

Innovative Water Quality Management Utilizing Wetlands Construction on a Golf Course

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Objectives:

1. Use a golf course wetland to improve residential runoff.
2. Protect and improve a sensitive wetland environment.
3. Regenerate water supplies for golf course use.

Start Date: 1998

Project Duration: 5 years

Total Funding: \$125,000

When applied properly to golf course turf, pesticides and fertilizers do not move off-site through runoff or leaching to any large extent. Golf courses may actually improve the water quality in streams and rivers flowing through the course. This project takes this idea one step farther to determine if the constructed wetlands on Purdue's new Kampen Golf Course can improve water quality in runoff from the adjacent neighborhood. The neighborhood includes two residential highways, parking lot of a motel, a gas station, and 200 residences. The water flowing through the Kampen Course eventually enters Celery Bog, a natural wetland.

After construction of the Kampen Course was finished in 1998, automatic water samplers were installed at six points throughout the wetland system. The sam-

plers were located to track the progress of water as it enters the east edge of the course, travels through the wetland system, and exits the far northwest edge of the course (sites 1 through 6 in figure). Throughout 1999 and 2000, the focus of water sampling was storm-based, following the thought that the highest concentration of potential pollutants is washed from surfaces and appears in the "first flush" of stormwater runoff.

Selected storm-hydrograph samples were analyzed by staff of the Limnology Laboratory, Dept. of Forestry and Natural Resources, for total suspended solid (TSS), total phosphorus, total Kjeldahl nitrogen (TKN), hardness, anions (chloride, fluoride, sulfate, nitrate, nitrite), and cations (ammonia, calcium, magnesium, potassium).

Additionally, "first-flush" storm samples from selected events were collected and transported to Heritage Environmental Labs, Inc. in Indianapolis for more detailed chemical analysis.

These samples were analyzed for cations, anions, organophosphate pesticides such as the dinitroaniline preemergence herbicides (pendimethalin), 27 organochlorine pesticides such as dieldren, 6 chlorinated herbicides like 2,4-D, and other potential contaminants such as nutrients, pesticides, salts, metals, petroleum product. Continuing the observed trend, no



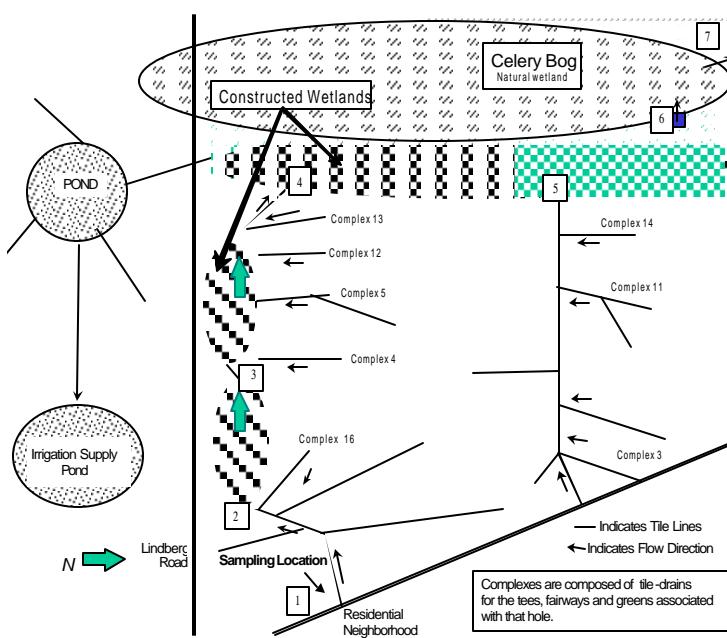
A series of man-made wetlands on the Kampen Golf Course improve water quality before entering a protected wetland down stream.

unusually high levels of any of a wide array of potential pollutants, including pesticides and metals were detected at the golf course sampling sites through September, 2001.

Surprisingly, even from the urban runoff there has been no measurable oil and grease. Heavy metals of concern, such as mercury and lead, are below detection limits in all samples. However, low levels of atrazine were detected in water entering the golf course system from the urban area in June of 1998 and April, 2001. This indicates that the golf course is not the source of the atrazine found in the watershed this spring, and that the golf course wetland system is functioning to decrease levels of the herbicide entering it from the urban area.

Summary Points

- As the golf course and the wetland mature, they become more efficient in improving the water quality as it flows through the course.
- Key parameters like nitrogen and pesticide concentrations were either decreased as the water circulated through the golf course wetlands or were not detectable at either sampling site.
- No unusually high levels of any of a wide array of potential pollutants, including pesticides and metals, were detected at the golf course sampling sites.



Schematic of the wetland study site at the Kampen Golf Course of Purdue University.