



An Exploratory Study of Reducing Water Pollution-related Environmental Damages and Human Health Risks Using Assimilation Function of Wetlands in the State of Mississippi

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Introduction

Poorly treated wastewaters have been causing environmental damages in the ambient environment, and challenging human health in society. State of Mississippi has been recording higher levels of NPDES permit violations than national average and neighboring states in complying with the water pollution regulation by the Clean Water Act. Utilizing natural wetlands would be an alternative in increasing the compliance rate, while reducing financial burden.

Table 1. NPDES violations (per 100 facilities) in 2009

State	Violations
Alabama	41.8
Georgia	6.7
Louisiana	23.3
Mississippi	53.9

(Source: New York Times. 2009. Clean Water Act Violations: The enforcement record. September 13)

Wetland Utilization in Louisiana

Table 2. Municipalities using natural wetlands in Louisiana

Municipality	Parish	Design capacity (m ³ /day-MGD)
Amelia	St. Mary	3400 (0.90)
Mandeville	St. Tammany	2300 (0.60)
Broussard	Lafayette	2800 (0.75)
Luling	St. Charles	12100 (3.20)
Thibodaux	Lafourche	15100 (4.00)
Breaux Bridge	St. Martin	4800 (1.27)
Mandeville	St. Tammany	15100 (4.00)
Riverbend Oxidation Pond	St. Bernard	1700 (0.47)
City of St. Martinville	St. Martin	5700 (1.50)
Tchefuncte Club Estates	St. Tammany	600 (0.16)

(Source: Ko, et al., 2012)



Assimilation function of wetlands

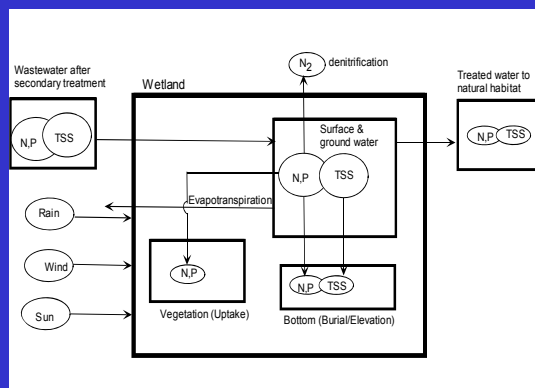


Figure 1. A diagram of a wetland assimilation method

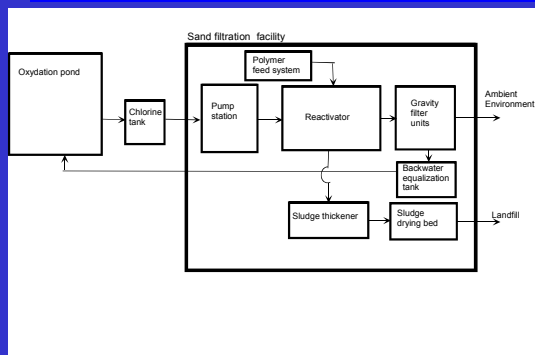


Figure 2. A diagram of the sand filtration method as reference system

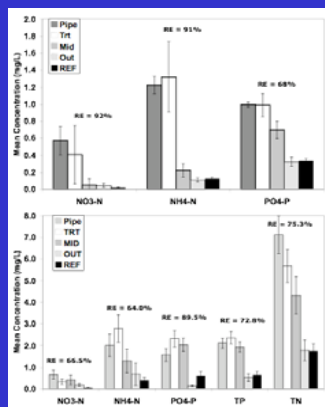


Figure 3. Mean nutrient concentrations from 1993-95 (Upper), and from 2001-07 (lower)

(Source: Ko, et al., 2012)

Findings & Conclusions

Utilizing natural wetlands as a component of wastewater treatment system has been providing multiple benefits to the natural environment and economic savings to local communities:

- Water quality improvement, increased vegetation productivity, surface accretion, and carbon sequestration
- Economic savings of the Breaux Bridge site was estimated as \$2.6 millions over a 20-year period, after considering capital cost and annual O&M costs (Ko, et al., 2004).

As of 2008, 1,437 NPDES permits were issued for the wastewater treatment plants in State of Mississippi, with 53.9% violation rate, requiring more concentrated efforts of improving wastewater quality in the State.

Wetland assimilation is way of adopting natural services for sustainable human communities with reduced financial costs, while improving environmental quality of natural ecosystem surrounding human communities.

Future Directions

- 1) Make a list of NPDES permit holders for POTW (publicly owned Treatment Work) in State, with theirs treatment design, and serving population.
- 2) Develop a list of violation records for the NPDES sites.
- 3) Conduct a geological/habitat study of wetland assimilation for the sites defined as target sites.
- 4) Estimate potential costs and benefits of utilizing wetlands for the sites, following multiple case of scenarios.
- 5) Engage in stakeholder outreach efforts to State/Local government employees and local residents across the State

References

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