



Wetlands Valuation and Management

Oklahoma Clean Lakes
and Watersheds
Association

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Oklahoma Conservation
Commission

Outline

◎ Valuation of Wetlands

- What services do wetlands provide?
- What is ecosystem or wetland service valuation?
- Examples of Wetland Service Valuations

◎ How does wetland value tie into management?

◎ OCC partnerships and recent, current, and future projects

Wetland Statistics

- State acreage = 44,735,821
- Original Wetland Acreage = 2,842,600
- Remaining Wetland Acreage = 949,700
 - About 2% of total land area
- Acreage Lost = 1,892,900
- % Lost = 67%
- Most wetlands in Oklahoma are palustrine
 - Freshwater wetlands that lack flow

Services of Wetlands

Four categories of ecosystem services

- 1) **Regulating** (water quality, flood protection, etc.)
- 2) **Provisioning** (food, water, building materials)
- 3) **Supporting** (soil formation, nutrient cycling)
- 4) **Cultural** (spiritual, recreational, scientific, aesthetic, education)

Millennium Ecosystem Assessment (2005). *Ecosystems and human well-being: synthesis*. Washington, DC: Island Press.

Services of Wetlands

Services

- Quality of Life
- Flood Protection
- Erosion Control
- Groundwater Recharge
- Maintenance of Streamflow
- Water Quality Improvement
- Fish and Wildlife Habitat
- Education
- Economic

Services of Wetlands

Flood Protection

Catches Water



Slows Water



Services of Wetlands

● Maintenance of Streamflow

- By shallow groundwater discharge to streams
- By aquifer recharge and subsequent discharge to streams
- By slowing runoff that enters streams



Services of Wetlands

● Water Quality Improvement

- “Kidneys of the landscape”
 - Physical settling due to long retention times
 - Nutrient enriched sediment
 - Sediment with pesticides
 - Metals
 - Uptake by hydrophytic vegetation
 - Microbial action



- ⦿ Nutrient removal
 - 70%-90% nitrogen
 - 45% mean retention of phosphorus
- ⦿ Biological Oxygen Demand
- ⦿ Suspended solids and associated pollutants
 - 80-90% of sediment from runoff
 - Associated pollutants adsorbed to suspended solids
 - Nutrients, organics, metals, and radionuclides
- ⦿ 20-100% of metals
 - Depends on metal and wetland
- ⦿ Pathogens

Services of Wetlands

● Wildlife Habitat

- Microscopic to large mammals
 - Invertebrates
 - Amphibians
 - Migratory birds
 - Obligatory mammals (beaver, muskrat, otter)
 - Non-obligatory (rabbit, deer, raccoon)
- Biological diversity and landscape stability



Although wetlands comprise 3.5-6% of U.S. land, more than 1/3 of the T&E species live only in wetlands.

Services of Wetlands

● Fish Habitat

- Most important “nurseries” for juvenile fish
- Some species require these habitats for entire life



Services of Wetlands



● Education

- Living, outdoor classrooms
 - Unique plant and animal species
 - Ecological principles
 - Energy flow
 - Nutrient recycling
 - Carrying capacity
- Spark an interest in the “real” world of science
 - “Tell me and I forget, teach me and I remember, involve me and I learn”.

Benjamin Franklin

Established Benefits/Services

- Quality of Life
- Flood Protection
- Erosion Control
- Groundwater Recharge
- Maintenance of Streamflow
- Water Quality Improvement
- Fish and Wildlife Habitat
- Education
- Economic



Services of Wetlands

⦿ Economic

- Goods = Natural products (timber, fish, shellfish, cranberries, wild rice)
- Recreation
 - Fishing
 - Hunting
 - Non-consumptive (birdwatching, hiking)
- **Flood protection**
- **Water quality improvement**
- **Erosion control**
- **Groundwater recharge**

Value of Wetlands

- ◉ Valuation – the process of estimating what something is worth either financially or otherwise
- ◉ Value = monetary worth
- ◉ Value = degree of importance in ethics
- ◉ Value = Ecological Function – the ability of specific functions to perform & the ecological value of their contribution to the overall health of the ecosystem
- ◉ Benefit = Goods (tangible) and/or Services (intangible)

In simple terms, wetland valuation is used to estimate the ecological, socio-cultural and/or economic values of the services a wetland ecosystem provides for society.

Valuation of Wetlands

Four types of values can be assigned to ecosystems

- 1) Direct Use Value – actual use of a good or service
(fishing, hunting, birdwatching)
- 2) Indirect Use Value – (wildlife show, fishery -fish
recruitment for continuous or
adjacent waters)
- 3) Option Value – preserving the option for future use
- 4) Non-use Value - attributed to the welfare the
ecosystem may give other people or
future generations, or existence
value

Valuation

❖ Market-based

Market price – reflects the value to the “marginal buyer”

Productivity

Productivity Method – income benefit of service verses the cost of protecting/restoring service

❖ Revealed Preference

Avoided Cost/Replacement Cost/Substitution Cost

Travel Cost – cost of travel required to consume or enjoy ecosystem services

Hedonic Pricing – the reflection of service demand in the prices people will pay for associated goods

❖ Stated Preference

Contingent Valuation – value for service demand elicited by posing hypothetical scenarios that involve some valuation of land-use alternatives

Conjoint Analysis – Allows respondents to think in terms of tradeoffs

❖ Benefit Transfer

Benefit Transfer – transfer of study findings to new study areas

Valuation Examples

● Association of State Wetland Managers

- In context of restoration cost/benefit or return on investment
- Explains the concept of ecosystem service valuation and natural capital
- Provides some historical context for efforts to develop measures of wetland function, benefits, and their value to society within U.S. policy
- Connects the use of ecosystem service valuation to contemporary concerns and issues
- Explains the valuation process and some of the most commonly used methods
 - Illustrates advantages and disadvantages of each approach
- Provides summaries of five wetland valuation case studies
- Outlines best practice recommendations
- Includes available decision support tools, methods, and software

*Stelk, M.J. & Christie, J. (2014). Ecosystem Service Valuation for Wetlands Restoration: What It Is, How To DO It, and Best Practice Recommendations. Association of State Wetland Managers, Windham, Maine

Valuation Examples

- “Valuing Wetlands: Guidance for valuing the benefits derived from wetland ecosystem services” published by The Ramsar Convention (de Groot, Stuij, Finlayson, & Davidson, 2006)
- “An integrated Wetland Assessment Toolkit: A guide to good practice,” published by the International Union for Conservation of Nature (IUCN) Species Programme (Springate-Baginski et al., 2009)
- Valuing the Protection of Ecological Systems and Services,” published by the U.S. EPA (EPA Scientific Advisory Board, 2009)

*All 3 reports include seven steps for a comprehensive decision-making process which includes the actual valuation

Valuation Examples

◉ Wetland Ecosystem Services in Delaware (2007)

- Analyzed the change in delivery of ecosystem services associated with declines in wetlands over time
- Used Integration Valuation of Ecosystem Services and Tradeoffs (InVEST) – a spatially-explicit modeling tool

Demonstrated:

- 1) loss in carbon storage (194,417 metric tons)
- 2) increase in nitrogen delivered to waterways
- 3) increase in phosphorus delivered to waterways
- 4) increase in sediment delivered to waterways
= increased municipal water treatment costs
- 5) increase in flood height and area
= increased damage (\$) to residential structures
- 6) direct habitat loss and increased habitat reduction
= economic loss from fishing, hunting, and wildlife viewing

<http://www.dnrec.delaware.gov/Admin/DelawareWetlands/Documents/Economic%20Evaluation%20of%20Wetland%20Ecosystem%20Services%20in%20Delaware.pdf>

Valuation Examples

● Lents Project Case Study, Oregon (2004)

- Enhanced wetlands and floodplains in a redevelopment setting
- Gross benefits accrued over 100 years totaled \$31,274,639
 - Flood Abatement: \$14,694,387
 - Biodiversity Maintenance: \$5,706,064
 - Air Quality Improvement: \$2,544,635
 - Water Quality Improvement: \$2,388,982
 - Cultural Services: \$5,940,571

<http://www.portlandoregon.gov/bes/article/386288>

Common Questions/Statements About Wetlands

- ⦿ Why are wetlands important?
- ⦿ Why should we care about wetlands?
- ⦿ Are wetlands really worth the effort?
- ⦿ Wetlands are only good for producing mosquitoes and snakes!
- ⦿ Wetlands get in the way of the good use of my land.
- ⦿ I'm tired of hunters and bunny huggers telling me we need more wetlands!

Oklahoma Wetlands Management

Restoration

● 319 NPS Program

- **2013 OCC Project: Method Development to Incorporate Wetland Resources in Watershed Planning Efforts in Oklahoma**
 - WRAP – assessment methodology to identify, inventory, and rank potential wetland restoration sites
 - Applied in the N. Canadian River watershed, Lake Thunderbird watershed, and Horse Creek watershed of Grand Lake.
 - To be included in wetland registry
 - To be “marketed” to restoration programs
 - USDA NRCS Wetland Reserve Easement Program
 - USFWS Partners for Fish and Wildlife
 - To be “marketed” to mitigation programs
 - USACE “customers”
 - ODOT

Restoration

- ◎ 2014 OCC Project: **Restorable Wetlands Database and Web Application Development**
 - Intended to connect those with restoration needs with those who can provide restoration or who need mitigation sites
 - Restorable wetlands database framework
 - Database link and feedback mechanism to the Oklahoma Wetland Website
 - Real-time database – includes potentially restorable wetland and stream sites

Historical Wetland Trends

- ◎ 2015 OCC/OSU Project: **Using Wetland Mapping to Guide Restoration Decisions and Determine Wetland Trends**
 - Wetland mapping (revised NWI maps) and web hosting of 2-3 high priority watersheds
 - Apply the WRAP tool
 - Develop an assessment methodology to identify historic wetland gains/losses
 - Determine types of wetland gains/losses and causes for loss
 - Apply tool to 2-3 priority watersheds
 - Information will be incorporated into 319 (NPS) planning

Mitigation

- ◎ 2015 OCC Project: **Identifying Oklahoma Department of Transportation Mitigation Needs and Linking Needs with Opportunity at the Watershed Scale.**
 - Joint partnership with ODOT
 - Determine current mitigation needs (service areas, resource types, acreage, etc.)
 - Determine future mitigation needs (service areas, resource types, acreage, etc.)
 - Assist in finding potentially restorable locations
 - Assist with mitigation as needed and agreed

Mitigation

- Oklahoma Rapid Assessment for Wetlands (OKRAM) — stressor based rapid assessment method
 - Joint effort involving several groups
 - OSU, Conservation Commission, OWRB, ODEQ, USACE
 - OKRAM undergoing continued testing and revision
 - Primary intended uses include:
 - Pre- and post- restoration monitoring
 - Pre- and post- mitigation monitoring

Future Projects

- Continued updates/revisions to the NWI maps
- Continued testing/revision of the OKRAM in all wetland types and regions
- Continued application of the WRAP
- Continue to develop assessment capabilities
- Continue to develop restoration capabilities

Summary

- Wetlands are important to everyone for the services they provide
- We need to share information on the importance of wetlands
- Wetland management depends on the acceptance of wetlands as important land features
- All wetland projects of OCC are building capacity for restoration and mitigation

www.wetlands.ok.gov

Oklahoma Wetlands Program - Home - Windows Internet Explorer provided by State of Oklahoma

https://www.ok.gov/wetlands/

Search Site

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About the Wetlands Program

The goal of the Oklahoma Wetlands Program is to provide assistance with wetland related issues for Oklahomans. Many state and federal agencies and tribal governments are involved in different aspects of wetland management, regulation and restoration. This web portal synthesizes relevant wetland information and provides links to partner websites to help landowners, developers, researchers, educators, students and citizens locate the assistance they need.

Local intranet | Protected Mode: Off 100%

THANKS

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