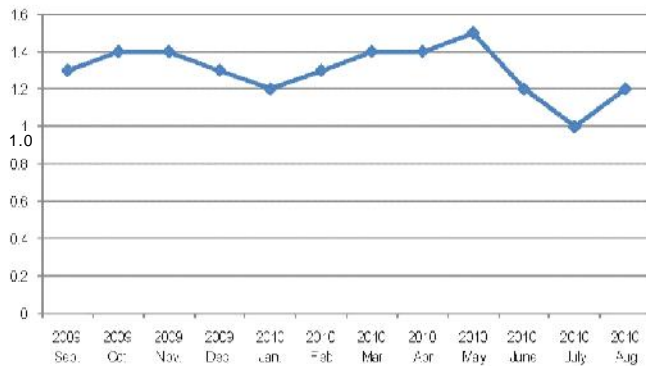
(b) B.O.D.



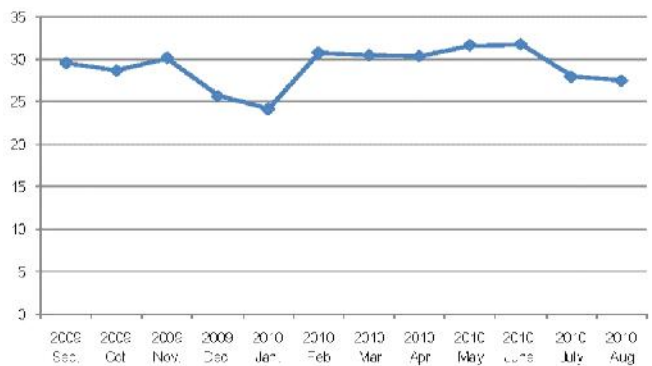
(c) Chloride



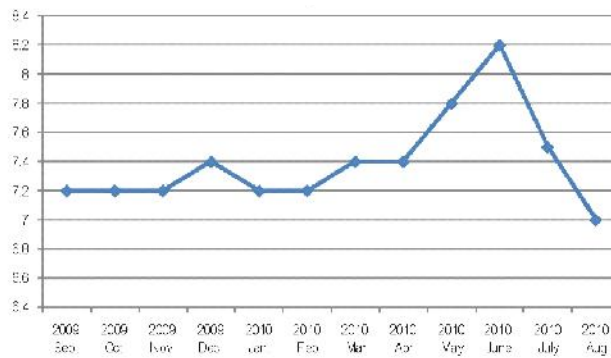
(d) Turbidity



(e) E.C.



(f) Water temperature °C



(g) pH

Fig. 2 : Trand in different physico-chemical parameters of Basupur wetland

**Table 1 : Physico-chemical properties of Basupur wetland (from Sept. 2009- Aug. 2010)**

Months	D.O.	B.O.D.	Chloride	Turbidity	E.C.	Water	pH
2009 Sep.	5.42	4.00	40.2	20.5	1.3	29.6	7.2
2009 Oct.	5.4	4.05	44.52	24.00	1.4	28.70	7.2
2009 Nov.	5.6	4.10	48	23.6	1.4	30.2	7.2
2009 Dec.	5.8	4.02	47.00	22.50	1.3	25.70	7.4
2010 Jan.	6.6	4.00	47.25	21.80	1.2	24.2	7.2
2010 Feb.	6.0	4.02	47.20	20.20	1.3	30.8	7.2
2010 Mar.	5.8	4.00	47.50	19.10	1.4	30.5	7.4
2010 Apr.	5.0	4.00	47.80	19.00	1.4	30.4	7.4
2010 May	4.6	3.90	48	18.70	1.5	31.70	7.80
2010 June	4.8	3.95	48.20	19.20	1.2	31.80	8.20
2010 July	5.6	4.00	45.5	20.00	1.0	28.00	7.5
2010 Aug.	5.8	4.00	42.00	22.50	1.2	27.5	7.00

expected to bring about changes in the levels of carbon dioxide, and carbonates and hence a fall in the pH value.

The D.O. varied from 4.6 to 6.6 in the study site (Fig. 2a). The heights D.O. concentration (6.6) was observed in month of January and the poor concentration was observed in the month of May. D.O. showed inverse relationship with water temperature (Boyd, 1981). The average D.O. concentration in this wetland was slightly high primarily due to open the water surface or absence of *Eichhornia crassipes* and thereby due to high atmospheric O<sub>2</sub> diffusion into the water and low O<sub>2</sub> demands by the microorganisms during the oxidation of dead leaves and roots, which were less in quantity.

The B.O.D. varied from 3.90 to 4.10 mg/l (Fig. 2b). The maximum B.O.D. concentration (4.10mg/l) was observed in month of November and the minimum concentration (3.90mg/l) was observed in May. In month of November the maximum B.O.D. of wetland water has more organic matter and comparatively minimize value of dissolved oxygen.

The water showed alkaline characteristics and the average maximum alkalinity level was observed 525 mg/l in the month of June and the average minimum alkalinity was 160 mg/l in the month of August.

The chloride content ranged from 40.2 to 48.20 mg/l (Fig. 2c) in this wetland. The minimum average chloride content obtained was 40.2 mg/l in September and the maximum average was 48.20 mg/l in June. The increase in the chloride content in the summer months, as attributed by Rodrigo *et al.* (2002), was due to higher evapo-transpiration, domestic waste and effluent which feed this wetland.

### Conclusion :

The present study investigated the changes in different physico-chemical parameters of water in Basupur- Handia wetland. High temperature of water and alkaline pH was main characteristics, while DO and BOD were in non-polluted range.

From the study it was found that although the physico-chemical parameters of the water of the wetland is indicating much pollution into it but high monthly variations are of concern and so anthropogenic disturbances must be reduced. If necessary steps are not taken at the right earnest, it may be sooner converted into a wasteland.

### Acknowledgment :

The authors are thankful to Head, Botany Department, University of Allahabad for providing laboratory facilities. The authors are also grateful to University Grant Commission (UGC) for providing research fellowship to one of the authors (AM).

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