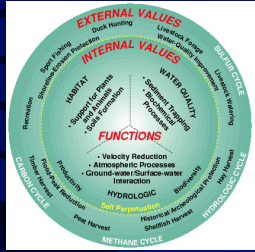


Wetland Importance and Values



Matthew J. Gray
University of Tennessee

Civilization and Wetlands

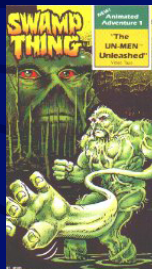
6,000 Years of History



Atchafalaya Basin



Southern Iraq



Sinister Image of Wetlands

Wetland Values

Biological Values

- Wetland-dependent Wildlife Habitat
- Aquatic and Terrestrial Fish and Wildlife Habitat
- Reservoirs of Biodiversity



Environmental Values

- Flood Control
- Groundwater Replenishment
- Shoreline Stabilization
- Sediment and Nutrient Retention & Export



Societal Values

- Fur & Timber Harvest
- Aesthetics
- Recreation/Tourism
- Economic Value (consumptive & non-consumptive uses)



Biological Values

Aquatic and Terrestrial Wildlife

Many Species Use Wetlands Facultatively and Opportunistically

Aquatic Wildlife




Bluegill Beds


Interactions



Terrestrial Wildlife








Biological Values

Biodiversity of Wetlands

4% of Earth's Surface Area
40% of World's Species Depend on Freshwater Wetlands


Species Richness & NPP in Tidal Estuarine Wetlands Rivals Tropical Rainforests



Taxon	Number of Species Endangered	Number of Species Threatened	Percentage of U.S. Total Threatened or Endangered
Plants	17	12	26
Mammals	7	—	20
Birds	16	1	68
Reptiles	6	1	63
Amphibians	5	1	75
Mussels	20	—	66
Fish	26	6	48
Insects	1	1	38
Total	98	25	

NOTE: 50% of Listed Animals Occur in Wetlands

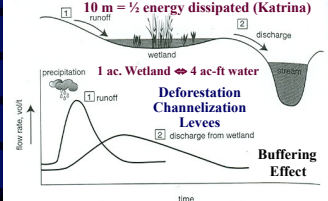
25% of Marine Life Depend on Coral Reefs & Estuarine Wetlands



Environmental Values

Flood Control

1 ha Wetland can store 15,000 m³ of floodwater



10 m = 1/2 energy dissipated (Katrina)

1 ac. Wetland ↔ 4 ac-ft water

Deforestation Channelization Levees

Buffering Effect

MS River HBL Forest

60 Days (1500s)

↓

12 Days (now)


\$12-16 Billion in Damage from 1993 MS River Floods


2 Functions:

- Slow Velocity
- Store Water

➔ Buffer Discharge

\$1.5 Billion (NC 2016: Matthew)




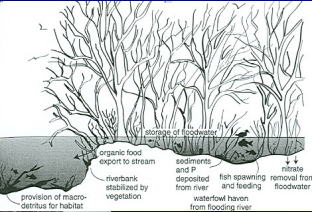


Environmental Values

Shoreline Stabilization

Reduce Erosion





organic food export to stream
sediments and P deposited from river
riverbank stabilized by vegetation
provision of macro-debris for habitat


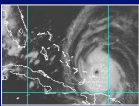
fish spawning and feeding
nutrient removal from floodwater
nitrate removal from floodwater

Buffer Ocean Storms

2004 Hurricanes

- Charley (22)
- Frances (15)
- Ivan (60)
- Jeanne (6)

\$25 Billion in Damage in U.S.

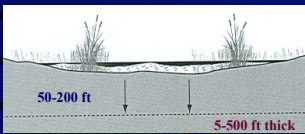



Environmental Values

Groundwater Replenishment

Soil Type

Area of Wetland



50-200 ft

5-500 ft thick


Hydrologic Inputs

Depth of Aquifer


Human Uses:

Irrigation

65% in High Plains



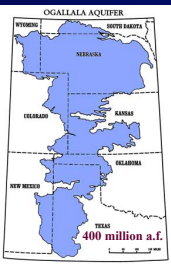
Daily Life Needs



95% of Pumping from Ogallala Aquifer—SHP (TX)

Environmental Values

Groundwater Replenishment




OGALLALA AQUIFER

NEBRASKA
KANSAS
OKLAHOMA
TEXAS

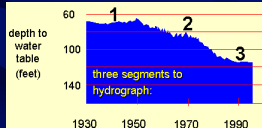
400 million a.f.

174,000 mi²
3.3 Billion ac-ft
(336,000 gal = 1 ac-ft)



Playa Wetlands

Recharge at 0.5–3.24 inches / ac / yr (0.35)



Dropping 1–2 ft / yr

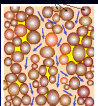
Environmental Values

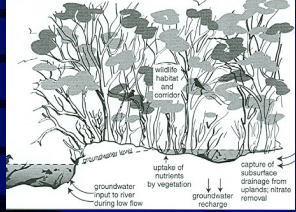
Sediment & Nutrient Retention & Export

Chemical & Nutrient Uptake by Plants
98% N, 97% P

Bind with Soil Particles & Become Buried

Eutrophication






uptake of nutrients by vegetation

capture of subsurface drainage from uplands; nitrate removal

groundwater recharge

groundwater input to river during low flow

Waste Water Treatment

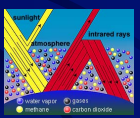


Hyacinth, Cattail

Pesticides, Heavy Metals, Grease, Oil (100,000X)

Climate Control

40% of Global C



infrared rays

atmosphere


water vapor, methane, carbon dioxide

Water Quality

Carbon, Sulfur, Nitrogen Sinks

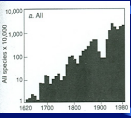
Societal Values

Trapping and Timber Harvesting



12 Million Pelts Annually
40 mil (%) \$1 Billion


Florida
\$16 Million for Alligators





Alligators (N/1000)

1980 1990 1995

22 Million ha total in US
13 Million ha of Hardwood Bottomlands in SE
\$620/ha or \$8 Billion Total







Cherrybark, willow, water, Nuttall, pin oaks

Societal Values

Recreation & Tourism



Fishing, Crabbing

98 Million Americans
\$60 Billion Annually

(\$150 million in MS)



Waterfowl Hunting



Trapping

Wetland Tours:



www.gatorpark.com/full_site

Wetland Bird Festivals



<http://wowbirdfest.com/>

Estimated Economic Value

http://ramsar.org/values_intro_e.htm
Nature 387:253-260

	Total value (US \$) per hectare per year	Total global flow value (US \$ per year)
Estuaries	22,382	4,100,000,000,000
Seagrass/algae beds	19,004	3,801,000,000,000
Coral reefs	6,075	375,000,000,000
Tidal marsh/mangroves	9,990	1,648,000,000,000
Swamps/floodplains	19,580	3,231,000,000,000
Lakes/ivers	8,498	1,700,000,000,000

Wetland Ecosystems = **\$14.9 Trillion**
 All Natural Ecosystems = **\$33.0 Trillion**

Thus, wetland systems account for approximately 45% of the realized value of natural ecosystems!

Reflects the multiple values!

