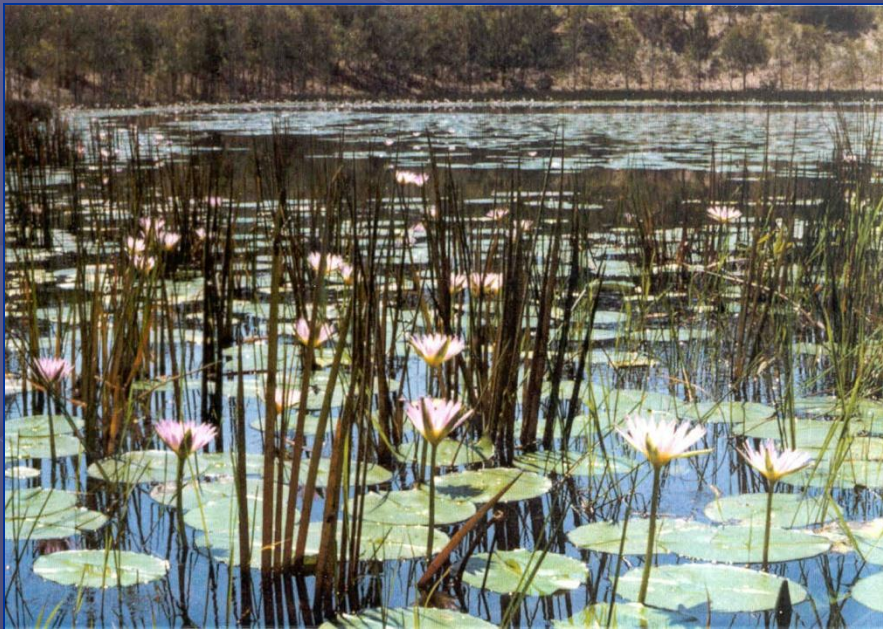


Stormwater Wetlands : Design and Performance.



Moderators: Bill Hunt – NCSU
Margaret Greenway - Griffith University,

Stormwater Wetlands in the Urban Landscape



Wetlands are areas that may be permanently or periodically inundated by surface-water runoff, and **support a diversity of vegetation types.**



Macrophyte-dominated shallow water (< 50 cm)

Ponds are areas of permanent open water.

They include lagoons, lakes, sediment basins and detention ponds.

They may be fringed with zones of emergent vegetation, or support submerged plants.



Phytoplankton-dominated deeper water (> 50 cm)

TSS and Nutrient Removal Mechanisms

Suspended Solids and Organic Matter:

- Sedimentation **facilitated by the vegetation**
- Finer particles adhere to the biofilm surfaces of the **vegetation** or gravel substrate
- **Microbial** degradation of organic particulates

Nutrients:

- Direct uptake by **plants** and **micro-organisms**. Inorganic nutrients converted to organic biomass
- **Microbial processes** facilitate the removal and transformation of nutrients especially nitrogen removal
- **Chemical adsorption of phosphorus**

Pathogen Removal Mechanisms

Physical mechanisms:

- Adsorption (onto particles) , filtration (assisted by the vegetation) and sedimentation

Chemical mechanisms:

- UV light disinfection

Biological mechanisms:

- predation and lysis of bacteria by bacteriophages (viruses)
- competition with natural-wetland microbial populations
- natural death and decay

Treatment Processes in Wetlands and Ponds

	Wetlands	Ponds
Physical	Filtration/sedimentation facilitated by macrophytes Adhesion of fine particles and colloids to biofilm surfaces	Settlement/sedimentation. Passive-density dependent
Biological	Nutrient uptake by macrophytes, attached periphyton and phytoplankton/bacterioplankton. Macrophyte-dominated	Nutrient uptake by phytoplankton/bacterioplankton. Phytoplankton dominated
	Sediment microbial processes facilitate nutrient removal, transformations, recycling. Microbial hydrocarbon degradation, microbial predation of pathogens.	
Chemical	Nutrient and metal adsorption to substrate. UV disinfection of pathogens	

Presentations

- **Margaret Greenway**: Macrophyte zonation and sustainability in stormwater wetlands in subtropical Australia: design and function
- **Bridget Wadzuk**: Constructed stormwater wetlands; design and function
- **Jon Hathaway**: Indicator bacteria sequestration in stormwater wetlands
- **Bill Hunt**: Constructed wetlands v ponds for stormwater management; a framework for ecosystem services assessment