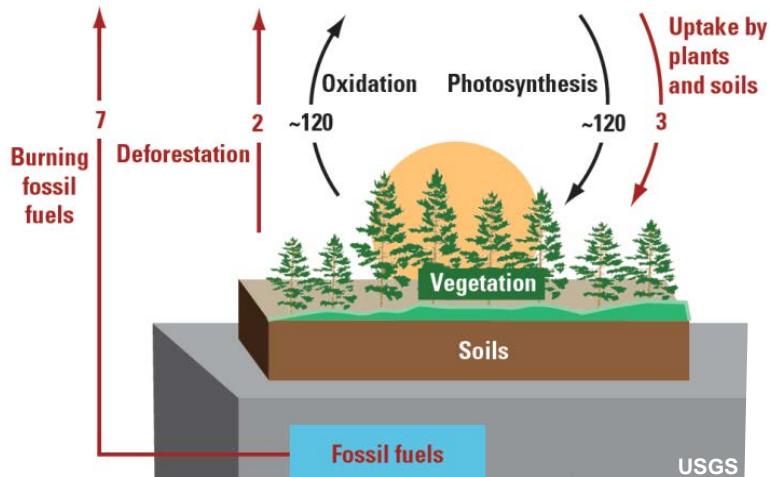


# Sequestering Carbon Through Restoration



## How It Works



## Taking Its Measure



## Promoting It Biologically And Economically



# **A Role for Restoration In Climate Change Mitigation**

**Michael J Hooper**

**Columbia Environmental Research Lab**

**Columbia, Missouri**

# Climate Change and Injury/Damage Assessments

**GCC will: Influence exposure and effects inputs into NRDA's  
Act as a co-occurring stressor with chemical/oil impacts**

**Challenge: Incorporate both influences on injury and service loss  
into Natural Resource Damage Assessments**

**Injury is quantified against baseline conditions, considering the pre-  
injury conditions of the resource, pre-existing anthropogenic  
modification**

**GCC will complicate development of Baseline Conditions**

**Challenge: Develop temporal and spatial baselines accounting for  
the progression of GCC effects both historical and in the future, in  
the absence of contaminant injury.**

# Climate Change and Ecological Restoration

## Challenges

**Shifting species ranges and assemblages  
(including migratory pathways and timing)**

**Invasive species occurrence and prevalence**

**Changing temperatures and precipitation patterns  
and the resulting changes in surface hydrodynamics**

**Balancing sea level rises and saltwater intrusion with increasing  
erosion and sediment deposition in shoreline restorations**

## Implications

**Restoring ecosystem structure, function, and services may preclude  
the ability to completely restore pre-injury species assemblages**

**Forecasting the whereabouts of replacements to be acquired or  
upgraded may become a challenge.**

# Climate Change and Ecological Restoration

*Carefully designed NRDA-associated restorations can provide adaptation opportunities*

## Adaptation to Climate Change Effects through Ecological Restoration

**Develop diverse restored ecosystems with functional redundancy to provide resilience necessary to buffer both short- and long-term effects of climate change**

**Provide habitat, refugia, and corridors for species impacted by GCC-induced stressors**

**Seek opportunities to provide habitat for threatened or endangered species previously extirpated from restored areas**

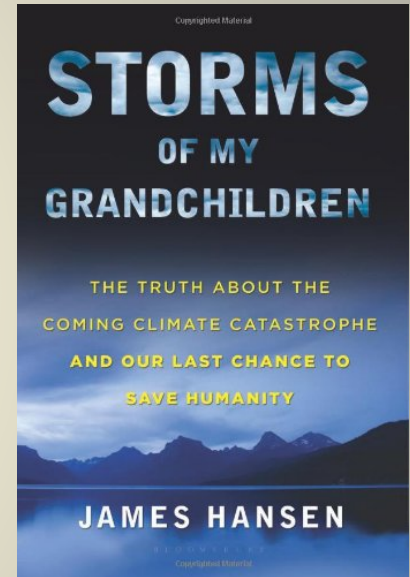
**Strengthen shorelines and offshore barriers with oyster and seagrass beds, mangroves, and other transitional ecosystems to protect on-shore habitats from increasingly intense storm events**

# Climate Change and Ecological Restoration

## Mitigation

***Adapt to species loss, ice sheet disintegration, increased intensity of floods, storms, droughts and fires? Such talk is disingenuous and futile. For the sake of justice and equity, for our children, grandchildren and nature we have no choice but to focus on mitigation.***

**James Hansen**



# The Maumee River Riparian Restoration The Fort Wayne Reduction Works Site, Allen Co., Indiana



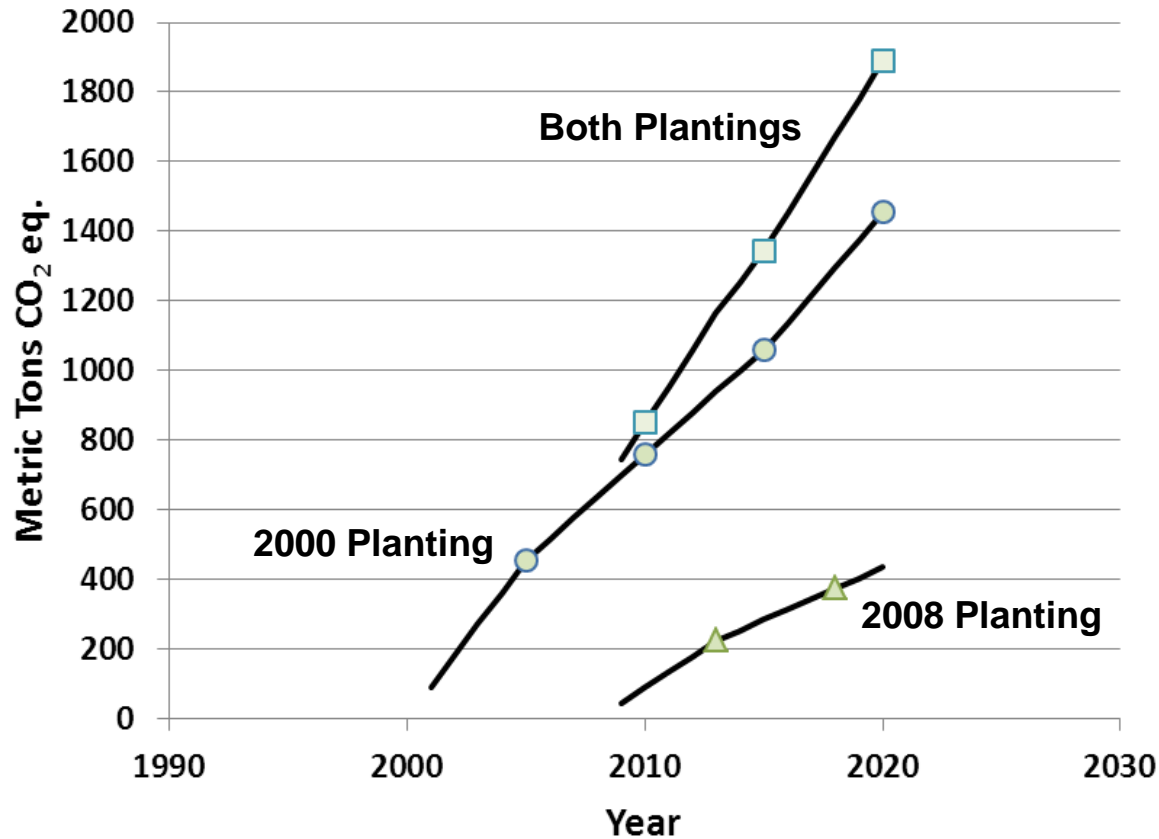
Year Planted	2000	2008
Acres Planted	~47	~13
Species		
Bur Oak ( <i>Quercus macrocarpa</i> )	3000	800
Pin Oak ( <i>Q. palustris</i> )	2500	500
Swamp White Oak ( <i>Q. bicolor</i> )	1500	0
Swamp Chestnut Oak ( <i>Q. michauxii</i> )	1500	0
Green Ash ( <i>Fraxinus pennsylvanica</i> )	3500	0
Sycamore ( <i>Platanus occidentalis</i> )	3500	600
River Birch ( <i>Betula nigra</i> )	1000	700
Shellbark Hickory ( <i>Carya laciniosa</i> )	1000	700
Overcup Oak ( <i>Q. lyrata</i> )	1000	400
Silky Dogwood ( <i>Cornus amomum</i> )	1700	0
Red Osier Dogwood ( <i>C. sericea</i> )	1600	0
Buttonbush ( <i>Cephalanthus occidentalis</i> )	1600	500
Tulip ( <i>Liriodendron tulipifera</i> )	0	500
Black Walnut ( <i>Juglans nigra</i> )	0	500
<b>Total Seedlings Planted</b>	25400	5200
<b>Seedlings Planted/Acre</b>	540	400



ht

contentId=96

## Maumee River Riparian Restoration Carbon Sequestration Estimate



USEPA Reforestation Afforestation Project Carbon On-Line Estimator  
<http://ecoserver.env.duke.edu/RAPCOEv1/ProjectCarbon/Estimates.aspx>





Executive Order 13514

**FEDERAL LEADERSHIP IN ENVIRONMENTAL, ENERGY,  
AND ECONOMIC PERFORMANCE**

**Section 1. Policy.** In order to create a clean energy economy that will increase our Nation's prosperity, promote energy security, protect the interests of taxpayers, and safeguard the health of our environment, *the Federal Government must lead by example.*

**Section 9(a)iii. Recommendations for Greenhouse Gas Accounting and Reporting.** “...<federal agencies including> the Department of the Interior... shall... develop and provide...greenhouse gas reporting and accounting procedures... that:  
...consider and account for sequestration and emissions of greenhouse gases resulting from Federal land management practices;..”

# **Sequestering Carbon Through Restoration**

## **Forest Carbon Sequestration: Issues and Challenges**

**Timothy Pearson**

Program Officer

Winrock International, Arlington, Virginia

## **Challenges and Opportunities for Carbon Sequestration In the Restoration of Wetlands**

**Scott Bridgham**

Professor of Biology and Environmental Studies

University of Oregon, Eugene, Oregon

## **Win-Win Restoration: Investing in Carbon Sequestration**

**Kristin Skrabis**

Economist

Office of Policy Analysis, US Department of the Interior, Washington, DC