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Wetland Restoration – Creating Green Jobs in the Low-Carbon Economy

DOI Transition Recommendations

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Our nation's wetlands provide many important services, including water storage, water quality improvement (e.g., removing nitrate and other pollutants), flood and storm protection, carbon sequestration, nutrient cycling, soil stabilization, tidal and storm surge protection in the case of coastal wetlands, habitat for many endangered species, economically and culturally important species, and migratory bird species, education, and recreation.

About half of historic global wetland area has been lost, and it is likely that remaining wetlands occupy less than 9% of the earth's land area; however, they contribute far more in ecosystem services than their small area suggests.[1] In this same vein, many of America's wetlands have been destroyed (over half of our historic wetlands have been converted) or exist in degraded states, and wetlands are continuing to be destroyed every year.[2] On top of this, our wetlands face continued threats from climate change (e.g., saltwater intrusion from rising sea levels), and development (e.g. subsidence & draining as a result of water diversion and construction).

Green Jobs

Wetlands play an important role in the global carbon cycle, and as such, wetland restoration can help increase carbon sequestration and mitigate greenhouse gas emissions. Because of all of these important environmental functions, wetland restoration jobs can be considered green jobs as well as low-carbon jobs.

The Center for American Progress has argued that an economic stimulus package should invest in green and clean energy infrastructure, and that a $100 billion investment over 2 years could create 2 million new jobs.[3] The Center for American Progress also recommends that $800 million of this $100 billion be used to expand existing programs by to restore parkland, forests, wetlands, wildlife refuges, and rural ecosystems.[4]

Examples of the types of jobs involved in wetland restoration include heavy equipment operators, landscape architects, gardeners, project managers, biologists, hydrologists, ecologists, environmental engineers, geomorphologists (stream/riparian restoration), private mitigation bankers (e.g., Wildlands, Westervelt), GIS/computer support staff, real

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[1] Zedler JB and Kercher S. 2005. Wetland resources: Status, trends, ecosystem services, and restorability *Annual Review of Environment and Resources* 30:39-74.

[2] EPA "Threats to Wetlands" http://www.epa.gov/owow/wetlands/pdf/threats.pdf

[3] Robert Pollin, Heidi Garrett-Peltier, James Heintz, and Helen Scharber (2008) Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy, Commissioned by the Center for American Progress.

[4] Bracken Hendricks and Benjamin Goldstein (2008) A Strategy for Green Recovery: Stimulating the Economy Today by Rebuilding for Future Prosperity, Center for American Progress Action Fund (http://www.americanprogressaction.org/issues/2008/green_recovery_memo.html)

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estate staff, attorneys, and conservation organizations that can hold conservation easements or endowment funds. Additional jobs for hydrologists, biologists, ecologists will be available in long-term monitoring for wetland health and restoration success.

Wetlands and Carbon Sequestration

Wetlands are the largest global soil carbon reservoir – comprising only 4 percent of the Earth's land area, but storing almost 33% of the world's soil organic matter.[5] Wetlands are anaerobic (low to zero oxygen) environments, and therefore are good carbon storage sites. Carbon is stored in wetland trees and other plants as well as in plant litter, peat, soil and sediment which can be built up over thousands of years. It is when wetlands are drained or exposed to oxygen – e.g., from development or natural events like storms – that they release large amounts of carbon dioxide (CO2) into the atmosphere.

In addition to being carbon sinks, wetlands are also sources of methane (CH4) and nitrous oxide (N2O), two potent greenhouse gases. For example, CH4 has 21 times the global warming potential of CO2, and N2O has 310 times the global warming potential of CO2[6]. However, even though CH4 and N2O contribute to global warming, on balance, wetlands help reduce the greenhouse effect by storing carbon, especially over the long-term. Exactly how much carbon a wetland stores depends on a number of factors including temperature, photosynthesis rates, decomposition rates, water level, hydroperiod, and flows of water and nutrients.[7] As such, climate change may impact wetlands' ability to store carbon, as of yet, the projected impacts on wetlands' ability to store carbon are not well-understood.

Mandates for Wetland Restoration

The Clean Water Act requires Section 404 permits from the Army Corps of Engineers in order for dredged for fill material to be discharged into the waters of the United States.[8] When a permit is obtained for discharge, adverse impacts to wetlands, streams, and other aquatic resources must be avoided and minimized. When impacts are deemed unavoidable, compensatory mitigation is required, i.e. the restoration, establishment, enhancement or preservation of wetlands, streams or other aquatic resources.

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[5] Conservation, Protection and Utilization of Louisiana's Coastal Wetland Forests
Final Report to the Governor of Louisiana from the Coastal Wetland Forest Conservation and Use Science Working Group (April 30, 2005) http://www.coastalforestswg.lsu.edu/THEFinalReport.pdf

[6]Greenhouse gases and global warming potential values: Excerpt from the Inventory of U.S. Greenhouse Emissions and Sinks: 1990-2000. (April 2002) U.S. Greenhouse Gas Inventory Program, Office of Atmospheric Programs; U.S. Environmental Protection Agency (http://www.epa.gov/climatechange/emissions/downloads/ghg_gwp.pdf)

[7] Climate Change in Wetland Areas Part II: Carbon Cycle Implications, from *Acclimations*, July-August 1999, Newsletter of the US National Assessment of
the Potential Consequences of Climate Variability and Change
(http://www.usgcrp.gov/usgcrp/Library/nationalassessment/newsletter/1999.08/Wet.html

[8] EPA "Wetlands Compensatory Mitigation" (http://www.epa.gov/owow/wetlands/pdf/CMitigation.pdf)

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Thus wetland restoration activities through the Clean Water Act can also be a job creation engine. However, there are many examples of failed wetland mitigation projects, so any wetland restoration and/or mitigation efforts must be accompanied by monitoring and adaptive management in order to ensure long-term success.

Transition to Green, the Green Group transition recommendation book recommends wetland restoration as a key priority for the next Administration.[9] For example, Transition to Green recommends that the Army Corps of Engineers focus on restoring and repairing our damaged ecosystems, establishing an Office of Ecosystem Restoration at CEQ, incorporating restoration into infrastructure and transportation planning, and expanding resources for the Wetland Reserve Program. Other involved federal agencies must include Department of the Interior, Department of Agriculture, Environmental Protection Agency, National Oceanic and Atmospheric Administration, and Department of Transportation.

[9] Transition to Green: Leading the way to a healthy environment, a green economy, and a sustainable future (2008) (http://switchboard.nrdc.org/greentransition.php)