THE MICROBIAL BIOCHEMICAL POTENTIAL OF TWO DETENTION-RETENTION MARSHES IN THE KISSIMMEE RIVER VALLEY WATERSHED

BY

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THESIS

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ABSTRACT

The Microbial Biochemical Potential of Two
Detention-Retention Marshes in the
Kissimmee River Valley Watershed

One of the major programs to abate the deterioration of water quality in the Lake Okeechobee watershed was the addition of detention-retention facilities.

The microbial biochemical potential of two differnet detention-retention marshes in the Kissimmee River Valley were examined to determine their effectiveness to improve water quality. The kinetics of decomposition and nutrient mineralization and assimilation, as mediated by microorganisms, and the enumeration of microorganisms capable of utilizing various substrates were studied. Various communities within each marsh were studied during a 2-year period. The decomposition rates of 3 plant substrates were determined. Chitin was used as a standard for organic decomposition. Chitin had significantly higher ($p < 0.05$) rates of decomposition than the plant material in all sites at both marshes. Chitin decomposition rates were significantly different ($p < 0.05$) between sites. Significant differences ($p < 0.05$) in rates of decomposition were also found between the 3 plant substrates. The difference in decomposition rates for the 3 plant substrates existed within sites, as well as between sites. The number of microorganisms and the mineralization and assimilation rates were sig-

nificantly different ($p < 0.05$) between the detention-retention marshes. Significant differences ($p < 0.05$) in numbers of micro-organisms and rates were also found between sites within each marsh.

The variation in detrital processing demonstrated that site-specific dynamics occurred in the detention-retention marshes. Higher decomposition rates were associated with sediment sites containing organic matter with either a continuous, shallow flow of water or alternate wet/dry periods. Decomposition rates were lowest at sites containing sandy sediments, and dry soil sites without a flow of water. Higher aerobic and anaerobic bacterial activity was also associated with sediment sites containing organic matter with either a continuous, shallow flow of water or alternate wet/dry periods. Higher fungal activity was associated with dry soil sites. High fungal activity was also associated with alternate wet/dry sediment sites, but only during dry periods. Microbial activity was lowest at sites containing sandy sediments and in water columns.

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At first men try with magic charms
To fertilize the earth,
To keep their flocks and herds from harm
And bring new young to birth.

Then to capricious gods they turn
To save from fire or flood;
Their smoking sacrifices burn
On altars red with blood.

Next bold philosopher and sage
A settled plan decree
And prove by thought or sacred page
What Nature ought to be.

But Nature smiles—a Sphinx-like smile
Watching their little day
She waits in patience for a while—
Their plans dissolve away.

Then come those humbler men of heart
With no completed scheme,
Content to play a modest part,
To test, observe, and dream.

Till out of chaos come in sight
Clear fragments of a Whole;
Man, learning Nature's ways aright
Obeying, can control.

William C. Dampier

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