

The Use of Constructed Wetlands to Treat Effluent

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Introduction

- What are Constructed Wetlands?
- What are the Benefits of using Constructed Wetlands?
 - Improved Water Quality
 - Wildlife Habitat
 - Flood Control



History of Constructed Wetlands

- Thousands of years ago the Egyptians and the Chinese used natural wetlands to clarify liquid effluent.
- The first man made wetland was constructed in Australia in 1904.
- Wide spread use of these systems was adopted around the middle of the last century.

Components

1. A Basin with Water



2. Substrate



3. Plant Life



Substrate

- Various soil, gravel, sand, rock, and organic material are typically used as substrates.
- Important properties of a substrate include:
 - Cation Exchange Capacity
 - pH
 - Porosity



Plant Life

- Wetland plants perform numerous functions:
 - Prevent Erosion and Channel Flow
 - Carry out gas exchanges between the atmosphere and sediments
 - Plants uptake carbon, nutrients and trace elements and incorporate them within their tissue

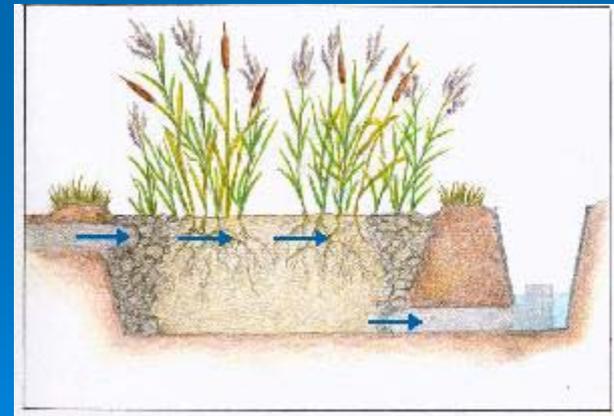
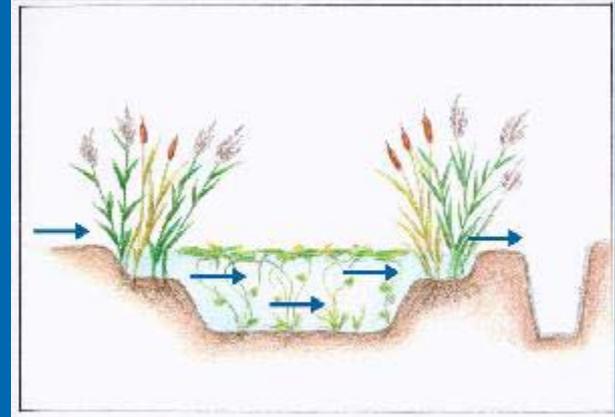


Types of Constructed Wetlands

- Surface flow
 - Aesthetic benefits
 - Generates habitat for a variety of species
 - Capital and operating costs are low
- Sub-Surface Flow
 - More efficient treatment process than surface flow
 - Resistant to freezing conditions
 - Reduction in possible odors and pests

Surface Flow versus Sub-Surface Flow

- Cost
- Maintenance
- Treatment
- Efficiency



Design Criteria

- Hydrology is the main design characteristic
 - Water Balance Equation $S = Q + R + I - O - ET$

S = Net Change in Storage

Q = Water Contributed from Surface Flow

R = Water Contributed from Rainfall

I = Net Infiltration

ET = Loss due to Evapotranspiration

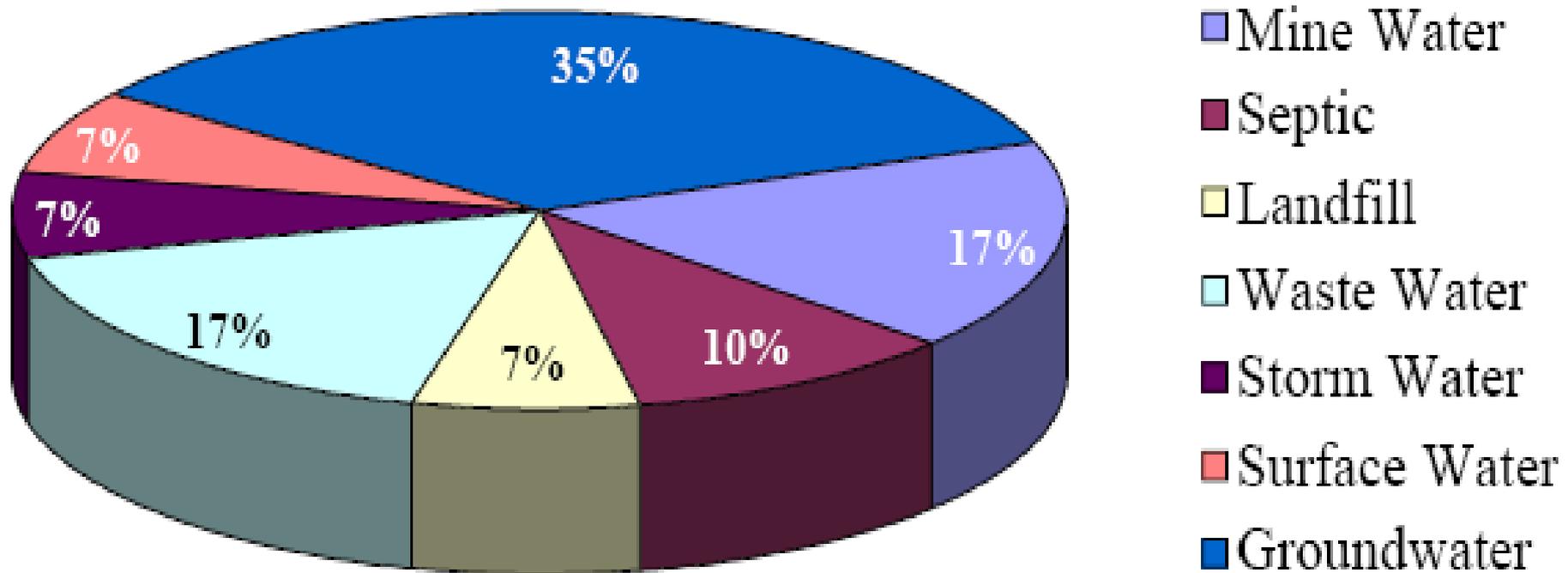
Applications

- Storm Water Runoff
- Municipal Wastewater
- Industrial Wastewater
- Agricultural Wastewater
- Acid Mine Drainage
- Landfill Leachate



Applications Cont.

➤ Distribution of Constructed Wetlands According to Application



New Applications

- Raw Sewage
- Collected Wash Rack Effluent
- Aircraft and Runway deicing chemicals



Limitations

- Performance of constructed wetlands under adverse weather.
- Lack of statistical data concerning the performance and treatment efficiency.
- Economic Feasibility



Conclusion

- Constructed Wetlands are an ecological alternative to traditional treatment processes.
 - The use of constructed wetlands is becoming more common.
 - More research is needed.
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Questions

