ASSESSMENT OF WASTE WATER TREATMENT IN CANAANLAND, OTA, OGUN STATE, NIGERIA.

Isiorho, S. A.
Department of Geosciences, Indiana University – Purdue University,
Ft. Wayne (IPFW), Fort Wayne, IN 46805, USA.

and

Oginni, F. A.
Department of Civil Engineering, Covenant University,
Canaan Land Km. 10, Idiroko Road, P.M.B. 1023, Ota, Ogun State, Nigeria.

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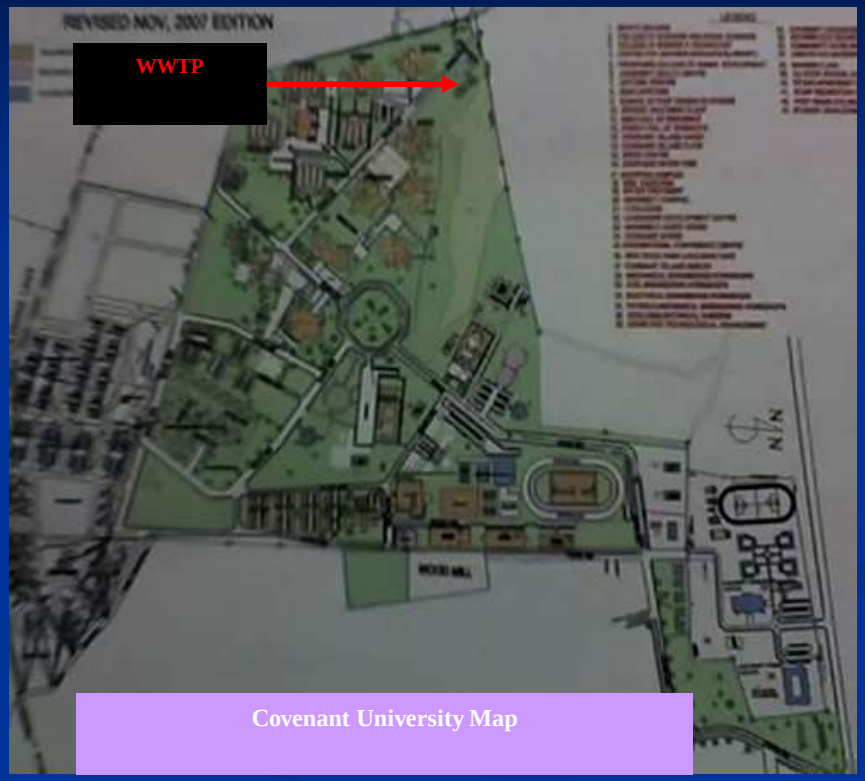
INTRODUCTION

- Much waste water is being generated and most are not treated in developing nations
- Constructed wetlands (CW), are now widely used as an accepted method of treating wastewater (Gopal, 1999; Kivaisi, 2001; Vymazak, 2007; Rousseau et al, 2008) and are cheaper than traditional wastewater treatment plants.
- CW is appealing to developing nations in the tropics due to the high rate of plant growth (Kivaisi, 2001).
- Some Universities and Colleges use CW for teaching, research, and demonstration purposes such as Covenant University, Ota, Ogun State, Nigeria.

STUDY AREA

- Canaanland in Ota, Ogun State, Nigeria is the home of the Living Faith Tabernacle Church (largest church auditorium) and that of the Covenant University. It is located within the Iju hydrological basin.
- Sewage Treatment Plant (STP), for this community is located in Covenant University.
- Sewage is discharged into 2 anerobic septic tanks in the STP and treated effluent discharged into a canal which empties into River Iju.
- Water consumption in the University
  ~ 4,216 m^3/day from 8 boreholes
  - ~80 % returns as waste water



Covenant University Map

- Covenant University uses constructed wetland for waste water treatment. The wastewater flow in the constructed wetlands is the main focus of this paper.

Why look at the waste water?

- Treated waste water flows to R. Atura that eventually flows into the Atlantic Ocean affecting thousands ...fish and potable water

Constructed Wetlands

- The constructed wetlands consist of six chambers
  - Each chamber consists of four cells:
  - Within each cell are water hyacinth plants

- The constructed wetland removes solids, dissolved solids, nutrients, and pathogens.

Effluent Disposal

- Effluent from the constructed wetland is discharged through a 15m long, lined channel into a gully (30 m deep & 35 m wide) that drains into Iju River …to the Atlantic through Lagos lagoon.

METHODS

- Water samples were collected from three boreholes and tested for pH, conductivity and total dissolved solid (TDS)

- At the constructed wetlands, pH, TDS, and conductivity measurements were made at each cell using a Milwaukee Sm802 pH/EC/TDS meter.

RESULTS AND DISCUSSIONS

Chemistry of three water (boreholes) samples

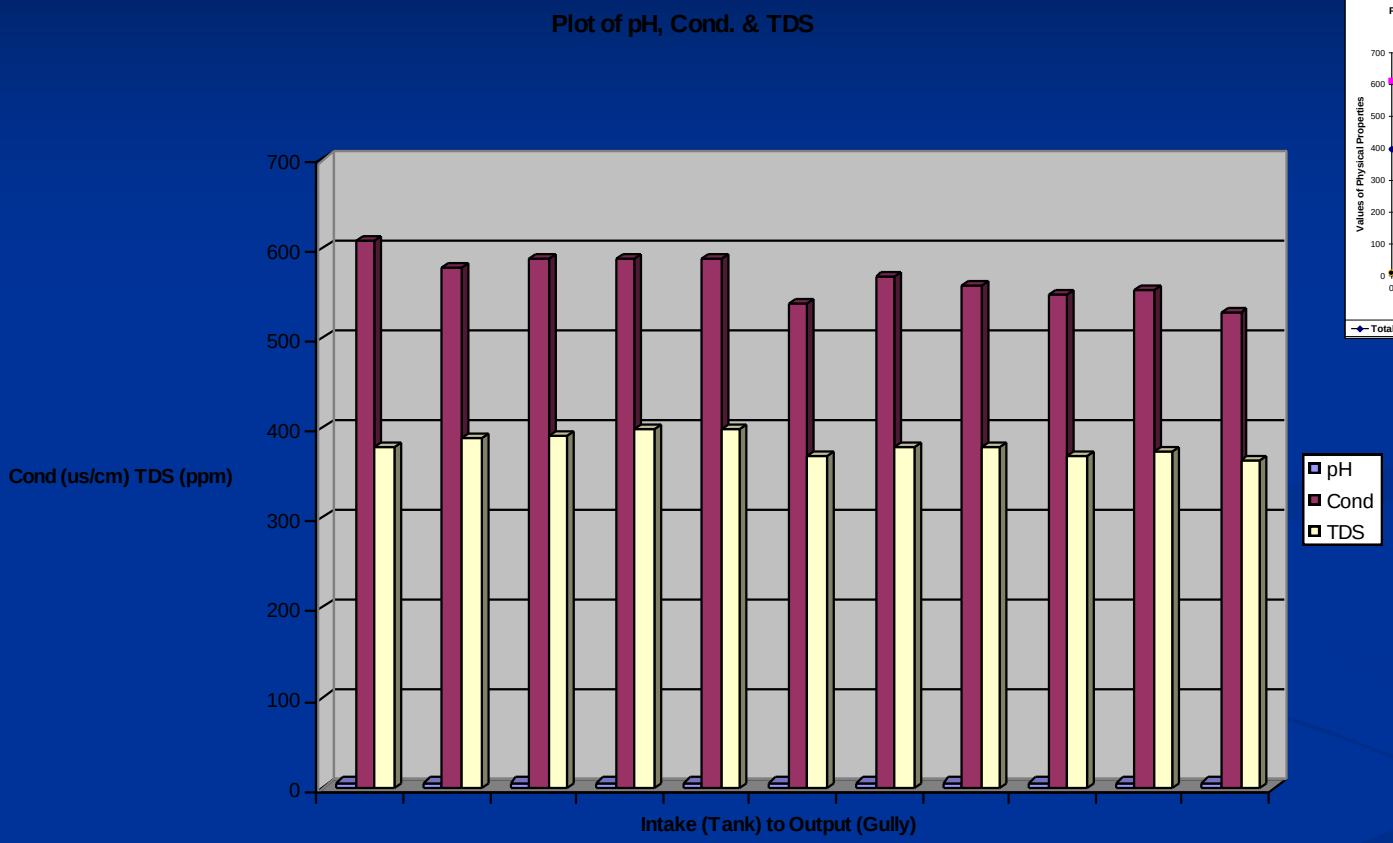
Parameters	**pH**	**Conductivity** us/cm	**TDS** ppm
Hebron Water (table water)	6.61 (n=6)	77.17	41.17
Hebron Water (Sachet)	7.79 (n=9)	67.78	36.67
Guest House	5.5 (n=6)	37	18.67

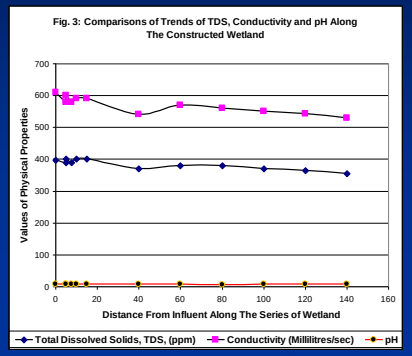
RESULTS AND DISCUSSIONS

Limited water chemistry in the wetlands

Parameters	pH (n=2)	Conductivity milliliters/sec	Total Dissolved Solids (TDS) ppm
Influent Tank	6.8	610	380
First Chamber C_A 1st Cell	6.75	580	390
First Chamber C_A 2nd Cell	6.8	590	393
First Chamber C_A 3rd Cell	6.75	590	400
First Chamber C_A 4th cell	6.75	590	400
Second chamber (4th cell)	6.75	540	370
Third chamber (4th cell)	6.75	570	380
Fourth chamber (4th cell)	6.7	560	380
Fifth chamber (4th cell)	6.75	550	370
Sixth chamber (4th cell)	6.7	555	375
Effluent chamber	6.8	530	365

RESULTS AND DISCUSSIONS

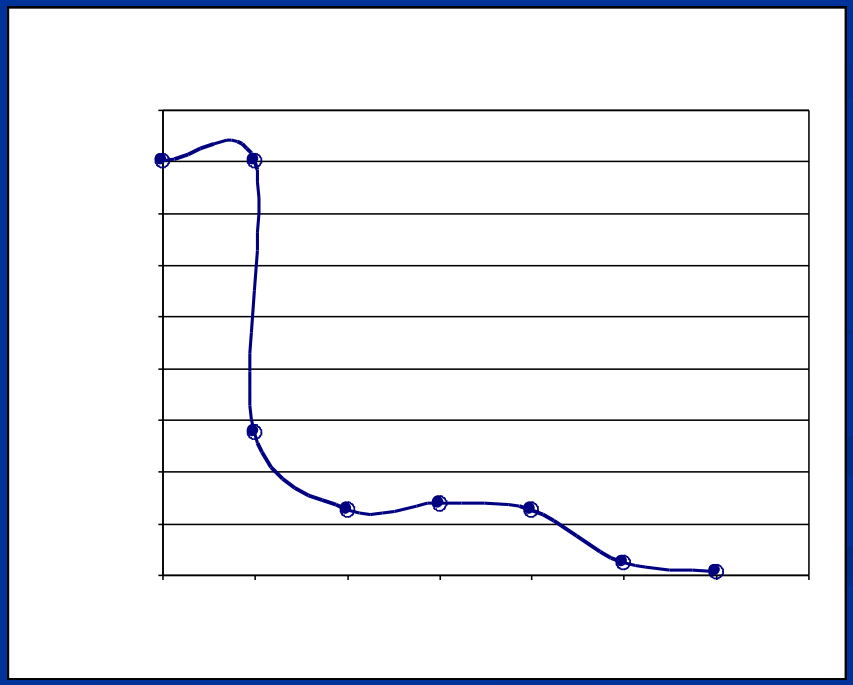




Overall, there was an 8% reduction in TDS and 10% reduction in Conductivity within the wetland. Constructed wetlands have been documented to remove up to 80% TDS and nutrients from waste water (Whitten & Isiorho, 2001)

RESULTS AND DISCUSSIONS

- Preliminary result of bacteriological analysis along the constructed wetland indicates that the wetland was able to remove the contaminants efficiently. Further study are being undertaken in this area.
  - Below is a plot of coli form within the wetland systems (influent along the wetland…to discharge point)



SUGGESTIONS

- To reduce the flow rate of the wastewater, sand and gravel should be introduced into the cells/chambers to provide more time for plants to effectively reduce TDS, thereby enhancing the water quality at the end of the treatment.

- Further study on bacteriological analyses should be carried out to establish the effectiveness of the wetland in this respect.

- Increase in student population would lead to an increase in waste generation. The size and design of any wetlands will depend on the volume and type of wastewater to be treated.

CONCLUSIONS

- Constructing wetlands is a more economical and easier way of treating wastewaters, especially in developing nations.

- The constructed wetland at the Covenant University will be more efficient if the flow rate of the wastewater is reduced, allowing the plants and microbes additional time to remove nutrients, solids, heavy metals and pathogens.

- The monitoring of the wetlands will continue to closely assess their improved effectiveness and efficiency in the treatment of the wastewater from the Covenant University campus.

THANKS

Any questions?