

2008 Annual Report

Wilma H. Schiermeier Olentangy River Wetland Research Park



WILMA H. SCHIERMEIER
OLENTANGY RIVER
WETLAND RESEARCH PARK





In this Annual Report we focus on several 2008 news items that featured the ORWRP: the Ramsar designation; managing methane emissions and carbon sequestration in wetlands; China's Three Gorges Dam; and two TV wetland documentaries.

Korean TV crew filming the Olentangy River Wetlands from the roof of the Heffner building.

OSU President E. Gordon Gee receiving the designation of the ORWRP as a "Ramsar Wetland of International Importance" at the 2008 Swampfest, from representatives of the U.S Ramsar Committee and the U.S. Fish & Wildlife Service.



One of the Three Gorges on the Yangtze River in China.

Executive Summary

This is the seventeenth consecutive annual report of the Wilma H. Schiermeier Olentangy River Wetland Research Park (ORWRP). It covers progress in calendar year 2008, the 15th year of hydrologic operation of the two 2.5-acre experimental wetland “kidneys” on the site, the 12th year of ecological development of our 7-acre mitigation wetland “billabong,” the 10th year of the Sandefur Wetland Pavilion, the 8th year since the restoration of our bottomland hardwood forest, the 6th year of occupancy of the Heffner Wetland Research and Education Building, and the 4th year of operation under our Wilma H. Schiermeier Endowment.

The feature event of 2008 was the ORWRP being named the 24th Ramsar Wetland of International Importance in the USA by the U.S. Fish and Wildlife Service and the Ramsar Convention in Switzerland. As the first Ramsar site in Ohio, we are enormously proud to be on the same list as the Florida Everglades, Chesapeake Bay, Okefenokee Swamp in Georgia, and Caddo Lake in Texas. Those of you among the estimated 650 people who attended our Swampfest in September 2008 at the ORWRP know how proud President Gordon Gee is of his Ohio State wetland park.

Forty-one courses from 4 OSU Colleges and two other Ohio colleges used the ORWP in 2008. Two master’s degrees and one undergraduate honors thesis were completed in 2008, raising the total number of theses and dissertations completed at the ORWRP and prior wetland programs to 68. Short courses on wetland restoration and wetland delineation were taught in 2008 to 35 participants from 8 states. An additional training course on wetland conservation and management was taught at the Harry Oppenheimer Okavango Research Centre in Maun Botswana in March 2008 by Drs. Mitsch and Zhang, to 21 natural resource professionals from throughout Botswana.

The ORWRP expenditures from grants, contracts, development funds, short courses, endowments, and other accounts were approximately \$1,000,000 in 2008. Research at the ORWRP continued on the effects of hydrologic pulsing on wetlands, a statewide network of water quality monitoring, and a 10-faculty research project on monitoring the effects of the pending dam removal on the Olentangy River. That last project resulted in 10 undergraduate research posters being presented at the Denman Undergraduate Research Forum at Ohio State in May 2008. ORWRP researchers and graduate students presented over 30 national and international papers in 2008 including presentations in China, Botswana, Iceland, Poland, and Brazil.

One hundred forty-six tours or presentations of the ORWRP were given to almost 4,000 visitors/participants in 2008. Two “Moonlight on the Marsh” distinguished lectures were sponsored again by the ORWRP in 2008. On May 2,

2008, Mary Kentula, U.S. Environmental Protection Agency, Corvallis, Oregon, presented a summary of her distinguished career on working to determine the condition of wetlands in the United States. On September 25, 2008, Royal Gardner, Professor of Law from Stetson University, presented an overview of the Ramsar Convention at our 2008 Swampfest.

Olentangy River Wetland Research Park (ORWRP) research was cited in hundreds of newspaper stories or web sites in 2008 on 8 different topics! Early in the year, our Mississippi River Basin collaboration with LSU was featured in Columbus and Louisiana papers prior to the OSU-LSU football game in New Orleans (we would like to forget about the game’s outcome!). Then we introduced the mythical muskrat Olentangy Olga to the world on international wetland day on February 2, with several local papers picking up the story. After the excitement of the Ramsar designation finally slowed, we were featured in web and print media on hurricane protection by wetlands, methane emissions from wetlands, comparisons of tropical and temperate zone wetlands for carbon sequestration, and what needs to happen in China upstream of the Three Gorges Dam.

The ORWRP was also featured in two movies in 2008: a 60-minute international wetland documentary produced by a Korean Broadcast System (KBS) TV station and shown on October 30 and a 6-minute documentary on innovative research at Ohio State University that showed on the Big Ten Network on November 20. The latter can still be seen on our web site.

We continue to fly the OSU wetland flag around the world. We had twelve graduate students from 5 countries working on graduate degrees at the ORWRP in 2008. We had research or teaching collaboration with Botswana, Brazil, China, Costa Rica, Estonia, Iceland, Korea, and Poland.

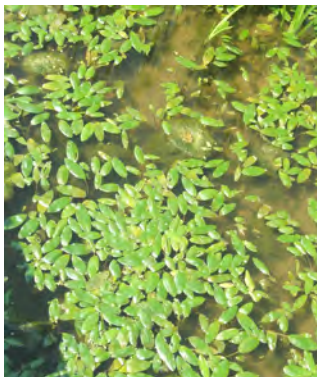
We continue to pledge to our supporters and our university that we will invest any resources we receive into our most important missions—educating our students at Ohio State and researching how best to protect and enhance the rivers and wetlands of Ohio and the world.



William J. Mitsch, Ph.D., Director
Wilma H. Schiermeier Olentangy River
Wetland Research Park
The Ohio State University
February 1, 2009



September brings loads of color to the campus wetlands.



Pond vegetation at the ORWRP.



A muskrat dwelling at the ORWRP.



Hippos are a regular sight in the Okavanga Delta in Botswana.

Why Wetlands?

Wetlands are shallow to intermittently flooded ecosystems that are more commonly known by such terms as swamps, bogs, marshes, and sedge meadows. They are now revered and protected as important parts of the natural landscape because of their functions in cleaning and retaining water naturally, preventing floods, and providing a habitat and food source for a wide variety of plant and animal species. Yet it is estimated that more than half of the original wetlands in the lower 48 states have been lost to drainage projects and human development projects. Ohio has lost about 90 percent of its original wetlands.

When we lose wetlands, we lose their ability to provide clean water, prevent floods, and enhance biological diversity. Many organizations are calling for creation and restoration of wetlands to clean up our streams, rivers, and lakes and to recover lost habitat. Five million acres of wetlands in the Mississippi River Basin have been suggested as necessary to help prevent the dead zone, or hypoxia, in the Gulf of Mexico.^{1,2} The U.S. Army Corps of Engineers oversees a regulatory program that results in tens of thousands of acres of wetlands being restored and created each year to replace wetlands that are lost to development. Furthermore, the largest wetland restorations in the world, at costs that will exceed \$20 billion, are underway in the Florida Everglades, Louisiana Delta, and Mesopotamian Marshlands.³ Coastal wetlands are needed more than ever for protection from disasters such as the 2004 Indian Ocean tsunami and the 2005 Hurricane Katrina in New Orleans.^{4,5} Now wetlands are considered to be the linchpin of climate change because of their storage of carbon.³

A National Academy of Sciences panel⁶ concluded that much more research is needed before we can be assured that those wetlands that are constructed to replace wetlands destroyed for development are successful. Even though a U.S. Fish & Wildlife Service report⁷ suggested that there was a net gain of wetlands in the United States from 1998 to 2004, the question of whether we can create and restore sustainable rivers and wetlands remains unanswered. We are optimistic that it can be done.

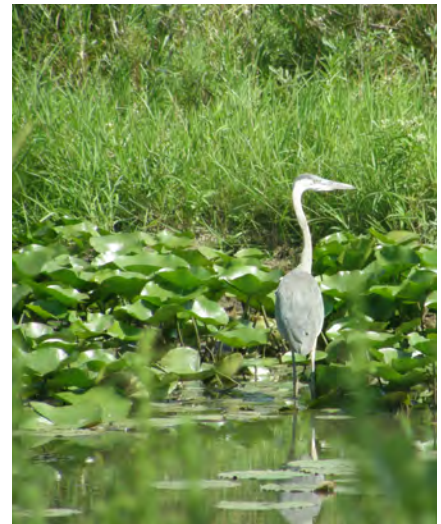


On view on an early morning on the boardwalk are water plants and animals which make the wetland their home.

The Vision

The Wilma H. Schiermeier Olentangy River Wetland Research Park is a university campus facility in Ohio, USA, designed to provide teaching, research, and service related to wetland and river science and ecological engineering. At the research park, we seek to understand: 1) how wetlands, rivers, and watersheds function, and 2) if and how we can restore these systems. The 50-acre site itself is a long-term, large-scale riverine wetland research and teaching laboratory. There is no other facility of its kind on any other university campus in the world, so it also has as its mission the dissemination of wetland science and ecological engineering around the world.

The wetland research park is also a nature park, providing habitat for a diversity of plants and animals for the residents of central Ohio to observe and enjoy. It is indeed possible to have a first-rate “living laboratory” that is also appreciated for its ecology and aesthetics in an urban region. Cooperation between the university and its urban neighbors is both symbolic and real at the Olentangy River Wetlands.



Some of our 3800 tour visitors in 2008 make use of the scope at the Sandefur Wetland Pavilion.

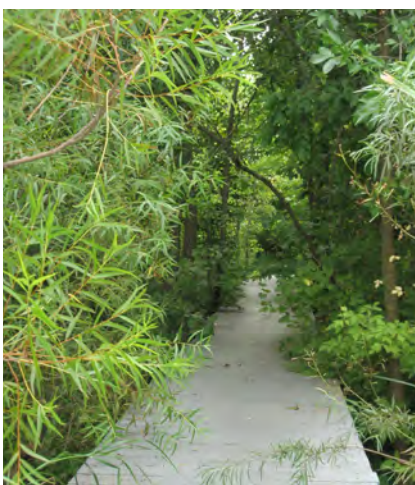


Ducks, herons and egrets take advantage of a wet spot in our billabong on a warm summer day.



Snow outlines the Sandefur Wetland Pavilion and the Heffner Wetland Building in a winter scene.

History of OSU's Wetlands



Lush vegetation thrives in the wetland.



Informative signs are placed through the wetland park for self-guided tours.

The Olentangy River Wetland Research Park is a 50-acre site owned by The Ohio State University, immediately north of Dodridge Road and adjacent to the Columbus campus. The research park is being developed in several phases:

Phase 1 (1992-1994)—Construction of two experimental wetland basins and their water delivery system;

Phase 2 (1994-1999)—Development of a research and teaching infrastructure at the site, including boardwalks, experimental mesocosms, a plant-material greenhouse, additional wetlands, instrumentation for long-term research, and a visitor pavilion;

Phase 3 (2000-2003)—Development and construction of the Heffner Wetland Research and Education Building on the site; and

Phase 4 (2003-present)—International collaborations, river restoration, and urban ecotourism.

The construction of two 2.5-acre deepwater marshes and a river water delivery system was completed in 1994. Pumps were installed on the floodplain to bring water from the Olentangy River to the wetlands and pumping officially began on March 4, 1994. River water has been and continues to be pumped continuously, day and night, into the two wetlands. It then flows by gravity back to the Olentangy River through a swale and constructed stream system. In May 1994, one wetland basin was planted with marsh vegetation typical of wetlands in the Midwest; the other remained as an unplanted control.

Establishing infrastructure for research and education at the site began in 1994 with the construction of boardwalks in the two experimental wetlands (winters of 1995 and 1996) and ended with the dedication of the Sandefur Wetland Pavilion in 1999. That phase also included the creation of the 7-acre naturally flooded oxbow (locally called our billabong) and construction of the mesocosm compound for medium-scale research on wetland function.

Phase 3, the construction of the \$2.8 million Heffner Wetland Research and Education Building at the ORWRP, began in 2000 with the receipt of \$1.18 million in two Hayes Investment Fund grants from the Ohio Board of Regents. The grants were the result of an effort of a 5-university consortium of Ohio institutions—Ohio State, Wright State, Shawnee State, Youngstown State, and Kenyon College. Most of the remaining support for the building came through donations. The decision to go forward with building construction was made on December 13, 2001. Construction began in spring 2002 and staff and students moved into the building on March 6, 2003. Three additional wetlands were developed in the vicinity of the building, including a stormwater wetland that receives runoff from the roof of the Heffner Wetland Building.



Our current Phase 4 involves establishing or joining regional and international networks such as the Ohio Center for Wetland and River Restoration (OCWRR) and the Global Wetland Consortium (GWC), and achieving the designation as a Ramsar Wetland of International importance. Current projects include the construction of a city bike path shelter, experimental streams, and research access to the Olentangy River itself. This phase also involves continued fund raising to establish long-term endowments for the ORWRP.

Teaching

Formal University Courses

Forty-one courses involving 470 students from 4 OSU Colleges and other Ohio institutions used the ORWRP in 2008 for teaching. Course topics included: physical geography (College of Social and Behavioral Sciences); natural history, water quality, and wetland ecology (College of Food, Agricultural, and Environmental Sciences); landscape architecture and ecological engineering (College of Engineering); ornithology, conservation biology, and chemistry (College of Biology, Math and Physical Sciences). Columbus State and University of Toledo brought student groups to the ORWRP in 2008 for field trips.



A total of 68 students have completed Ph.D. dissertations, masters theses, or honors undergraduate theses in wetlands and related fields in the last 20 years at Ohio State, with 57 of those in the fifteen-year period from 1992 through 2008. Two masters students and one undergraduate honors student completed their degrees at the ORWRP in 2008. While most students writing theses are from Ohio State departments, there have been visiting students from European universities (two from the UK, three from Denmark) and the Far East (Korea and China). In 2008, visiting graduate students from Ewha Woman's University, Seoul, Korea, and East China Normal University, Shanghai, China, conducted dissertation research at the ORWRP.



Wetland Professional Short Courses

Two short courses were taught in 2008 at the ORWRP—*Wetland Delineation* and *Wetland Creation and Restoration*. The courses were taught in the conference room in the Heffner Wetland Building and attracted 35 participants from 8 states (OH, WA, IN, WV, TN, IL, KY, AL). Participants were primarily from environmental consulting firms and State and Federal agencies and they indicated high satisfaction with the content and location of the courses.

In addition, a training course on wetland conservation and management was taught at the Harry Oppenheimer Okavango Research Centre in Maun Botswana in March 2008 by Drs. Mitsch and Zhang to 21 natural resource professionals from throughout Botswana.



Publications/Scholarly Presentations

Thirty-one publications were published or presented by researchers at the ORWRP in 2008 including one special issue from Costa Rica, 12 peer-reviewed papers, 15 proceeding papers and published abstracts, and three theses/dissertations. A significant letter was published in *Science* on the implications of the new water level fluctuations that will impact millions of people upstream of the Three Gorges Dam in China. Other papers were published on bottomland hardwood forest productivity, riverine wetland improvement in water quality, and methane emissions from created wetlands. Papers were presented or published in the USA, China, Poland, Iceland, and Brazil in 2008. The ORWRP was featured on the cover of *The Ohio Journal of Science* in their April 2008 issue.

The editorial office of *Ecological Engineering*, an international journal dedicated to the creation and restoration of ecosystems, continues to be housed in the Heffner Wetland Building at the ORWRP. The journal received 421 manuscripts in 2008 and published 99 papers from 23 countries.



Research

Research remains the primary focus of the Olentangy River Wetland Research Park. Several research projects were active at the ORWRP in 2008, including funded grants and contracts from the U.S. Environmental Protection Agency on estimating the effects of hydrologic pulsing on wetland function and developing a water quality and nutrient monitoring network in Ohio, and the City of Columbus for restoration of the Olentangy River itself. The Olentangy River restoration project is a multi-researcher project that will examine the river before and after a dam is removed from the river adjacent to Ohio State University's campus. It resulted in 10 undergraduate research abstracts being presented at Ohio State's Denman Research Forum in May 2008.

Wetland and river projects that we continue to be involved with include comparison of methane emissions and carbon sequestration of tropical and temperate wetlands. The ORWRP continued research collaboration with EARTH University in Costa Rica on carbon sequestration and methane emissions from tropical wetlands and with the University of Botswana's Harry Oppenheimer Okavango Research Centre (HOORC) on biogeochemistry of seasonal floodplains in the Okavango Delta in Botswana. Four OSU researchers visited the Okavango Delta in March 2008.



Okavanga Delta, Botswana



Mary Kentula, USEPA, lectures in the Heffner lobby.



Royal Gardner, Stetson University, presents a summary of Ramsar at the 2008 Swampfest.



Ed Begley, Jr. (center) presents SWACO 2008 Emerald Award to (left to right) ORW advisory committee members Sue Kelly, Jerry Pausch, and Ruthmarie Mitsch and ORW Director Bill Mitsch.

Service

Moonlight on the Marsh Distinguished Lectures

Two ORWRP “Moonlight on the Marsh” distinguished lectures, sponsored by the Jerry and Lenora Pausch Foundation, were held in 2008. On May 2, 2008, Mary Kentula, U.S. Environmental Protection Agency, Corvallis, Oregon, presented “Assessing the Condition of the Wetland Resource: Mitigation to National Survey and In-Between,” that summarized her 30-year career on working to determine the functions and values of wetlands in the United States. On September 25, 2008, Royal Gardner, Professor of Law from Stetson University, Gulfport, Florida, presented “Wetlands in a Global Context: The Ramsar Convention,” an overview of the Ramsar Convention at our 2008 Swampfest event on the evening of September 25, 2008 at the ORWRP.

Other Events

The ORWRP hosted a Saturday morning gathering at the wetlands on February 2, 2008, attended by over 100 visitors to celebrate International wetland day. We chose that as an opportunity to have OSU President Gordon Gee unveil an illustration of “Olentangy Olga,” our new muskrat mascot. After the ceremony, Professor Mitsch led a group of children, adults, and photographers to one of the wetlands where they could see the muskrat home of Olga. It turns out that this is also President Gordon Gee’s birthday so we celebrated that event too with a cake and song.

The ORWRP was honored by the the Solid Waste Authority of Central Ohio (SWACO) by receiving their 2008 Emerald Award for education on May 7, 2008. The award was presented before more than 250 people attending SWACO’s annual banquet at the Easton Hilton to Professor Mitsch by noted actor and environmentalist Ed Begley, Jr.

One of the biggest events ever held at the ORWRP was Swampfest 2008, held to celebrate the naming of the site as the 24th Ramsar Wetland of International Importance in the United States. More description of that event, attended by an estimated 650 visitors, is given on page 10.



The Olentangy River Wetland Research Park has a Wikipedia web site! [The http://en.wikipedia.org/wiki/Olentangy_River_Wetland_Research_Park](http://en.wikipedia.org/wiki/Olentangy_River_Wetland_Research_Park) describes the site history and gives links to several publications. Check it out!

Tours

Formal tours and presentations of the ORWRP continued to be among our popular public service activities in 2008. Since 1994, the ORWRP has led over 1,500 wetland tours and presentations to almost 30,000 individuals. The ORWRP conducted 146 tours and public presentations on the Olentangy River Wetland Research Park in 2008 to 3,800 participants.

Distinguished Visitors and Guests

During 2008, we were pleased to serve as host to two visiting international scientists. Dr. Barbara Ngwenya, from the Harry Oppenheimer Okavango Research Centre, University of Botswana, was a visiting scientist for the first half of 2008. She interacted with ORWRP students and scientists in several productive ways and presented two seminars in late April on campus—one in the School of Environment and Natural Resources and one in the Environmental Science Graduate Program. Dr. Ngwenya is a social scientist who studies human use of wetlands in southern Africa and other locations. She also accompanied ORW staff and students to the 29th annual meeting of the Society of Wetland Scientists in Washington DC in late May 2008.

Dr. Ulo Mander, Professor of Geography and Environmental Science at Tartu University joined the ORWRP in early October 2008 and immediately started an ambitious research on greenhouse gas emissions from wetlands at the ORWRP that involved OSU graduate students as well as a visiting graduate student from China. Professor Mander is the recipient of a Fulbright scholarship that allowed him to be a visiting scholar at the ORWRP for six months.

Several other distinguished scientists, engineers, and resource managers visited the ORWRP in 2008, including: Beth Middleton (USGS, Lafayette, LA), Charles Wooley (U.S. Fish and Wildlife Service, St. Paul, MN), Dana Warren (Cornell University), Daniel Dauwalter (University of Wyoming), Andrew Sutherland (University of New Brunswick), Dave Boufford (Harvard University), Laura Meyerson (University of Rhode Island), Piotr Wioski (University of Botswana), Changwoo Ahn (George Mason University), Suzane Pittenger-Slear (Chair, U.S. Ramsar Committee), and Sarah Cowles (visiting scholar at Knowlton School of Architecture).

Publicity

The Olentangy River Wetland Research Park and its research and teaching were publicized hundreds of times during 2008 in newspaper articles, press releases, web stories, and other publications on 8 different topics. Early in the year, our collaboration with LSU was featured in Columbus and Louisiana papers in the days leading up to the BSC game in New Orleans. We were also featured in web and print media on hurricane protection by wetlands, methane emissions from wetlands, comparisons of tropical and temperate zone wetlands for carbon sequestration, and the Three Gorges Dam.



Dr. Barbara Ngwenya, HOORC, University of Botswana, spent a year 2007-08 at the ORWRP as a visiting wetland social scientist.



Dr. Ulo Mander, University of Tartu, Estonia, is spending 6 months at the ORWRP over 2008-09 as a visiting Fulbright scholar in wetland ecology.



Research in the News

The Olentangy River Wetland Research Park was in the news throughout the world in 2008.

Tropical Carbon

In one of the first comparisons of its kind, researchers at the ORWRP demonstrated that wetlands in tropical areas are able to absorb and hold onto about 80 percent more carbon than can wetlands in temperate zones. ORWRP scientists extracted soil cores from wetlands in Costa Rica and in Ohio and analyzed the contents of the sediment from the past 40 years. Based on their analysis, they estimated that the tropical wetland accumulated a little over 1 ton of carbon per acre per year, and the temperate wetland accumulated .6 tons of carbon per acre per year. These results were presented at a national soils meeting in Texas and were released in an OSU press release.



Swampfest 2008

Our tiny wetland at the northern edge of Ohio State University's Columbus campus was officially designated as a Wetland of International Importance in 2008. The Wilma H. Schiermeier Olentangy River Wetland Research Park became the 24th such designated wetland in the United States in June 2008. It is the only Ramsar wetland in Ohio, and one of just a handful in the Midwest. Other U.S. wetlands that have achieved the designation include the Everglades National Park and the Okefenokee National Wildlife Refuge. At 50 acres, the site is by far the smallest designated wetland in the United States.

To celebrate this designation, a day-long celebration called **Swampfest 2008** was held during the first week of classes at Ohio State on September 25, 2008. About 650 people attended the event which included an address by OSU President Gordon Gee, a Moonlight on the Marsh lecture by Royal Gardner, and a presentation of the Ramsar certificate to President Gee by Ramsar and U.S. government officials. Bands played on the stage before and after the ceremonies and several environmental and university organizations benefited from displays at the event.



Three Gorges Dam



The annual flood pulse behind the world's largest hydro-electric dam, the Three Gorges Dam in China, will be unlike anything found in nature.

As the reservoir of Yangtze River water rises and falls by as much as 100 feet every six months there will be a profound impact on the landscape over time, many environmental experts worry. Among the concerns: The reservoir will contain factory toxins and raw sewage and sediment which might cause the water level to rise higher than planned, threatening to flood a large city upstream and possibly even send water spilling over the top of the dam.

But perhaps the flooding phenomenon can also be put to good use, according to wetland experts from the ORWRP and Shanghai and Chongqing China in a letter published in *Science* in October 2008. Among the possibilities they see in an ecosystem that has such an exaggerated change in flooding levels: introducing new agricultural practices during low water levels, creating terraced ponds and wetlands along the borders of the giant reservoir, and establishing food production businesses that capitalize on the changing water levels.



ORWRP Documentaries

The ORWRP was featured in two movies in 2008: a 60-minute international wetland documentary produced by a Korean Broadcast System (KBS) TV station and shown on October 30 in Korea; and a 6-minute documentary on innovative research at Ohio State University that showed on the Big Ten Network on November 20. The latter can still be seen on our web site <http://swamp.osu.edu>



Methane Emissions

A study by ORWRP scientists published in the scientific journal *Wetlands* is part of ongoing research comparing pulsing vs. steady-flow conditions in two experimental wetlands on the Columbus campus as sponsored by the U.S. EPA and others.

“Pulsing refers to a number of different conditions in wetlands – river pulses that happen on a seasonal basis, two-per-day coastal tides, and the rare but huge ones, like hurricanes or tsunamis,” said William Mitsch, director of the Wilma H. Schiermeier Olentangy River Wetland Research Park at Ohio State.

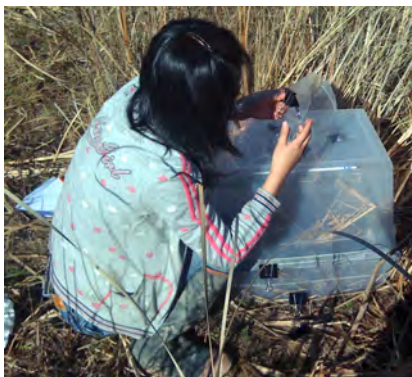
“Our point is that the healthiest systems and the ones with the lowest emissions of greenhouse gases are those that have these pulses and that are able to adapt to the pulses.”

Methane is the major component of natural gas and is a greenhouse gas associated with global warming. While the Environmental Protection Agency estimates that human activities are responsible for about 60 percent of methane emissions worldwide, wetlands are among the natural sources. Bacteria that produce methane during the decay of organic material cause wetlands to release the gas into the atmosphere.





Faculty, staff, students at the ORWRP in 2008



Development

The Olentangy River Wetland Research Park has been partially supported in its 15 years of development by thousands of private donations to the University. Through December 2008, almost \$4.5 million in cash and in-kind support has been raised for the wetland project, from corporations, foundations, and individuals.

In 2008, there were 588 donations to the ORWRP, 13% higher than the previous high, totaling over \$100,000. Over 30 staff and faculty at The Ohio State University made donations to the ORWRP in 2008 as did many of our alumni(ae) who are working in Ohio and all over the USA. Over the years, 15% of the donations (equivalent to more than \$700,000) received at the ORWRP have been as in-kind contributions that sometimes do not appear on the accounting sheets.

Future Directions

We at the ORWRP continue to focus on the use of the site facilities for continued wetland experiments and stream and river restoration projects and integration of wetland and river science with collaborating universities in Ohio and around the world. We are actively involved in the Lower Olentangy River Ecosystem Restoration centered on the 5th Avenue Dam removal, the estimation of the importance of wetlands in climate change around the world, and exchanges of international scientists and graduate students. We are determined to make the ORWRP one of the great water resource research stations in the world.



Iceland

ORWRP's Impact

Through 2008, the economic and academic impacts of the Olen-tangy River Wetland Research Park (ORWRP) on Ohio State University and the world of wetland science have been significant. In the course of its development and operation, the ORWRP has resulted in an economic advantage to the University of \$9 million in extramural grants and contracts, donations, and short course fees. Over \$1.8 million of that support has been as endowments that will allow the site to be part of the university setting for a very long time.

Just as important, the ORWRP has contributed to the completion of 57 graduate and undergraduate student theses and Ph.D. dissertations; publication of 160 papers listed in the ORWRP reprint series; leadership of over 1,500 formal wetland tours and presentations for the public to an estimated 30,000 individuals, including K–12 students, university students, garden clubs, campus visitors, and Federal, State, and local public officials.

We have also provided a convenient set of campus ecosystems in support of over 380 Ohio State University class listing in eight university colleges and many courses from other Ohio institutions, clearly saving those departments and courses significant travel costs and carbon footprints of taking students on field trips far from campus. Our current Ohio Center for Wetland and River Restoration (OCWRR) at the ORWRP has over 80 affiliates from 9 campuses and institutions in Ohio.

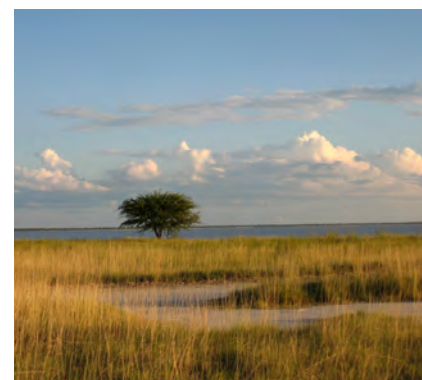
ORWRP's research and teaching have reached around the world, including activity in 2008 in Botswana, China, Korea, Poland, Costa Rica, Iraq, Brazil, and Iceland. We joined prestigious company when the ORWRP was admitted to a group of wetland research facilities called the **Global Wetland Consortium** (GWC; <http://www.global-wetlands.org/>) in 2007. The consortium currently has nine wetland research organizations around the world as members; only two are from the USA. The designation of the ORWRP as a **Ramsar Wetland of International Importance** in June 2008 was more important, elevating the ORWRP to an even more visible international status. As described by the Ramsar Secretariat, the ORWRP "is a unique combination of 1) a biologically diverse assemblage of different wetland and riverine habitats both representative and unique to the region; 2) high-quality university teaching, research, and publishing related specifically to wetland ecology and management; and 3) significant wetland ecotourism and outreach for an urban community where few wetlands remain."



Brazil



China



Botswana

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Formal university course use in 2008

Quarter	Course	Enrollment	Instructor	College
Winter 2008	CE/FABE/ENR 618 Ecological Engineering and Science	35	J. Martin/ V. Bouchard	FAES/ENG
	ENR 726 Wetland and River Restoration	12	William Mitsch	FAES
	Geography 210 Physical Geography and Environmental Issues	10	Bryan Mark	MAPS
	ENR 999 Graduate Student Research	4	William Mitsch	FAES
	ENR 999 Graduate Student Research	1	Parwinder Grewal	BIOL
	FABE 999 Graduate Student Research	1	Jay Martin	FAES
	FAEB 693 Independent Study-Undergrads	1	Jay Martin	FAES
	ENR 693 Independent Study-Undergrads	1	William Mitsch	FAES
Spring 2008	Biology 175 Columbus State	17	Julie Cronk	Columbus State
	Art & the Environment Class	25	Shelly Casto	Wexner Center
	EEOB 322 Introduction to Ornithology	30	John Condit	BIOL
	ENR 510 Natural History of Ohio	10	Dave Johnson	FAES
	Landscape Architure 323 Water in the Environment	15	Jason Kentner	ENG
	Landscape Architure 622 Water in the Environment	15	Jason Kentner	ENG
	ENR 693 Independent Study-Undergrads	2	William Mitsch	FAES
	ENR 999 Graduate Student Research	6	William Mitsch	FAES
	ES 999 Graduate Student Research	1	Parwinder Grewal	BIOL
	BIOL 999 Graduate Student Research	1	John Harter	BIOL
	FABE 999 Graduate Student Research	1	Jay Martin	FAES
	FAEB 693 Independent Study-Undergrads	1	Jay Martin	FAES
	Geography 210 Physical Geography and Environmental Issues	50	Bryan Mark	MAPS
	Biology 127 Columbus State	10	Mort Javadi	Columbus State
	Geography H410 Global Climate and Environmental Change	50	Bryan Mark	MAPS
Summer 2008	Biology 125 Columbus State	30	Julie Cronk	Columbus State
	ENR 693 Independent Study-Undergrads	2	William Mitsch	FAES
	Columbus State, Biology 127	9	Julie Cronk	Columbus State
	ENR 999 Graduate Student Research	5	William Mitsch	FAES
	Biological Sciences, Ecology Lab	15	Indra Sindhu	Columbus State
	ENR 999 Graduate Student Research	1	Richard Dick	FAES
	ES 999 Graduate Student Research	1	Parwinder Grewal	BIOL
	FABE 999 Graduate Student Research	1	Jay Martin	FAES
Fall 2008	FAEB 693 Independent Study-Undergrads	1	Jay Martin	FAES
	EEOB 661 Conservation Biology	27	John Harter	BMAPS
	ENR 725 Wetland Ecology and Management	30	Bill Mitsch	FAES
	Geography 210 Physical Geography and Environmental Issues	40	Bryan Mark	MAPS
	ENR 999 Graduate Student Research	5	William Mitsch	FAES
	ES 999 Graduate Student Research	1	Richard Moore	FAES
	ENR 999 Graduate Student Research	1	Richard Dick	FAES
	FABE 999 Graduate Student Research	1	Jay Martin	FAES
	ENR 693 Independent Study-Undergrads	1	William Mitsch	FAES
	University of Toledo Environmental Class	3	Jill Shalabi	University of Toledo
TOTAL NUMBER OF STUDENTS		473		
NUMBER OF COURSES		41		

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 Weller, Nova Anderson, Columbus, OH
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 Williams, Stephanie A., Columbus, OH
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 *Wise, Karen Marie, Ravenna, OH
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*Zhang, Li, Columbus, OH

* ORW alum, staff, or professor
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Donation Support for the Olentangy River Wetland Research Park through 2008

Year	Number of donations	Total amount of donations	In-kind donations*	Endowment donations
2008	588	\$103,481	\$7,700	\$36,879
2007	520	\$81,629	\$0	\$8,483
2006	387	\$211,559	\$97,909	\$5,722
2005	377	\$207,972	\$4,000	\$2,381
2004	332	\$1,689,049	\$0	\$1,518,536
2003	289	\$361,569	\$71,403	\$50,956
2002	264	\$365,056	\$80,510	\$ 445
2001	319	\$248,416	\$75,000	\$1,140
2000	250	\$237,077	\$31,300	\$97,620
1999	165	\$115,626	\$3,705	\$94,000
1998	149	\$98,839	\$23,624	\$4,415
1997	168	\$78,228	\$13,503	\$300
1996	146	\$221,889	\$18,778	\$4,000
1995	108	\$97,184	\$36,516	\$11,000
1994	86	\$62,686	\$48,744	
1993	46	\$259,206	\$21,215	
1992	7	\$59,347	\$6,327	
TOTAL	4203	\$4,498,811	\$702,589	\$1,835,901

* In-kind includes construction of 7-acre billabong in 1996 (\$170,000), donation of bottomland forest in 2001 and 2006 (\$170,000), earthwork and gravel for building construction (2002-03, 2008), paved driveway (2003), civil engineering for building (2003), and vehicles (1999, 2000, 2006)

Research Project

- LSU/OSU Partnership on The Mississippi-Ohio-Missouri (MOM) River Basin Restoration
- Carbon Sequestration and Methane Emissions in Tropical and Temperate Freshwater Wetlands
- Effects of Hydrologic Pulsing on Wetland Function
- Lower Olentangy River Ecosystem Restoration
- Water Quality and Nutrient Monitoring Network in Ohio
- Grave Creek Wetland and Stream Restoration on OSU-Marion Campus
- Hydrology and Amphibians in Natural and Created Vernal Pools in Central Ohio

Sponsorship

- LSU, ORWRP, U.S. Environmental Protection Agency
- U.S. Department of Energy, Fulbright Foundation, and ORWRP
- U.S. Environmental Protection Agency
- City of Columbus
- U.S. Environmental Protection Agency
- Ohio State University Planning and Real Estate Office
- ORWRP

2008 Publications at the Olentangy River Wetlands

Peer-Reviewed Papers

- Altor, A.E. and W.J. Mitsch. 2008. Pulsing hydrology, methane emissions, and carbon dioxide fluxes in created marshes: A 2-year ecosystem study. *Wetlands* 28: 423-438.
- Altor, A.E. and W.J. Mitsch. 2008. Methane emissions and carbon dioxide fluxes in created wetland mesocosms: Effects of hydrologic regime and hydric soils. *Ecological Applications* 18: 1307-1320.
- Anderson, C.J. and W.J. Mitsch. 2008. The influence of flood connectivity on bottomland forest productivity in central Ohio, USA. *Ohio J. Science* 108 (2): 2-8.
- Anderson, C.J. and W.J. Mitsch. 2008. Tree basal growth response to flooding in a bottomland hardwood forest in central Ohio. *J. American Water Resources Association* 40: 1-9.
- Bernal, B. and W.J. Mitsch. 2008. A comparison of soil carbon pools and profiles in wetlands in Costa Rica and Ohio. *Ecological Engineering* 34: 311-323.
- Dale, V.H., Biddinger, G.R., Newman, M.C., Oris, J.T., Suter, G.W., Thompson, T., Armitage, T.M., Meyer, J.L., Allen-King, R.M., Burton, G.A., Chapman, P.M., Conquest, L.L., Fernandez, I.J., Landis, W.G., Master, L.L., Mitsch, W.J., Mueller, T.C., Charles F. Rabeni, C.F., Rodewald, A.D., Sanders, J.G., and van Heerden, I.L. 2008. Enhancing the Ecological Risk Assessment Process. *Integrated Environmental Assessment and Management* 4: 306-313.
- Kohlmann, B., W.J. Mitsch, and D.O. Hansen. 2008. Ecological management and sustainable development in the humid tropics of Costa Rica. *Ecological Engineering* 34: 254-266.
- Mitsch, W.J., J. Lu, X. Yuan, W. He and L. Zhang. 2008. Optimizing ecosystem services in China. *Science* 322: 528.
- Mitsch, W.J., J. Tejada, A. M. Nahlik, B. Kohlman, B. Bernal, and C. E. Hernández. 2008. Tropical wetlands for climate change research, water quality management and conservation education on a university campus in Costa Rica. *Ecological Engineering* 34:276-288.
- Nahlik, A.M. and W.J. Mitsch. 2008. The effect of river pulsing on sedimentation in created riparian wetlands. *Journal of Environmental Quality* 37: 1634-1643.
- Swab, R.M. and W.J. Mitsch. 2008. Effect of hydrologic restoration and *Lonicera maackii* removal on herbaceous understory vegetation in a bottomland hardwood forest. *Restoration Ecology* 16: 453-463.
- Tuttle, C.L. L. Zhang, and W.J. Mitsch. 2008. Aquatic metabolism as an indicator of the ecological effects of hydrologic pulsing in flow-through wetlands. *Ecological Indicators* 8: 795-806.

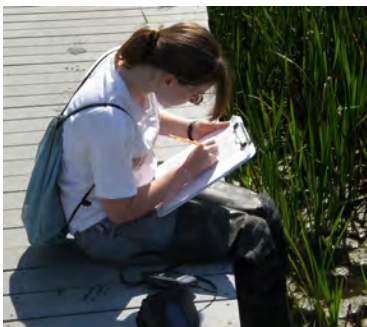
Other Papers and Published Abstracts

- Bernal, B. and W.J. Mitsch. 2008. Comparing carbon sequestration rates in tropical and temperate wetlands using radiometric dating. Soil Science Society of America/Geological Society of America Annual Meeting, Houston TX.

- Bernal, B. and W.J. Mitsch. 2008. Comparing carbon sequestration rates in tropical and temperate wetlands using radiometric dating. Abstracts, 8th INTECOL Wetland Conference, Cuiaba, Brazil.
- Bernal, B. and W.J. Mitsch. 2008. Estimating carbon sequestration in a Great Lakes coastal wetland using radiometric dating, Abstracts, Society of Wetland Scientists 29th Annual Meeting, Washington, DC.
- Cooley, C., and W.J. Mitsch. 2008. Sampling flood event water quality on a river: Implications for floodplain restoration after dam removal, Abstracts, Society of Wetland Scientists 29th Annual Meeting, Washington, DC.
- Huang, C., W.J. Mitsch, and L. Zhang. 2008. Ecological restoration design of a small stream and riparian wetlands on a college campus in central Ohio USA, Abstracts, Society of Wetland Scientists 29th Annual Meeting, Washington, DC.
- Keljo, K. and W.J. Mitsch. 2008. Impact of wetland macrophyte community diversity on macroinvertebrate community composition, Abstracts, Society of Wetland Scientists 29th Annual Meeting, Washington, DC.
- Korfel, C., W.J. Mitsch, T. Hetherington, and J. Mack. 2008. Hydrology, physiochemistry, and amphibians in natural and created vernal pool wetlands, Abstracts, Society of Wetland Scientists 29th Annual Meeting, Washington, DC.
- Mitsch, W.J., L. Zhang, D. Fink, A. Nahlik, C. Tuttle, A. Altor, and M. Hernandez. 2008. Hydrologic pulsing and riparian freshwater wetlands, Abstracts, Society of Wetland Scientists 29th Annual Meeting, Washington, DC.
- Mitsch, W.J. and J.W. Day, Jr. 2008. Reconnecting rivers and floodplains: The effectiveness of river diversions on water quality and other ecosystem services” Abstracts, 8th INTECOL Wetland Conference, Cuiaba, Brazil.
- Mitsch, W.J. and J.W. Day, Jr. 2008. Restoring the Mississippi River Basin and Delta” Abstracts, 8th INTECOL Wetland Conference, Cuiaba, Brazil.
- Nahlik, A.M. and W.J. Mitsch. 2008. The effects of hydrology and climate on methane emissions from freshwater flow-through wetlands, Abstracts, Society of Wetland Scientists 29th Annual Meeting, Washington, DC.
- Noon, M. and W.J. Mitsch. 2008. Vegetation analysis of a riparian bottomland hardwood forest upstream of a dammed reservoir prior to dam removal, Abstracts, Society of Wetland Scientists 29th Annual Meeting, Washington, DC.
- Song, K., H. Kang, and W.J. Mitsch. 2008. Spatial pattern effects on denitrification in created wetlands, Abstracts, Society of Wetland Scientists 29th Annual Meeting, Washington, DC.
- Young, C., J. Martin, W. Mitsch, A. Hoet, and F. DeGraves. 2008. Pathogen removal by constructed riparian wetlands during variable hydrologic conditions in Central Ohio. Abstracts, American Ecological Engineering Society (AEES) Annual Meeting, Blacksburg, VA.
- Zhang, L. and W.J. Mitsch. 2008. Effects of floating aquatic plants and water source on water quality in three small ponds in central Ohio, Abstracts, Society of Wetland Scientists 29th Annual Meeting, Washington, DC.

Reports/Special Issues

- Kohlmann, B., and W.J. Mitsch (eds.) 2008. Ecological management and sustainable development in the humid tropics of Costa Rica. *Ecological Engineering* 34: 253-382.



Theses and dissertations completed 1992 through 2008

Ph.D. dissertations (14)

- Anne E. Altor “Methane and carbon dioxide fluxes in created riparian wetlands in the midwestern USA: Effects of hydrologic pulses, emergent vegetation and hydric soils” Environmental Science Graduate Program (2007)
- Daniel Fink “Effects of a pulsing hydroperiod on a created riparian river diversion wetland” Environmental Science Graduate Program (2007)
- Maria E. Hernandez “The effect of hydrologic pulses on nitrogen biogeochemistry in created riparian wetlands in Midwestern USA” Environmental Science Graduate Program (2006)
- Christopher J. Anderson “The influence of hydrology and time on productivity and soil development of created and restored wetlands” School of Environment and Natural Resources (2005)
- Deni Porej “Faunal aspects of wetland creation and restoration” Evolution, Ecology, and Organismal Biology (2004)
- Changwoo Ahn “Ecological engineering of wetlands with a recycled coal combustion byproduct” Environmental Science Graduate Program (2001)
- John J. Gutrich “Ecological and economic analysis of natural capital: Assessing and modeling the substitutability of mitigation wetlands for natural sites” Department of Agricultural, Environmental, and Developmental Economics (2000)
- Michael A. Liptak “Water column productivity, calcite precipitation, and phosphorus dynamics in freshwater marshes” Environmental Science Graduate Program (2000)
- Douglas J. Spieles “Nutrient retention and macroinvertebrate community structure in constructed wetlands receiving wastewater and river water” Environmental Science Graduate Program (1998)
- Randall J.F. Bruins “Modeling of flooding response and ecological engineering in an agricultural wetland region of Central China” Environmental Science Graduate Program (1997)
- Neal E. Flanagan “Comparing ecosystem structure and function of constructed and naturally occurring wetlands: Empirical field indicators and theoretical indices” Environmental Science Graduate Program (1997)
- Robert W. Nairn “Biogeochemistry of newly created riparian wetlands: evaluation of water quality changes and soil development” Environmental Science Graduate Program (1996)
- Naiming Wang “Modelling phosphorus retention in freshwater wetlands” Environmental Science Program (1996)
- Paul E. Weihe “Colonizing and introduced vegetation in created riparian wetlands: Establishment during the first two growing seasons” Environmental Science Graduate Program (1996)

Master’s theses (26)

- Joni M. Lung “Mink and raccoon use of wetlands as influenced by wetland and landscape characteristics in central Ohio” Evolution, Ecology, and Organismal Biology Department (2008)
- Blanca Bernal “Carbon pools and profiles in wetland soils: The effect of climate and wetland type” Master’s Thesis, School of Environment and Natural Resources (2008)
- Chelsea A. Korfel “Hydrology, physiochemistry, and amphibians in natural and created vernal pool wetlands” School of Environment and Natural Resources (2007)
- Debra Gamble “Tree growth and hydrologic patterns in forested mitigation wetlands” School of Environment and Natural Resources (2006)
- Cassandra L. Tuttle “The effects of hydrologic pulsing on aquatic metabolism in created riparian wetlands” Environmental Science Graduate Program (2005)
- Amanda M. Nahlik “The effects of river pulsing on sedimentation in two created riparian wetlands” Environmental Science Graduate Program (2005)
- Rebecca Swab “Effectiveness of *Lonicera maackii* removal from a bottomland hardwood forest in central Ohio” School of Environment and Natural Resources (2005)
- Tracy J. Tenwalde “Averting and treatment costs regarding nitrogen risk in public water supplies in Columbus, Ohio: Implications for wetland nitrogen sequestration” Department of Agricultural, Environmental, and Development Economics (2005)
- Eric Lohan “A methodology to ecologically engineer watersheds for nitrogen nonpoint source pollution control” Environmental Science Graduate Program (2004)
- Mark Dilly “Atrazine fate in a created wetland” Environmental Science Graduate Program (2003)
- Sarena M. Selbo “Hybridization between native and introduced populations of cattail and big bluestem: Conservation implications” Evolution, Ecology, and Organismal Biology (2002)
- Cheri Higgins “Ecosystem engineering by muskrats (*Ondatra zibethicus*) in created freshwater marshes” Environmental Science Graduate Program (2002)
- Amie M. Gifford “The effect of macrophyte planting on amphibian and fish community use of two created wetland ecosystems in central Ohio” Environmental Science Graduate Program (2002)

- Daniel F. Fink “Efficacy of a newly created wetland at reducing nutrient loads from agricultural runoff” Environmental Science Graduate Program (2001)
- Matthew Cochran “Effect of hydrology on bottomland hardwood forest productivity in central Ohio (USA)” Natural Resources (2001)
- Sarah K. Harter “Patterns of short-term sedimentation in a freshwater created marsh” Natural Resources (1999)
- Sharon A. Johnson “Effects of hydrology and plant introduction on first-year macrophyte growth in a newly created wetland” Natural Resources (1998)
- Lisa J. Svengsouk “First-year response of *Typha latifolia* L. and *Schoenoplectus tabernaemontani* (K.C. Gmel.) Palla to nitrogen and phosphorus additions in experimental mesocosms” Environmental Science Graduate Program (1998)
- Kathleen D. Metzger “Self-design of a fish community in a created riparian freshwater marsh: A simulation model” Environmental Science Graduate Program (1997)
- John S. Koreny “Hydrology of a constructed riparian wetland system: Characterization and predictive modeling” Environmental Science Graduate Program (1996)
- Uygur Özsesmi “A spatial habitat model for the marsh-breeding red-wing blackbird (*Agelaius phoeniceus*) in coastal Lake Erie wetlands” Environmental Science Graduate Program (1996)
- Doreen M. Dudek “Tree growth responses to streamflow in a bottomland forest in central Ohio” Natural Resources (1995)
- Steven F. Niswander “Functional analysis of a created in-stream mitigation wetland: hydrology, phosphorus retention, and tree growth” Natural Resources (1994)
- Renée F. Wilson “Progress and success of five mitigation wetlands in Ohio” Natural Resources (1995)
- Karen M. Wise “Evaluation of acid mine drainage control by a constructed wetland in southeastern Ohio” Natural Resources (1994)
- Frank D. Voss “Groundwater investigation of Ohio State University wetland site” Geodetic Science (1993)

Undergraduate honors theses (11)

- Kyle Chambers “A two-year study of nutrients and carbon in a river impacted by a low-head dam.” Environment and Natural Resources (2008)
- Katherine E. Kleber “Fish population and movement within planted and naturally colonizing experimental wetlands, autumn 2000” Natural Resources (2000)
- Erika A. Filippi “The role of soil organic matter on denitrification potential in newly created wetlands” Natural Resources (1998)
- Bonnie F. Elfritz “A comparison of natural wetlands with a constructed wetland using the Floristic Quality Assessment Index” Natural Resources (1998)
- Kimberly K. Schamp “Groundwater patterns before and after wetland construction at the Olentangy River Wetland Research Park” Natural Resources (1997)
- Nicole L. Vorwerk “Comparison of three years of pH values between planted and unplanted wetlands at the Olentangy River Wetland Research Park” Natural Resources (1997)
- Rainie D. Gardner “Fish recruitment in the Olentangy River constructed wetlands” Natural Resources (1997)
- Tonya Cheek “Effect of fish on wetland water quality” Natural Resources (1996)
- Andrew W. Wehr “Early water quality of created wetlands at the Olentangy River Wetland Research Park” Natural Resources (1995)
- Michael E. Berkal “Hydrology and water chemistry of the Olentangy River in Worthington (Franklin County), Ohio, and their potential effects on a future constructed wetlands facility downstream in Columbus, Ohio” Natural Resources (1992)
- Douglas G. Stuart “Intensive water quality sampling in two constructed riparian wetlands” Natural Resources (1992)

Theses/research at other universities (6)

- Chuan Li “Research in forests at Xiashu urban forest in Jiangsu province, China” College of Forest Resources and Environment, Nanjing Forestry University, China (in progress)
- Rikki Bronnum “The effects of alachlor on denitrifying bacteria in mesocosms and created wetlands in central Ohio, USA” Master’s Thesis, Environmental Chemistry, University of Copenhagen, Denmark (2001)
- Hojeong Kang “The significance of enzyme activities in wetland biogeochemistry” University of Wales, UK (1999)
- Pernille Mortensen and Pernille Lanzky “Water quality improvement in a constructed wetland” Thesis, Royal Danish School of Pharmacy, Copenhagen, Denmark (1996)
- Rebecca Smith “Nitrogen transfer in groundwater in the riparian zone of the Olentangy River, Columbus, Ohio” Thesis, Cambridge University, Cambridge, England, UK (1996)

Press coverage of Olentangy River Wetlands Research Park in 2008

Date	Title	Publications
January 4	LSU and OSU Collaborate in Research Field to Save America's Wetlands	LSU News
January 4	LSU, Ohio State Join Forces to Battle Wetlands Loss	New Orleans City Business
January 6	LSU, Ohio State Team up in Quest to Save Wetlands	The Times-Picayune
January 7	LSU, OSU Unite in Dead Zone Fight	Baton Rouge Advocate
January 7	Coastal Pollution Forges Louisiana, Ohio Partnership	The Columbus Dispatch
January 8	Editorial: On Our Team	The Times-Picayune
January 31	Muskrat Love: Meet Olentangy Olga, Ohio State's Answer to Punxsutawney Phil	OSU Media Advisory
February 4	Olentangy Olga Helps Honor World Wetlands Day	The Lantern
February 6	Move Over, Punxsutawney Phil	The Booster
February 3	World Wetlands Day at the ORWRP	www.Ramsar.org
February 4	Dam Demolition Doomed	The Lantern
February 5	Dam Destruction Devastating	The Lantern
February 26	Wetland Research Park Announces 10 Travel Grants to OSU Students/Staff to Attend National Wetland Conference	OSU Press Release
April 1	2007 Annual Report	OSU Press Release
April 17	Látum vatnid ráða sjálft	Morgunblaðid
April 18	Art, Science Both Important in Learning to Save Planet	The Columbus Dispatch
April 21	International Recognition for Ohio State's Wetland	OSU Press Release
April 22	Pryce Congratulates OSU, Wetland Research Park for International Designation	Press Release
May 12	ORWRP Wins Local Environmental Award	OSU Press Release
May 13	Undergraduate Researchers at OSU Predict the Impact of the 5th Avenue Dam Removal at 2008 Denman Forum on Campus	OSU Press Release
May 30	ORWRP Has Major Presence at a National Wetlands Conference in Washington DC	OSU Press Release
June	Halting Hypoxia	Civil Engineering Magazine
June 20	USA adds 24th Ramsar Site	www.ramsar.org
July 7	Olentangy Wetland First in Ohio to be 'Wetland of International Importance'	CFAES OSU News
July 12	Editorial: Short Takes	Columbus Dispatch
September 3	Let the Water Decid	OSU News Room
September 20	Lots Bank on Bucks	The Columbus Dispatch
September 24	Some Marshes Pass Too Much Gas	Yahoo News, LiveSciences
September 24	Flooding Might Help Lower Gas Emission From Wetlands	OSU Research and others
August 4-June 28	OSU Wetland Expert in Three Gorges Trip	Kaixian News and others
October 1	Swampfest in Ohio Celebrates USA's 24th Ramsar Wetland	ORW Press Release
October 8	Study: Tropical Wetlands Hold More Carbon Than Temperate Marshes	OSU Research and others
October 24	Optimizing Ecosystem Services in China	Science
October 24	Wetlands Expert: China Should Think Outside the Flooding Box with Three Gorges Dam	OSU Research
October 24	Flooding May Offset Three Gorges Dam Impact on Environment Expert Says	National Geographic
October 28	Three Gorges Dam Area Farmers Should Avoid Fertilizer	Bloomberg.com

WETLAND RESTORATION TV DOCUMENTARY

(Includes India, Japan, Korea and USA wetlands)

30 OCTOBER 10:00 PM TV : KBS1 (Chanel 9)

KBS창원총국 '람사르총회' 특집 방송

30일 밤 10시 연속 다큐, 31일 오후 7시30분 보도특집 등 마련

KBS창원총국(총국장 전진국)이 제10차 람사르총회 개최에 맞춰 다큐로온 특집 프로그램을 마련했다.

30일 밤 10시에는 3년 연속 제작한 다큐멘터리 '습지 재발견 5부작'의 마지막 5편 '미래의 생존조건 습지(KBSI)'가 방영된다. 습지의 경제적 가치, 인간과의 공존에 질문을 던져온 전문가들이 습지복원에 나선 세계 각국을 취재해 담았다. 아시아 최대 석호이자 람사르등록습지인 인도의 찰리카 호수, 세계 최초 람사르등록 습지 일부분의 가부쿠리누마 등을 찾았다.

31일 오후 7시30분에는 보도특집 '환경재앙을 막는다(KBSI)'가 전파를 탄다. 눈이 사라지고 사막화 되어가고 있는 현실 속에서 눈이 지구 온난화와 환경재앙에 끼치는 영향에 대해 집중 조명한다.

람사르총회를 기념하는 축하 음악회 '습지가 전하는 생명의 소리(방송



11월 12일 오후 2시10분)도 마련했다. 11월 2일 오후 7시30분 창원공장에서 펼쳐지는 이번 공연에는 김영일, 임형주, 손호영, 등방신기 등 국내 정상급 가수가 출연해 람사르총회에 참가한 의국인과 함께 환경과 관련된 노래를 부른다.

이 밖에 매일 오후 1시30분부터 30분간 '여기는 람사르총회 현장입니다(KBSI)'를 통해 총회의 다양한 소식, 세계 환경정책 트렌드, 세계 습지와 우리 습지를 소개하고 친환경적으로 사는 삶의 방식을 전국에 방송하고 있다. 방송은 31일까지다. 조고윤기자

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[Embargoed until 8 a.m. CT (9 a.m. ET) Wednesday, October 8, 2008, to coincide with a poster presentation at the Geological Society of America joint meeting in Houston.]

STUDY: TROPICAL WETLANDS HOLD MORE CARBON THAN TEMPERATE MARSHES

COLUMBUS, Ohio – In one of the first comparisons of its kind, researchers have demonstrated that **wetlands** in tropical areas are able to absorb and hold onto about 80 percent more **carbon** than can wetlands in temperate zones.

The scientists extracted soil cores from wetlands in Costa Rica and in Ohio and analyzed the contents of the sediment from the past 40 years. Based on their analysis, they estimated that the tropical wetland accumulated a little over 1 ton of carbon per acre per year, and the temperate wetland accumulated .5 tons of carbon per acre per year.

The temperate Ohio wetland in the study covers almost 140 acres, meaning it sequesters 80 tons of carbon per year. The tropical wetland covers nearly 290 acres and stores 300 tons of carbon each year.

"Finding out how much carbon has accumulated over a specific time period gives us an indication of the average rate of carbon sequestration, telling us how valuable each wetland is as a carbon sink," said [William Mitsch](#), senior author of the study and an [environment and natural resources professor](#) at



(Last updated 10/7/08)

Images are available [here](#) to accompany this story.



New Research Blog Available Here!!

[New Research Blog Available Here!!](#)



Environment Some Marshes Pass Too Much Gas

By **Robert Roy Britt**, LiveScience Managing Editor
posted: 24 September 2008 10:02 am ET

Marshes pass a lot of gas, which adds to the whole global warming problem. One solution: Let them flood, a new study suggests.

The idea is pretty simple. Both nature and humans create greenhouse gases. Humans do it when they burn carbon-based stuff. One aspect to nature's contribution involves bacteria in wetlands that produce **methane** while munching on organic meals. Methane is the major component of natural gas, and it's also a **greenhouse gas** that acts like a blanket to keep solar radiation trapped inside the atmosphere.

Wetlands can be thought of as the kidneys of the environment, absorbing chemicals and gunk and its kidneys, either with floods, tides or occasional **catastrophic storms** such as hurricanes. Nature likes to flush humans sometimes work to prevent all that with levees, sea walls, dams and floodgates, but that means the kidneys can get a little backed up. When that happens, more methane is released from the deep water in a wetlands area, the researchers found.

In tests, pulsing water through wetlands cut down on methane emissions.

"Our point is that the healthiest systems and the ones with the lowest emissions of greenhouse gases are those that have these pulses and that are able to adapt to the pulses," Mitsch said.

The research, announced this week, was published in a recent issue of the journal *Wetlands*.

The study examined methane emissions over a two-year period. The researchers created two different kinds of conditions in two 2.5-acre experimental wetlands. In 2004, they used pumps to deliver monthly pulses to create conditions in the wetlands resembling natural marshes flooded with river water. In 2005, they pumped roughly the same amount of water but maintained a more artificial, constant flow with no pulses.

Methane is composed of carbon and hydrogen, and its emissions are expressed in terms of the amount of carbon released into the atmosphere. Methane emissions were measured approximately twice monthly over the two study years. In the areas where no pulsing was done, the methane emissions were double compared to the pulsed areas.

Three Gorges Dam Area Farmers Should Avoid Fertilizer (Update1)

Email | Print | A A A

By Randall Hackley and Gareth Gore

Oct. 28 (Bloomberg) -- Chinese farmers should stop using fertilizer during the flood season and fishermen experiment with fish-net systems to mitigate damage from the Three Gorges Dam.

Ohio State University researchers say if farmers in the flooded area that extends 410 miles (660 kilometers) behind the dam longer than the U.S.'s Lake Superior, don't avoid fertilizers, the water will become excessively nutritious and cause algae blooms in standing water covering fields along the Yangtze River.

Harnessing the Yangtze's energy has been a longstanding dream of the Chinese, originally envisioned by Sun Yat-sen almost 90 years ago. But since construction began on the dam in 1994, and power generation started in 2003, the project has been fraught with warnings from scientists of a burgeoning environmental nightmare.

The Three Gorges Dam, set to become the world's biggest hydroelectric power station when fully operational by 2012, has already forced about 1.5 million people to relocate. Damming Asia's longest river has led as well to the extinction of the Yangtze river dolphin as scientists foresee further ecological fallout.

"Nature is going to see something it's never seen before," said William Mitsch, an Ohio State University wetlands expert and natural resources professor. "There is no ecosystem that has such an exaggerated change in flooding levels, even the Amazon River."

Ecological Engineering

The scientist proposed altering farming methods and fishing practices to prevent further environmental damage to the region in an Oct. 24 letter co-written with four colleagues from Ohio State and China to the journal Science, which published an Aug. 1 report detailing the environmental dangers.

"If done properly, ecological engineering can minimize some of the impact," Mitsch wrote.

The reservoir floods a 244-square-mile (632 square kilometers) area, half that of Itaipu Dam on the Brazil-Paraguay border. If fully operational now, China's milestone project would provide 22,500 megawatts of power generation, about 3 percent of the nation's total consumption.

Three Gorges was designed foremost to control floods on the Yangtze. An overflow in 1954 killed more than 33,000 people and forced 18 million to move. The deluge covered Wuhan, then a city of 8 million residents, for more than three months.

NATGEO NEWS WATCH

NEWS EDITOR DAVID BRAUN'S EYE ON THE WORLD

Flooding May Offset Three Gorges Dam Impact on Environment, Expert Says

WETLANDS EXPERT: CHINA SHOULD THINK OUTSIDE THE FLOODING BOX WITH THREE GORGES DAM

COLUMBUS, Ohio – China's farmers and merchants should take advantage of new agricultural and business opportunities that could help mitigate some effects of the annual flooding behind the Three Gorges Dam on the Yangtze River, according to an Ohio State University wetland expert.

The level of water in the reservoir behind the dam will top off at 575 feet above sea level during the coming winter. The reservoir pool, covering abandoned cities, houses and farm fields formerly populated by an estimated 1.5 million people, will extend over 400 square miles – equivalent to the land area of Hong Kong. Then by summer the water level will drop 100 feet, and the cycle of flooding and receding water will repeat every year after that.

The region will become home to an entirely new ecosystem as an unprecedented amount of water covers what used to be dry land.

The Three Gorges Dam is the largest hydro-electric project in the world, intended to combine the generation of clean power with downstream flood control, and enable shipping in China's interior. Critics are concerned that the reservoir will contain factory toxins and raw sewage and that sediment might cause the reservoir level to rise higher than planned, threatening to flood a large city upstream and possibly even send water spilling over the top of the dam.



William Mitsch

The Times-Picayune • Subscribe Today's Paper & More

EDITORIAL: On our team

Tuesday, January 08, 2008

Louisianians understand how vital wetlands are: They serve as a buffer against storm surge and are nurseries for marine life and habitat for waterfowl. The loss of coastal wetlands is a crisis for this state.

But Louisiana's environmental well-being also depends on wetlands far outside its boundaries -- in the Midwestern farm states where they can act as filters to prevent nutrient pollution from entering the Mississippi River and eventually the Gulf of Mexico. Those nutrients, which come mainly from nitrogen-based fertilizer, are the cause of another environmental crisis for Louisiana, the huge dead zone that forms off the coast every summer.

Louisiana State and Ohio State universities have been working together since 2003 to reduce nutrient pollution, and that kind of partnership is important in addressing this multi-state issue.

"You have this problem in the Gulf of Mexico, and we're the cause of it," said William Mitsch, a professor of environment and natural resources who leads the Ohio State research team.

He's right, and it will take the efforts of states like Ohio and others to reduce the nitrogen load in the river and shrink the dead zone. Despite a 2001 agreement to do exactly that, billions of excess pounds of nitrogen continue to come down the river and fuel the massive algae blooms that suck oxygen out of the water when they die and decompose. The dead zone last year was one of the largest on record, 8,000 square miles.

Ohio State built model wetlands to show farmers how they could do the same. But the boom in ethanol production has made farmers more eager to plant corn than to create wetlands. "We've kind of gone backwards," Mr. Mitsch said.

The voluntary measures called for in the reduction plan aren't working, and the state and federal task force that oversees the agreement clearly needs to take a more aggressive approach.

When it comes to understanding the problem, though, Louisiana is not alone. Researchers like those at Ohio State who are working on ways to address the dead zone are important allies.

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AB • THE COLUMBUS DISPATCH | Opinion | SATURDAY, JULY 12, 2008

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EDITORIALS

Short takes

• **OHIO STATE** University's little wetlands project continues to win big recognition, a credit to the university and to Bill Mitsch, the OSU professor who created it.

The Wilma H. Schiermeier Olen tangy River Wetland Research Park, 50 acres of biological and habitat diversity in the middle of the city, has been designated a Wetland of International Importance. A complex of several wetlands, it's the first such site in Ohio and only the 24th in the United States.

The international Ramsar Convention on Wetlands, based in Switzerland, usually reserves the designation for larger and better-known locations, such as Everglades National Park in Florida and the Chesapeake Bay Estuarine Complex. The group's recognition of the Olen tangy tract is a tribute to the impact the project has had on wetlands research.

Since its construction between 1992 and 1994, more than 60 graduate and undergraduate students have studied at the site and published dissertations and theses. At least 12 alumni are conducting research around the world, and a waiting list holds names of professionals who want to spend sabbaticals there.

The wetlands' urban location also means thousands of people every year learn more about wetlands by visiting the park.

Mitsch's project also proves that, with care and proper science, high-quality wetlands can be created where natural wetlands have been destroyed. In a state that has lost more than 90 percent of its original wetlands, that's important. Saving natural wetlands from development is a priority, but the extent of their destruction in Ohio means that reconstruction is essential to regain their benefits, including healthier lakes, rivers and groundwater, natural flood control and more-abundant wildlife. OSU, at the Olen tangy wetlands, is leading the way.

The Columbus Dispatch

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SATURDAY, DECEMBER 6, 2007

Dam demolition will leave river smaller, cleaner

By Mark Forenchik
THE COLUMBUS DISPATCH

The 5th Avenue dam on the Olen tangy River is coming down.

The question is when. After months of hand-wringing and prodding from Columbus Mayor Michael B. Coleman, city utilities officials have decided to remove the dam just south of the Ohio State University campus. That will help clean the water on that section of the river and open a larger stretch for canoeists and kayakers, they said.

Public Utilities Director Tayana Arsh made the decision, utilities spokesman Rick Tilton said.

"She just weighed everything in front of her. She takes time to think about things. She doesn't make rash decisions," Tilton said.

Tilton said the city continues to look for more money to pay for potential cleanup costs should tests reveal toxins and other environmental hazards after the river narrows and its banks are exposed. Those costs were a sticking point for the city.

There's no timetable for demolition, Tilton said.

There's a state deadline of September 2008, although there's some wiggle room, said Mike Callaway, surface water manager for the Ohio Environmental Protection Agency's central district.

Olen tangy work will cost city \$640,000

The U.S. Army Corps of Engineers is willing to pay \$1.18 million of the projected \$1.82 million demolition cost. The city would pay the remaining \$640,000, which is what the city owes in fines for sewer overflows into rivers. The city would have to pay those fines unless it decides to use that money for the demolition.

Heather Dean of the Friends of the Lower Olen tangy Watershed said the city's decision means a cleaner river. With the dam removed, the water will flow naturally, and sediments, sewage and other pollutants won't remain trapped behind the dam and foul the water as they do now.

That section of the river is the most polluted, said Jeff Zylland, an environmental planner for the Corps of Engineers. Cleaner water will help fish, mussel and dragonfly populations, he said.

Once the water recedes, it won't look pretty at first, Dean said. There will probably be a lot of junk and trash left on the banks.

"There are going to be mud flats, and you'll probably be pulling out shopping carts," said Bill Mitsch, an Ohio State professor of environment and natural resources. "The river will be trying to sort out where it should flow."

Plans call for crews to seed the banks with grass and plant small vegetation while removing invasive plants such as honeysuckle, Zylland said.

But vegetation will sprout over time, perhaps cottonwood or willow trees, Mitsch said.

"I see people's urgency to plant," Mitsch said, "but Mother Nature may do a better job."

"After five or six years, people will say, 'That's pretty.'"

But while it still will be navigable for canoeists, it will be narrower, he said.

"Where's the river? That's the reaction we'll get," Mitsch said. But the Olen tangy, in its free-flowing state, is just a big creek, he said.

The dam was built in 1935 to supply cooling water to an OSU power plant. It was raised to its current height of 8 feet in 1964.

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中外专家到开县考察湿地生态系统

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雷宝山、溇溪河列为重点考察区



本报讯 (记者 刘康 肖燕妮) 6月20日至22日, 华东师范大学、重庆大学、重庆师范大学、重庆大学资源及环境科学学院和美国俄亥俄州立大学的相关专家奔赴开县, 对雷宝山和溇溪河自然保护区湿地生态系统进行科学考察。

雷宝山自然保护区位于开县北部山区, 大巴山南坡, 是北亚热带地区的典型代表区域, 是国家林业局2002年批准的国家级森林公园, 总面积18408公顷。

考察团由国际湿地保护联盟执行主席、美国俄亥俄州立大学教授威廉·米奇博士及其夫人美国俄亥俄州立大学博士、美国《生态工程》杂志主编露丝玛丽·米奇女士、美国俄亥俄沙砾公园总裁比尔·哈佛乐、美国俄亥俄州立大学博士、美国湿地研究中心副主任张女士和中国湿地著名专家、华东师范大学终身教授、全国政协委员陆健健博士、重庆大学三峡库区生态环境教育部重点实验室教授、博士生导师袁中博士及博士生等代表共16人组成。

考察期间, 科考人员对雷宝山溇溪河湿地和溇溪河湿地自然保护区的生物多样性进行了实地调查, 并对雷宝山溇溪河湿地的保护、开发和利用以及溇溪河湿地的生态修复工程提出建议。

威廉·米奇博士动情地说, 开县有美好的生态环境, 雷宝山溇溪河湿地和溇溪河湿地是开县人民的财富, 这些湿地将提供很好的植物天然种源, 丰富动物、植物的多样性。在谈到对湿地的建设时, 威廉·米奇强调, 以自然为母, 时间为父, 相信大自然比人类更聪明, 利用自然力对湿地系统进行修复, 给大自然以时间, 还原美好的湿地生态系统。在建设过程中尽量减少人为的规划设计, 主张无为而治。在考察了溇溪河湿地后, 威廉·米奇博士对溇溪河夏季泄洪, 冬季蓄水的水文变化产生了极大兴趣。他认为, 溇溪河湿地生态系统是可行的、科学的, 也必将会引起国际社会的广泛关注。溇溪河湿地生态系统具备了把生态服务功能建设得更好的条件, 对它的开发利用可以和农业生产结合起来。夏天枯水期, 可以在部分湿地保护区栽种粮食作物, 只是不要施肥、用农药, 希望最大限度地发挥好溇溪河湿地生态系统的服务功能。

The Lantern - Olentangy Olga helps honor World Wetlands Day 02/06/2008 08:15 AM

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Olentangy Olga helps honor World Wetlands Day

By: Diana Link
Posted: 2/4/08

Move over Punxsutawney Phil, here comes Olentangy Olga.

Olentangy Olga, a muskrat that lives in Ohio State's Olentangy River Wetland Research Park, was the belle of the ball Saturday morning at the park's first World Wetlands Day celebration.



Wetland Research Park Director William Mitsch said he came up with the idea of honoring Olentangy Olga to celebrate World Wetlands Day as an alternative to Groundhog Day, because both holidays fall on Feb. 2. Mitsch said he is dissatisfied with the amount of awareness for World Wetlands Day in the U.S. "I celebrated last year in Botswana, Africa," he said. "The entire Botswana press covered it, I go back to the U.S., and they don't even have a clue."

Ohio State president Gordon Gee helps unveil a picture of the muskrat, Olentangy Olga, OSU's version of Punxsutawney Phil at the Schiermeier Olentangy River Wetland Research Park Saturday morning to commemorate Groundhog Day and World Wetlands Day.

Unfortunately, Olga was in a shy mood and guests of the park did not get a chance to see her Saturday morning.

According to the park's Web site, the swamp is located on an approximately 30-acre site on West Dordridge Street, with two pumps bringing continuously flowing water in from the Olentangy River. The water then flows back into the river by the natural force of gravity. Wetlands are shrinking in size and number across the country, and Ohio alone has lost 90 percent of its wetlands, according to the Web site.

OSU President E. Gordon Gee was also on hand to celebrate World Wetlands Day. Gee fondly reminisced about walking through the swamp in his "hip waders" when the park opened 15 years ago. Gee said he understands the importance of wetlands and said "the research we are doing here brings me great pride."

Matt Ripley, a freshman in environmental science and zoology and also the park's site manager, said all the animals who live there came to the park on their own, and none of them are kept in cages.

"It's a good sign when a muskrat decides to live here, it shows the environment is stable enough to support a large animal like that," Ripley said. For those interested in learning about wetlands, the Wetland Research Park offers a number of short courses open to any OSU student. Information about these courses can be

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http://www.thelantern.com/home/index.cfm?event=displayArticlePrimeFriendly&Story_id=8980714-0bae-4573-948b-d0652b917cb9



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OHIO STATE HOME PAGE

(Last updated 9/23/08)

New Research Blog Available Here!!

Previous stories pertaining to Professor Mitsch's research:

- "Man-Made Wetland's Effectiveness Similar To Natural Marsh," 3/7/05.
- "Bringing Eden Back: Professor Helps In Effort To Restore One's Mesopotamian Marshlands," 12/16/04.
- "Ohio State Wetlands Professor Wins Prestigious Water Prize," 3/12/04.

FLOODING MIGHT HELP LOWER GAS EMISSION FROM WETLANDS

COLUMBUS, Ohio - River floods and storms that send water surging through swamps and marshes near rivers and coastal areas might cut in half the average greenhouse gas emissions from those affected wetlands, according to recent research at Ohio State University.

A study suggests that pulses of water through wetlands result in lower average emissions of greenhouse gases over the course of the year compared to the emissions from wetlands that receive a steady flow of water.

The study compared the emission of methane from wetlands under two different conditions, one with a pulsing hydrology system designed to resemble river flooding and one with a steady, low flow of water. The research showed that in areas of deeper water within the wetlands, methane gas fluxes were about twice as high in steady-flow systems than they were in pulsing systems. Methane emissions from edge zones, which are sometimes dry, were less affected by the different types of conditions.

Methane is the major component of natural gas and is a greenhouse gas associated with global warming. While the Environmental Protection Agency estimates that human activities are responsible for about 60 percent of methane emissions

William Mitsch

Wilma H. Schiermeier Olentangy River Wetland Research Park

Heffner Wetland Research and Education Building
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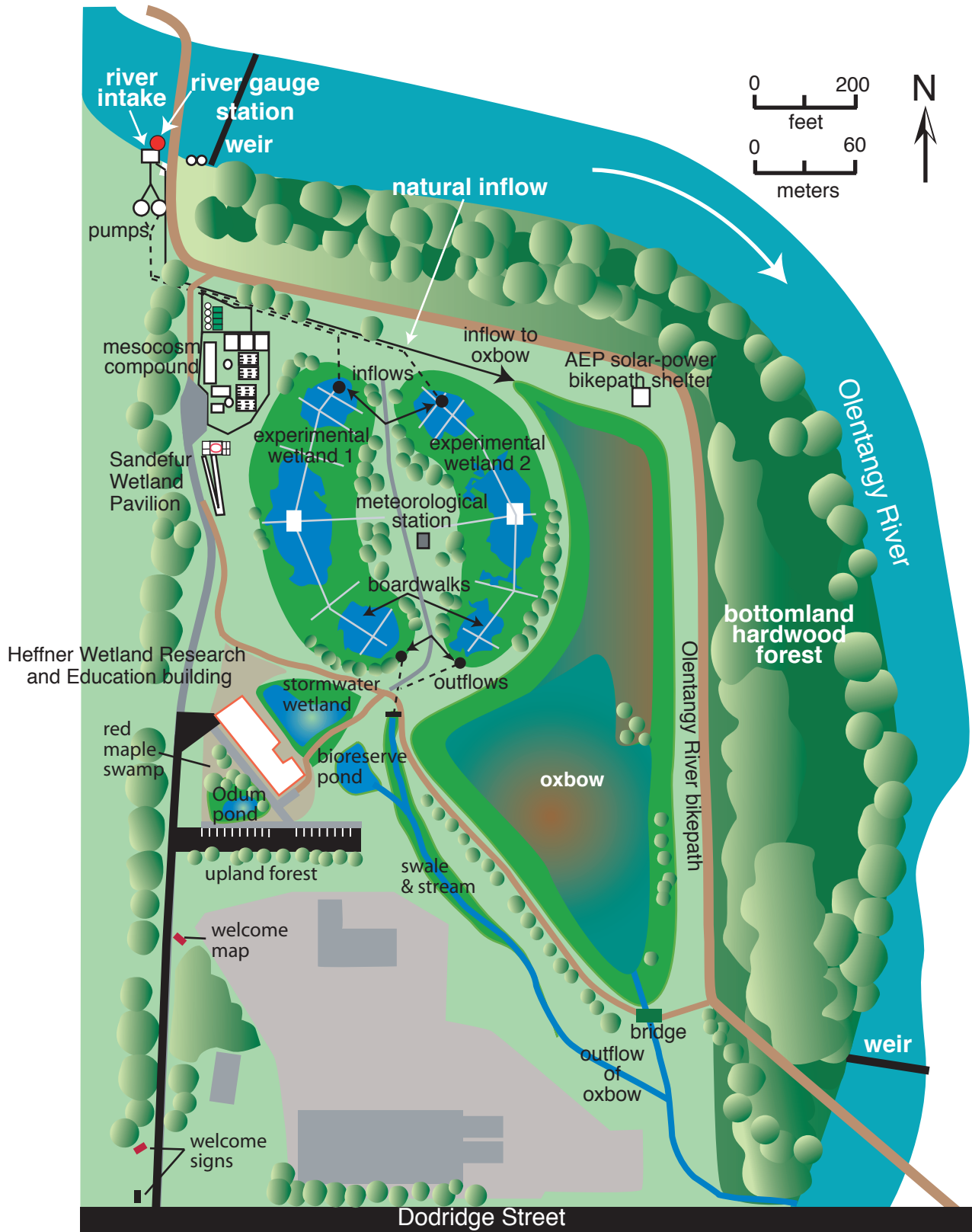
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