

WETLANDS: MINNESOTA'S DISAPPEARING TREASURE

IT'S WET!



- Rooted in the water balance of the wetland system.
- Water input and output, as well as the location of the wetland in proximity to lakes, rivers, and groundwater aquifers all contribute to what a wetland looks like on the surface, and the functions that it performs.
- Water inputs into wetland systems include precipitation, groundwater seepage, and influx from rivers and lakes.

Fig. 1 The inputs and outputs of water in a wetland system: Inputs: groundwater, precipitation, surface flow. Outputs: evaporation, transpiration, groundwater & surface outflow.

Services	Comments and Examples
Provisioning	
Food	production of fish, wild game, fruits, and grains
Fresh water	storage and retention of water for domestic, industrial, and agricultural use
Fiber and fuel	production of paper, natural cork, basketry
Biochemical	extraction of medicines and other materials from biota
Genetic materials	genes for resistance to plant pathogens, ornamental varieties, and so on
Regulating	
Climate regulation	source of and sink for greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
Water regulation (hydrologic fluxes)	groundwater recharge/discharge
Water purification and waste treatment	retention, recovery, and removal of excess nutrients and other pollutants
Flood regulation	retention of silt and sediments
Natural hazard regulation	flood control, storm protection
Pollution	habitat for pollinators
Cultural	
Spiritual and inspiration	source of inspiration; many religions attach spiritual and religious values to aspects of wetland ecosystems
Recreational	opportunities for recreational activities
Aesthetics	more scenic land (scenic or aesthetic value) to nearby wetland ecosystems
Educational	opportunities for formal and informal education and training
Supporting	
Soil formation	sediment retention and accumulation of organic matter
Nutrient cycling	storage, recycling, processing, and acquisition of nutrients

OUR FRIENDS AT RISK

There are currently five endangered species that are thought to inhabit, or are expected to soon inhabit, the Mississippi, Minnesota, and / or St. Croix Rivers:



Whooping crane

- Recently began to recover from near extinction
- Population began to decline due to loss of natural habitat, as a result of agriculture, hunting, and disturbance of nesting areas



Eastern massasauga snake

- Rarely spotted, therefore only speculated to live near marshes and rivers in Minnesota
- Has been threatened by cars, natural habitat loss (as a result of wetland habitat destruction), and persecution by humans

Topeka shiner

- Has been endangered since 1998
- Used to live in headwater streams of Mississippi River, now lives in the Rock River and Big Sioux-Medary Creek Watersheds

Higgins eye pearly mussel

- Found in St. Croix and Mississippi Rivers
- Endangered due to poor water quality and the invasive zebra mussel

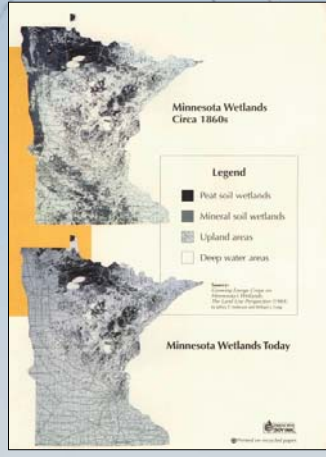


Winged mapleleaf mussel

- Now only found in St. Croix River
- Has been threatened by the invasive zebra mussel and the fact that its reproducing population is located close to Twin Cities urban area

Jonathan Chen, Sara Graybeal, Natalie Locke, Carl Skarbek and Melinda Vogel

Macalester College – St. Paul, MN



A LOOK BACK

- Prior to the settlement of Minnesota by European settlers the land was a diverse patchwork of prairie, wetlands and northern forests.
- When European settlers arrived they saw the land's natural resources for the taking.
- Since European settlement an estimated 11 million acres of wetlands have been drained or filled.
- Only 10 million acres now remain.
- Many areas, including those around the Minnesota River have lost of 90% of their original wetlands.
- Most of the wetland loss has been caused by farmers draining or filling the wetlands to establish farms on such productive land.

DON'T FORGET PROTECTION!

- Since 1937 work on public waters has been regulated but it wasn't until 1979 that wetlands were considered public waters.
- As agriculture continued to spread more wetlands began to disappear.
- In 1991 the Minnesota State Legislature passed the Minnesota Wetlands Conservation Act to maintain and protect Minnesota's wetlands and the benefits they provide.
- The act has been amended three times and is considered one of the most sweeping wetland protection laws in the country.
- The goal of the Wetlands Conservation Act is to achieve no net loss of wetlands, meaning that if an individual wants to drain a wetland they must restore or create new wetlands of at least equal public value.
- Numerous other federal, state and local laws are now in place to protect wetlands and the organisms that depend on them.



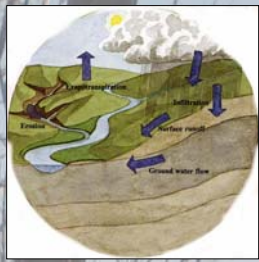
Sources: <http://www.exploreminnesota.com/Assets/images/image/Image150/dnr/colorlogo.gif>, <http://www.umcsc.usgs.gov/aquatic/images/5004455-e.jpg>, http://www.tpwd.state.tx.us/huntwild/wild/images/birds/whooper_1big.jpg, <http://www.dnr.state.pa.us/wet/wetlands/images/rattlef.jpg>, <http://www.wauteserv.org/explore/servelet/NatureServe/SearchName-Cross-america>, <http://www.fws.gov/midwest/EndangeredReptiles/conserv.html>, <http://www.fws.gov/midwest/twocities>, <http://www.fws.gov/midwest/EndangeredEdms/wingfz.html>, <http://www.fws.gov/midwest/EndangeredEdms/musoo-spp.html>, http://mtdc.mnstate.edu/mmbasin/mmbasin_overview.html, http://files.dnr.state.mn.us/assst/ace/ncplanning/bigpicture/wrs/consisting_wsr_efforts.pdf, <http://www.dnr.state.mn.us/wetlands/index.html>, <http://files.dnr.state.mn.us/ce/wetlands/wetland.pdf>, <http://www.bwsr.state.mn.us/wetlands/publications/MNRregulations.pdf>, "Wetland Soils: Genesis, Hydrology, Landscapes, and Classification," "Our Nation's Wetlands," "The Influence of Vegetation on Sedimentation and Resuspension of Soil Particles in Small Constructed Wetlands," "The Impact of Hydraulic Load and Aggregation on Sedimentation in Small Constructed Wetlands," <http://www.pca.state.mn.us/water/basin/mmbasin/erp/perm.html>, <http://www.bwsr.state.mn.us/wetlands/wc/forms/index.html>, <http://water.usgs.gov/wswm/WSI2425/images/fig18.gif>, "Hydrology and Wetland Conservation," <http://www.fws.gov/Midwest/DetroitLakes/history.html>, http://mtdc.mnstate.edu/mmbasin/fact_sheets/wetlands.html, <http://www.mnkarituralresources.com/wetlands/wca.htm>, http://www.mncenter.org/mcea_wetlands_initiative/2006-02/wetlands_faq.html#3

IT'S LAND!

- Hydric soils, or wetland soils, are defined by the connection they draw between vegetation in wetlands and the soil necessary to support that vegetation. Studies have found that vegetative cover short-circuits water flow and increases soil retention.
- This vegetation is important because it decreases runoff and erosion in wetlands and the surrounding waterways. Further studies have found that wetlands are efficient sources for reducing loss of nutritious and erosion material from otherwise arable land.
- Urbanization and land development on or around wetlands has an opposite and negative effect on the surrounding soils. Common practice is to strip the land of the helpful vegetative cover. Infiltration is decreased and erosion and run-off increase dramatically.



- Increased erosion means surrounding areas are more susceptible to flooding, and other wetland functions are greatly reduced. In addition, increased sediment load from erosion and runoff clouds the water and prevents sufficient light penetration, which has negative impacts on the local flora and fauna.
- The Minnesota Board of Water and Soil Resources has recently worked to help the problem of erosion and runoff in wetlands. In 2001, it approved \$3.2 million for cost-share projects to control soil erosion and reduce sedimentation in order to improve water quality. In 2004, it approved \$177,284 to be distributed among Soil and Water Conservation Districts for projects further intended to improve water quality by controlling erosion and reducing sedimentation.



HOPE FOR THE FUTURE



The Minnesota wetlands have undergone immense amounts of destruction and reconstruction. Since agriculture became a major part of life for the early settlers in Minnesota, the wetlands have been used for irrigation purposes as well as agricultural farmland since the soil is rich in nutrients. This constant draining has destroyed acres of wetlands. However, steps have been taken to restore the wetlands so that they can benefit the state of Minnesota.

- Wetland restoration is a process in which former wetlands are prepared and remade so that the geography of Minnesota is not changed and so natural habitats can be restored.
- Drainage files being re-routed and installed to divert the water from reaching private farmland, but control devices have been installed to monitor the amount of water draining so that while water may be drained, parts of the wetlands can still be restored.
- Native plants are planted around the wetland to restore habitats and wetland environments.
- Prescribed burns are conducted to activate the plant life.
- Through the Wetland Restoration Program and the RIM Reserve, Minnesota is able to pay and to entice farmers and private landowners to restore wetlands.
- Through the WRP and RIM Reserve alone, the Minnesota state government has restored over 92,439 acres of about 1,847 wetlands.

MACALESTER COLLEGE

