

Poplars and Willows for Environmental Services

The poplar and willow family (*Salicaceae*) is comprised of many deciduous species. Their distribution range includes a wide variety of climates and soils. Willow and poplar species have comparatively rapid growth rates. Both willows and poplars can be planted as un-rooted cuttings or as rooted stock. Poplars and willows can be used for many environmental purposes. This fact sheet describes each of these environmental services and illustrates their benefits and challenges.

General benefits:

- Increased economic diversity and/or value
- Carbon sequestration
- Can be used as carbon neutral source of energy
- Enhanced biodiversity
- Improved air and water quality
- Improved soil productivity
- Improved protection from environmental and human hazards
- Improved aesthetics

General challenges:

- Relatively long establishment time
- Case specific; not an off-the-shelf technology
- Species are climate specific
- Pests and/or diseases can decrease efficiency
- Weeds can pose great challenges during the establishment phase
- Systems are not permanent

RENEWABLE BIOENERGY PRODUCTION

Poplars and willows can be used for energy purposes, producing electricity, heat, and biofuels (ethanol).

Benefits:

- Renewable fuel
- Biodegradable end products
- High energy output compared to food energy crops such as corn
- Energy security

Challenges:

- More knowledge of pests and diseases is needed



EFFLUENT AND BIOSOLID MANAGEMENT

Poplars and willows can be used to clean secondary or tertiary municipal wastewater and industrial biosolids.

Benefits:

- Lower cost than conventional remediation
- Range of wastewater qualities and concentrations can be applied
- Enhanced biomass production
- High evapotranspiration rates enable zero-discharge opportunity

Challenges:

- Not effective during dormant season



BROWNFIELD REHABILITATION

Willows and/or poplars can be planted directly into contaminated soil to extract pollutants.

Benefits:

- Lower cost than conventional methods
- Recreation opportunities

Challenges:

- Not effective for all pollutants
- Pollutant up-take is a slow process



LANDFILL REHABILITATION

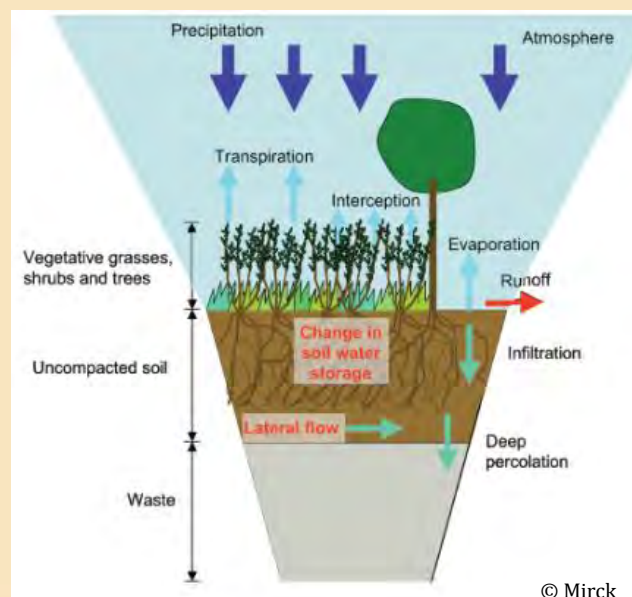
Willows and poplars can be used as a phytocapping alternative to clay/geomembrane covers, which traditionally keep rainwater out of landfills.

Benefits:

- Lower cost than conventional covers
- Biomass production
- Recreation opportunities

Challenges:

- Not effective in the dormant season



LIVING SOUND BARRIERS

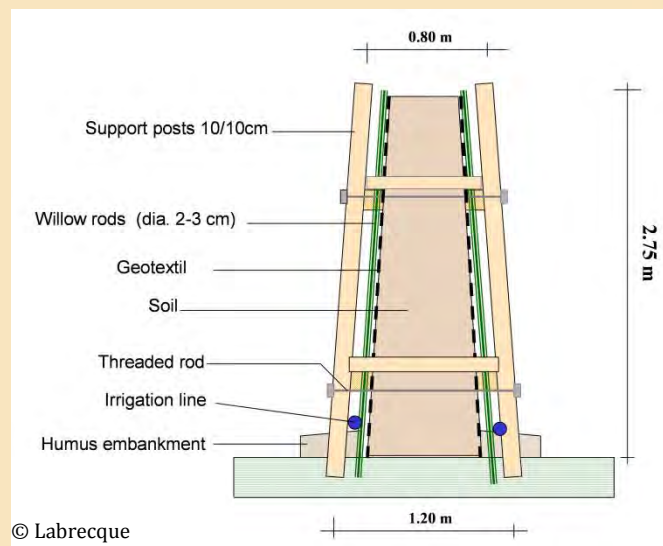
Willows can be used to build green sound barriers.

Benefits:

- Lower cost compared to conventional barriers
- Control noise levels

Challenges:

- Aesthetics will decrease over time

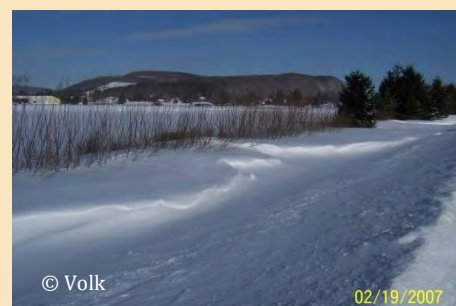


LIVING SNOW FENCES

Willows and poplars can be planted along highways to intercept blowing snow.

Benefits:

- Lower cost compared to conventional fences
- Improved safety



SHELTERBELTS

Willow and poplars are used as “nurse trees” in shelterbelts to protect people, farm yards, crops and livestock from the wind.

Benefits:

- Reduced wind energy
- Improved interception of air-borne particulates
- Increased snow retention improves crop yields
- Decreased soil erosion

Challenges:

- May limit the use of big farming equipment



RIPARIAN BUFFERS

Willows and poplars can be planted alongside waterways and wetlands to prevent nutrient leaching and erosion.

Benefits:

- Decreased nutrient loading and sedimentation
- Increased riparian habitat
- Stream shading to maintain temperature
- Improved fish habitat
- Restored habitat connectivity
- Recreation opportunities



SALINITY CONTROL

Poplars and willows can be planted on the periphery of wetlands to balance discharge and recharge water from shallow groundwater, thus mitigating salinity development.

Benefits:

- Prevent salt built-up
- Decreased sediment, nutrient and pollutant erosion

Challenges:

- Plant establishment if salinity levels are above 1 dS m⁻¹ and close to surface (cultivar specific).



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