

***IN SITU* ASSESSMENT OF pH AND DISSOLVED OXYGEN VALUES IN A WASTE STABILIZATION POND COMPLEX AT PONTA NEGRA, NATAL, RIO GRANDE DO NORTE – BRAZIL.**

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Introduction

- The removal efficiency of pathogenic bacteria in wastewater treatment systems is usually measured in terms of the reduction in numbers of thermotolerant coliform bacteria (TTC).
- However some environmental factors, such as the concentration of dissolved oxygen, pH values and the density and diversity of algae, can be good indirect indicators of the natural disinfection efficiency in waste stabilization pond systems (WSP).

(Pearson *et al.*,1987; Curtis *et al.*,1992; Rangeby *et al.*,1996; Davies-Colley *et al.*,1999).

- Previous studies on the Ponta Negra waste stabilization pond complex had demonstrated sub optimum treatment efficiency in terms of BOD and thermotolerant coliform removals.
- This was attributed to excessive wind mixing of the pond water columns.

Aims

- In this study *insitu* measurements of pH and dissolved oxygen (DO) were made in the pond effluents of the WSP series comprising a facultative pond followed by two maturation ponds.

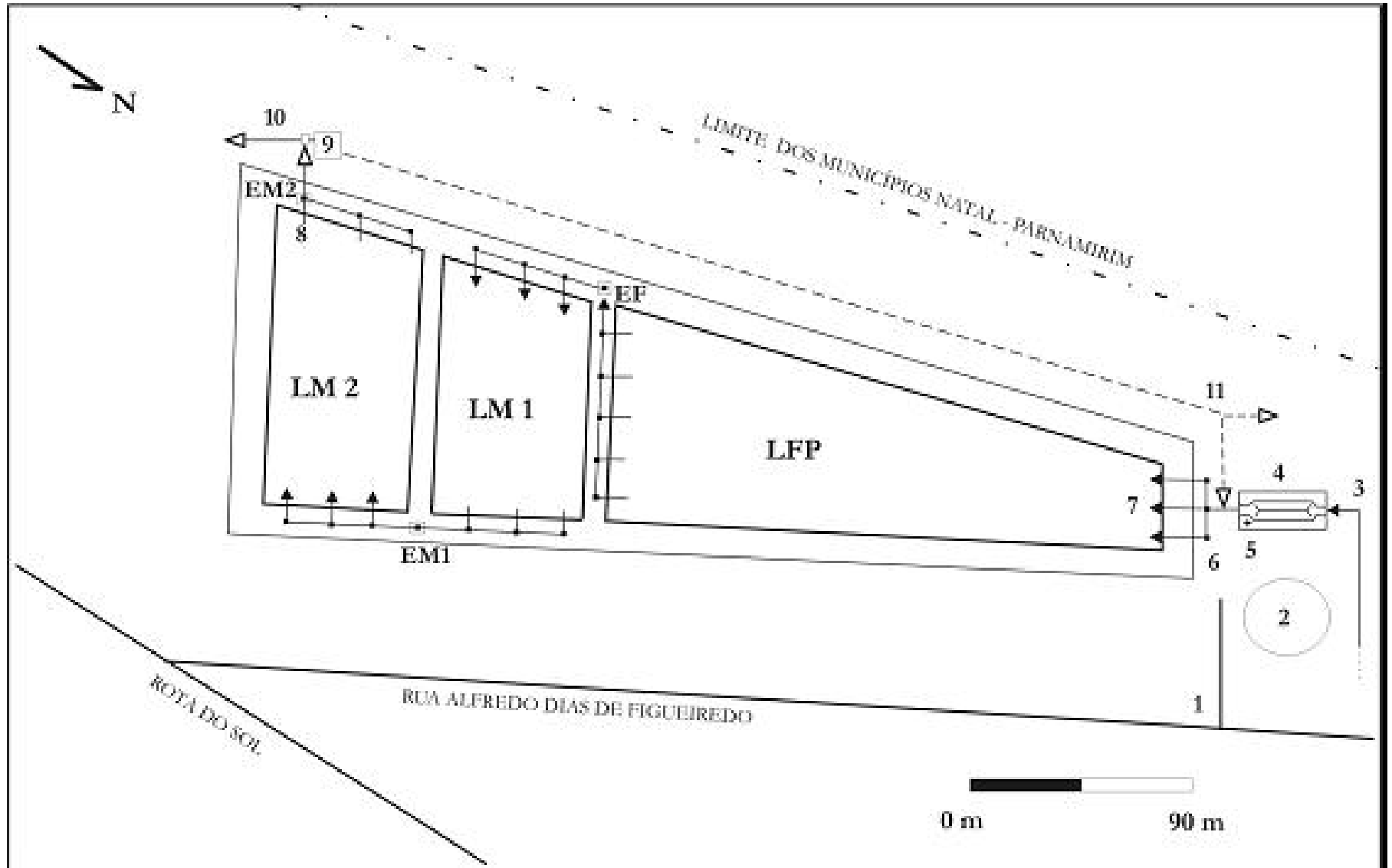
Location

- The present study was carried out at the WSP of Ponta Negra, in the city of Natal (50° 47' 42" S and 35° 12' 43" W), Rio Grande do Norte, NE. Brazil, which persistently shows poor thermotolerant coliform removal (Macedo et al., 2005) .

Methods

- *In situ* measurements of pH and oxygen concentrations were measured in the effluents of the WSP system, comprising:
- A primary facultative pond (effluent sampling points A,B,C)
- followed by two maturation ponds in series (effluent sampling points D,E, F and G,H,I respectively).
- The measurements were made in triplicate using a HORIBA multi-parameter meter (Water Quality Checker / U-10)
- on 16 separate occasions from 07/01/2004 to 11/03/2004 between 10:00 and 12:00 hours, when preliminary measurements had indicated maximum diurnal values for pH and DO.
- The sampling procedure was in accordance with APHA (2005) and each sampling for each site was made in triplicate.

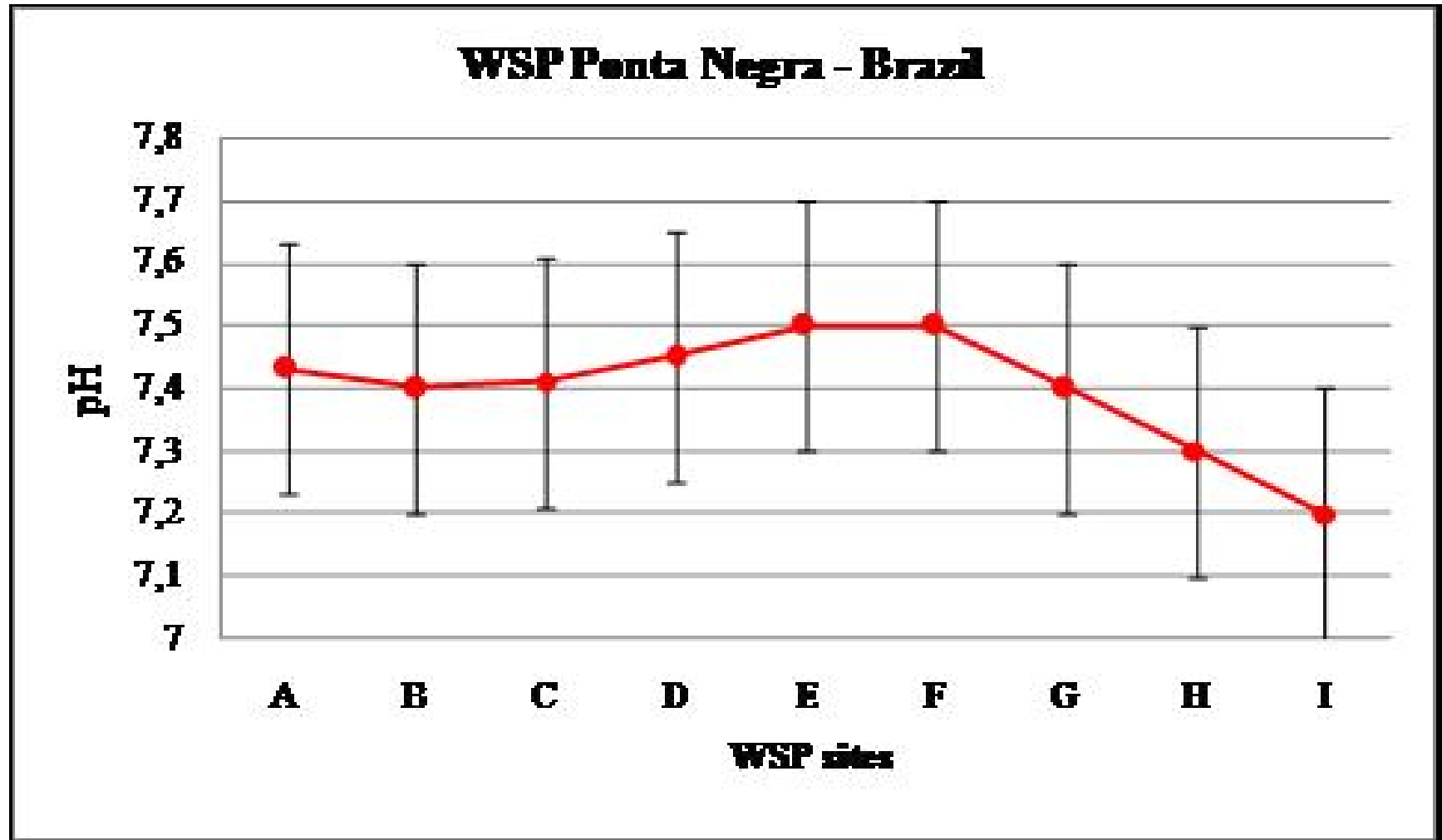
Representation of the Waste Stabilization Pond (WSP) of Ponta Negra



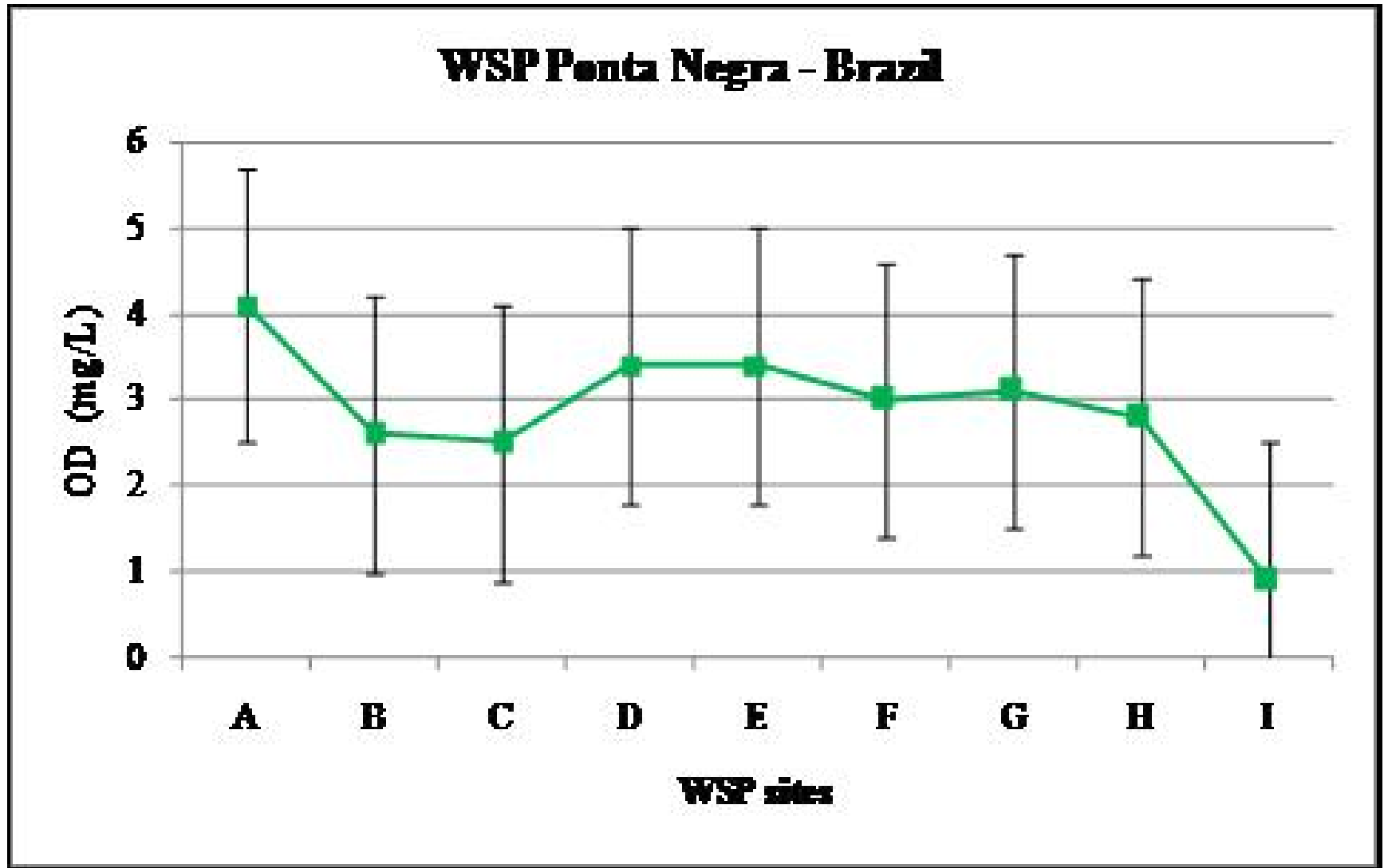
Results and discussion

Variations in the maximum insitu values for pH and DO at the various sampling points in the Ponta Negra WSP system are presented in the next figures

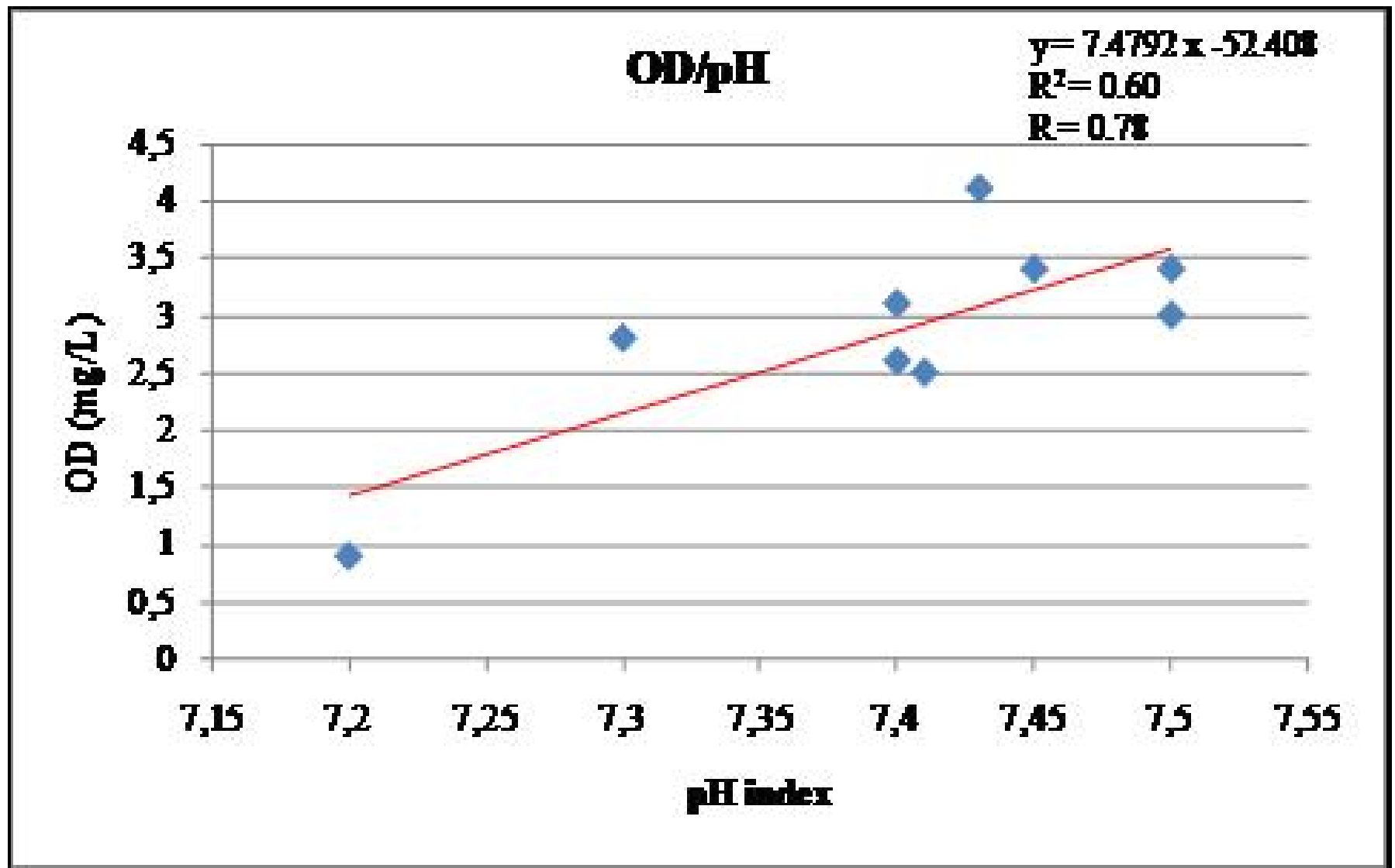
pH variation In the Ponta Negra WSP. The values are the means of triplicates determined on 16 occasions.
The bars are SE's ($p < 0.05$).



D.O. values in the Ponta Negra WSP



Correlation between O.D. and pH.



Conclusions

The measurements made in this study showed that values for pH <8.5 and OD <8mg/L, essential for good bacterial removal efficiency in a WSP system, were not being maintained and

this could account for the low removal efficiency of TTC previously reported for the system (Macedo et al., 2005).

This low efficiency was attributed to excessive wind mixing of the ponds which remained destratified throughout the day (Meneses et al).

Conclusions

- The results showed that the mean maximum pH never exceeded 7.7 and DO rarely exceeded 5.0mg/L.
- Thus optimum conditions for effective bacterial die-off were never achieved
- This probably accounts for the poor TTC removals in the Ponta Negra WSP system (Macedo et al., 2005).

- Thus low mean maximum values for dissolved oxygen and pH in a WSP system can be indicators of low disinfection efficiency.
- Such measurements are rapid and easy to accomplish and can be used to indicate when a more comprehensive evaluation of a system is necessary particularly if the effluent is to be used for irrigation or discharged into a sensitive water course.

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