



December, 2007



## Annual Report



**Center for Earth and Environmental Science  
Indiana University – Purdue University Indianapolis**



2007 Annual Report

CEES Publication 2007-99

## **2007 Annual Report**

### **IUPUI Center for Earth and Environmental Science**

#### **CEES Mission and Strategic Planning Initiatives**

Planning sessions with the CEES Community Advisory board during 2006 and 2007 resulted in a new strategic plan and revised mission for CEES. Further enhancing the strategic planning of CEES was the 2007 designation of CEES as a Signature Center at IUPUI. This designation brings new resources and additional focus to efforts to enhance water resources programs at CEES and build critical bridges between water resource research and human health. Our community partnerships, especially the long-term research and development program with Veolia Water Indianapolis, LLC., form the foundation from which these water resource research programs at CEES emerge.

The CEES mission is to provide applied interdisciplinary environmental solutions to translate research into action while promoting environmental stewardship through education and public service programs. Applied research is important in bringing solutions to critical problems and gives CEES its uniqueness. CEES' vision is to grow into an international leader providing environmental solutions to water resource issues both existing and emerging.

In order to maximize the efficient use of resources, CEES will pursue four strategic objectives in a manner that will further the universities goals of pursuing excellence in 1) research, scholarship and creative activity, 2) teaching and learning, and 3) civic engagement while also enhancing the resource base of the university.

*High priority* - The Center intends to place the highest priority on four strategic initiatives:

1. The Center will engage in cutting-edge research and training for mixed agricultural and urban watersheds
2. Evaluate and assess watershed Best Management Practices targeting atrazine, nutrients and emerging contaminants and pathogens
3. Establish a K-12 technology based science education program in water, air and energy
4. Work with state agencies on identifying watershed issues associated with Major Moves and other economic development initiatives, standards to be applied and training needs

*Medium priority* - The Center intends to make steady progress on the following four strategic initiatives:

1. Develop applied comparative research on sustainable integrated water resource management
2. Build partnerships with local and state government to support EPA collaborative watershed model and other federal models
3. Facilitate regional dialog to integrate stream and wetland mitigation efforts
4. Bridge a gap that exists between water resources and human health.

*Low priority* - The Center views two strategic initiatives as important and worthy of progressing, but at a slower pace than the high and medium priority issues:

1. Work with Indiana biofuels leaders to identify solutions to water resource issues
2. Become a source for longitudinal data on human health effects

*Foundational initiatives* - The Center has three foundational initiatives that are required to be resourced in order to maintain the ongoing credibility of the Center with influence leaders and academia:

1. Host research conferences on water resource management and human health issues
2. Develop CEES Regional Water Quality Monitoring Network and enhance mapping and visualization tools
3. Facilitate regional watershed management in central Indiana

CEES must bring research focus and pursue projects in the following areas in order to move toward the vision:

- Water Resource Evaluation and Watershed Management
- Assessment of Environmental Constituents
- Stream and Wetland Assessment and Restoration
- Environmental Data Management and Visualization
- Science Education and Public Outreach

### **2007 Research Project Activities**

#### ***Publications***

- Rogers, Y., Connelly, K., Tedesco, L., Hazelwood, W., Kurtz, A., Hall, B.E., Hursey, J., and Toscos, T., 2007, Why It's Worth the Hassle: The Value of In-Situ Studies When Designing. UbiComp 2007 In J. Krumm et al. (Eds.) *UbiComp 2007*, LNCS 4717, Springer-Verlag, Berlin Heidelberg, pp. 336–353. doi:10.1027/978-3-540-74853-3. (Nominated for best paper award).
- Vidon, P., Smith, A.P., 2007, Upland controls on the hydrological functioning of riparian zones in glacial till valleys of the Midwest. *Journal of the American Water Resources Association*, vol. 43, no. 6, p. 1524-1539.

#### ***Abstracts***

- Vidon, P., Wagner, L.E., and Gray, M., Impact of Storm Characteristics and Land Use on Nutrient Export in Two Central Indiana Watersheds, American Geophysical Union Annual Meeting, December, 2007.
- Johnstone, J., Vidon, P., Tedesco, L.P., and Gray, M., Nitrogen, 2007, Phosphorus and Carbon Loss Dynamics Monitoring Across Scale in Midwestern Streams: A Research Proposal, Geological Society of America, Vol. 39, No. 6.
- Vallely, L.A., Wilson J.S., Tedesco, L.P., Pascual, D.L., Randolph K.L., Li L., and Cigana J., Remote Sensing of Blue-Green Algae for Water Quality Management, Great Midwestern Regional Space Grant Consortia Conference, September, 2007.
- Hack, E., Tedesco, L.P., Pascual, D.L., Hall, B.E., and Ulmer, J., The Use of Benchmarks as a Tool for Watershed Planning and Implementation Strategies, Indiana Rivers Rally, June, 2007.
- Webber, J.J., Barr, R.C., Hall, B.E., and Tedesco, L.P., Using High Resolution Digital Surface Models to Evaluate and Manage the Impact of Urbanization on Primary Headwater Streams and Isolated Wetlands, 21st Biennial Workshop on Aerial Photography, Videography, and High Resolution Digital Imagery for Resource Assessment, May, 2007.
- Tedesco, L.P., Randolph, K., Pascual, D.L., Li, L., Wilson, J., and Willans, A., Hyperspectral Remote Sensing of Water Quality: A Rapid Assessment Tool for Mapping Blue-green Algae in Inland Water, Indiana Geographic Information Science Annual Meeting, March, 2007.

Tedesco, L.P., Randolph, K., Pascual, D.L., Li, L., Wilson, J., and Willans, A., Blue-green Algae in Midwestern Reservoirs: Tools for Management and Understanding, Indiana Lake Management Society Annual Meeting, March, 2007.

Tedesco, L.P., Vidon, P., Pascual, D.L., Campbell, M.A., L.R. Casey, L.R., Wilson, J., and Gray, M., The effects of small land use changes of stream water quality in mixed agricultural/urban watersheds: Eagle Creek Watershed, Central Indiana

### ***Invited Talks and Tours***

“Blue-green Algae and Their Toxins: The Midwest Experience”, Interagency Working Group –IDEM and IDNR, Indianapolis, September, 2007.

“The Central Indiana Water Resources Partnership: Working Towards Sustainable Water Resources in Central Indiana for Four Years”, Veolia Water Citizen’s Advisory Group, Indianapolis, August, 2007.

“Water Resources Research and the Central Indiana Water Resources Partnership”, Veolia Water Technical Direction Annual Meeting, Indianapolis, June, 2007.

“Eagle Creek Watershed Tour”, Purdue University Faculty, Hendricks, Boone, and Marion Counties, May, 2007.

“The Lilly ARBOR Project: An Experiment in Urban Riparian Restoration”, Hoosier Heartland RC&D Vegetative Options for Storm Water Management, Indianapolis, April, 2007.

“Towards Sustainable Water Resources for Mixed Agricultural and Urban Watersheds”, Marion County Soil and Water Conservation District Annual Meeting, Indianapolis, February, 2007.

“Drainage Basin Evolution and Natural Area Preservation: A Study from the Ritchey Woods Natural Area, Hamilton County, Indiana”, Indiana Land Protection Alliance, Indianapolis, February, 2007.

### ***Research Grants***

Mapping Aquatic Vegetation with Hyperspectral Remote Sensing Imagery

L.P. Tedesco, J. Wilson and L. Li

Indiana Department of Natural Resources, Lake and River Enhancement Program

7/07-12/08 \$49,995.00

Mitigation of Contaminants in Rural and Semi-Rural Environments to Protect Surface and Groundwater (Aquisafe 07)

KompetenzZentrum Wasser Berlin

L.P. Tedesco, Y. Moreau-Le Golvan (KWB); G. Grutzmacher (KWB); and E. Soyeux (Veolia)

7/07-3/09 \$265,608.00

Empirical and Bio-optical Modeling of Hyperspectral Reflectance for Improved Mapping of Water Quality Parameters in Central Indiana Reservoirs

L. Li, L. Tedesco, J. Wilson

Veolia Water Indianapolis

4/07-6/08 \$33,218 + analyses

Contaminant Transport Dynamics During Storms in Medium to Large River Systems of the Midwest

P. Vidon and L.P. Tedesco

Veolia Water Indianapolis

4/07-9/08 \$175,247

Watershed-Scale Evaluation of BMP Effectiveness and Acceptability: Eagle Creek Watershed, Indiana

L.P. Tedesco, J. Wilson, Co-PIs with R. Turco, Purdue University

US Department of Agriculture

7/06-7/09 \$650,000 (\$218,580 to IUPUI)

Quantifying Blue-Green Algae of Central Indiana Reservoirs Using Hyperspectral Reflectance

L. P. Tedesco and L. Li

Veolia Water Indianapolis

3/06-3/07 \$147,788.00

Eagle Creek Watershed Alliance: Phase I Watershed BMP Implementation, Education, and Public Outreach.

EPA 319 Grant Program/ Indiana Department of Environmental Management

3/2006-3/2009 \$522,911.00 (\$343,254 grant dollars to IUPUI)

### **2007 Science Education and Public Outreach Activities**

#### ***Publications***

Salazar, K.A., 2007, Leveraging Community Partnerships for Watershed Research and Education: Universities – Gateways to Education. River Voices, vol. 17, #3 & 4, p. 32-33.

#### ***Abstracts***

Bauer-Armstrong, C., Moore, P., Gartner, T., Salazar, K.A., Guhr, B., Creating a National Network of K-12 Professional Development Providers for Schoolyard Greening, 36th Annual Meeting North American Association for Environmental Education, Virginia Beach, Virginia, October 2007.

Tedesco, L.P., Salazar, K.A., Baker, M.P., Connelly, K., Furge, B. A., Integrating Technology and the Environment to Inspire Future Scientists, 36th Annual Meeting North American Association for Environmental Education, Virginia Beach, Virginia, October 2007.

#### ***Hosted Conferences and Workshops***

Discovering the Science of the Environment Teacher Professional Development Institute, Indianapolis, June, 2007.

#### ***Invited Talks and Tours***

“Towards Sustainable Water Resources for Central Indiana: Watershed Management and Wetland Restoration”, Central Indiana Land Trust, Inc Annual Land Stewards Appreciation Dinner, Indianapolis, November, 2007.

“Lilly ARBOR Project Tour”, 14<sup>th</sup> Annual INPAWS Meeting, Indianapolis, November, 2007.

“Towards Sustainable Water Resources for Central Indiana”. Hendricks County Master Gardeners Annual Meeting, Danville, IN, October, 2007.

- “Discovering the Science of the Environment”, Storm Water Solutions in an Educational Setting Workshop, Brownsburg, IN, August, 2007.
- “Environmental Service Learning: The CEES and Indy Parks and Recreation Partnership”, Indy Parks and Recreation Land Stewardship and Environmental Education Meeting, Indianapolis, July, 2007.
- “The Lilly ARBOR Project: An Experiment in Urban Riparian Restoration”, Association of Central Indiana Garden Clubs, Indianapolis, May, 2007.
- “Scott Starling Nature Sanctuary Wetland Tour”, Land Trust Alliance Conference, Indianapolis, April, 2007.
- “Discovering the Science of the Environment”, Riverside Intermediate School In-Service Presentation, Fishers, IN, April, 2007.
- “Towards Sustainable Water Resources for Central Indiana: Watershed Management and Wetland Restoration”, Indiana Master Naturalist Program, Avon, IN, March, 2007.

### ***Environmental Service Learning***

The CEES Environmental Service Learning program engages IUPUI undergraduate students, university-wide, in interdisciplinary environmental stewardship field days at local natural areas with community partners. The CEES Environmental Service Learning program received honorary membership in the Indianapolis Clean Stream Team in February, 2007 for work organizing volunteers to mark storm drains and for assistance with the White River Cleanup.

### **Spring and Fall 2007 Service Learning Tracking:**

- 15 Projects
- 473 Students
- 7 Project Partners
- 10 Courses
- 24 Sections
- 5 Departments
- 5 Schools
- 2 Universities

### ***Discovering the Science of the Environment Program***

The new Discovering the Science of the Environment program is an experiential, inquiry-based, outdoor laboratory focused science education program for 4<sup>th</sup>-9<sup>th</sup> grade classes in central Indiana. Utilizing a mobile resource trailer equipped with interactive technology tools, web interface, and GIS mapping capabilities, the DSE program travels to area schools to provide free educational programming at school ground natural areas. With the addition of new CEES staff, Education Specialist Brooke Furge, in March 2007 DSE has moved from planning to full implementation. Field programming with the mobile resource trailer began during the Fall 2007. It is anticipated that the program will reach over 2000 students annually.

**Fall 2007 Discovering the Science of the Environment Program Tracking:**

- 4 schools
- 8 teachers
- 6 programs
- 635 students

***Education Outreach Events***

Senator Evan Bayh Service Leader Summit, October, 2007

National FFA Convention Career Success Tours, October, 2007

Eagle Creek Watershed Alliance Water Festival, Indianapolis, October, 2007

Dow AgroScience Blue Planet Run, August, 2007

Civic Engagement Showcase, April, 2007

Earth Day Indiana, Indianapolis, April, 2007

Keep Indianapolis Beautiful Spring Garden Clinic, February, 2007

Hoosier Association of Science Teachers, February, 2007

Indiana Lifescience Initiative Day at the Indiana Statehouse, February, 2007

***Education and Teaching Grants***

Discovering the Science of the Environment

Nina Mason Pulliam Charitable Trust

7/06-7/08                      \$170,000.00

Discovering the Science of the Environment

Veolia Water Indianapolis, Dow AgroSciences, Eli Lilly and Co. Foundation, Duke Energy Foundation, Indianapolis Power & Light, Hoover Family Foundation, Noyes Foundation

7/06-12/08                      \$345,500.00

**Awards and Recognitions**

Nominee, US Professors of the Year Awards Program, Tedesco

**Advisory Boards and Committees*****Professional***

Laura Hare Charitable Trust, Trustee, 2006 – present, Tedesco

Eagle Creek Watershed Alliance, Education Committee, 2006-present, Salazar

Indiana Water Resource Research Center, Board of Directors, 2004 – present, Tedesco

Indianapolis Clean Stream Team Advisory Board, 2007 – present, Tedesco

City of Indianapolis Indy Greenprint Commission, Commissioner, 2007 – present, Tedesco

Town of Fishers, Department of Parks, Ritchey Woods Nature Preserve Advisory Council, 2007 – present, Tedesco

WFYI, Indiana Natural Heritage Advisory Board, 2007 – present, Tedesco

City of Indianapolis, Clean Stream Team Advisory Board, 2007 – present, Tedesco

Indianapolis Tree Board, 2006-present, Barr

Science Education Foundation of Indiana, Board of Directors, 2005 – present, Tedesco  
Society of Wetland Science, North-Central Chapter, Program Committee, 2006-2007, Tedesco  
State of Indiana Water Pollution Control Board, Department of Environmental Management, Wetland  
Science Advisory Group, 2004 – present, Tedesco  
State of Indiana Solid Waste Management Board, Gubernatorial Appointee , 2003-present,  
Tedesco  
Upper White River Watershed Alliance, Board of Directors, 2004 – 2006, Tedesco, 2007-present, Barr  
Upper White River Watershed Alliance, President, 2006, 2007  
Veolia Water Indianapolis Technical Advisory Board, 2003 – present, Tedesco

### ***University***

Campus Recycling Committee, 2003-present, Salazar  
Campus Sustainability Initiative Steering Committee, Chair, 2005 – present, Tedesco  
Campus Sustainability Initiative Steering Committee Member, 2005-present, Hall, Salazar  
Council on Civic Engagement, 2004 - 2007, Tedesco  
University Centers Advisory Committee, 2002 – 2007

### ***School***

Bachelor's of Science in Environmental Science, Program Director, 2006- present, Tedesco  
Center for Research and Learning, Board of Directors, 2004 – present, Tedesco  
Strategic Planning Administrative Committee, 2007, Tedesco  
Technology Committee, 1993 – present, Tedesco, Hall

### ***Community***

City of Indianapolis Indy Greenprint Commission, Commissioner, 2007 – present, Tedesco  
Laura Hare Charitable Trust, Trustee, 2006 – present, Tedesco  
Rotary Club of Indianapolis, Environment and Beautification Committee, co-chair, 2002 – 2007, Tedesco  
Town of Fishers, Department of Parks, Ritchey Woods Nature Preserve Advisory Council, 2007 – present,  
Tedesco  
WFYI, Indiana Natural Heritage Advisory Board, 2007 – present, Tedesco

### **Student Activities**

#### ***Scholarship Awards***

Ryan M. Mullins, B.S., Environmental Science, Carl H. Johnson Achievement Scholarship

Jeffrey M. Abshire, B.S., Environmental Science, Central Indiana Technical and Environmental  
Societies Scholarship



### ***Affiliated Graduate Students***

Kate Randolph

Research Focus: Remote sensing for water quality. Mapping the concentration and distribution of blue-green algae as tools for improved, efficient water quality management.

Advisor, Dr. Jeff Wilson

Leda Casey

Watershed hydrology and the fate and transport of contaminants. The effects of land cover and land use on water quality and nutrient loading to streams, lakes, and reservoirs.

Advisor, Dr. Lenore Tedesco

Laura Wagner

Nutrient specific flow paths during spring and summer storm events in Eagle Creek Watershed, central Indiana.

Advisor, Dr. Philippe Vidon

M. Abby Campbell

Research Focus: Nutrient and sediment loading of streams under the influence of land use change in Eagle Creek Watershed, Indianapolis, Indiana.

Advisor,

Dustin Graves

Research Focus: Water quality related to hydrology and sedimentology. Comparison of water chemistry of source water and evolved water in fens.

Advisor, Dr. Lenore Tedesco

Rebecca E. Sengpiel

Research Focus: Remote sensing for monitoring the distribution of blue-green algae.

Advisor, Dr. Lin Li

### ***Student Interns and Employees***

April Herman, BS, Geology - *Funding by Sam H. Jones Community Service Scholarship Program*  
as Service Learning Assistant

Henry Marr, BS, Computer Science

W. Ryan McAtee, BS, General Studies

Shruthi Munsunuri, BS, Engineering

Brad Woolems, BS, Public Affairs - *Funding by Sam H. Jones Community Service Scholarship Program*  
as Service Learning Assistant

## **Appendices**

CEES Advisory Board and Staff

CEES Researchers - Affiliated Faculty and Staff

Community Partners in Research and Education

CEES Financials Report



# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Dr. Lenore P. Tedesco

Director, Center for Earth and Environmental Science / Associate Professor, Department of Earth Sciences  
*Stream and Wetland Ecosystem Restoration, Water Resources, Environmental Education, Sedimentology,*  
*ltedesco@iupui.edu*

## Community Advisory Board

### Susan Cornacchione

Major Gifts Officer  
American Cancer Society  
*Susan.Cornacchione@cancer.org*

### Vince Griffin

Director, Environmental & Energy Policy  
Indiana Chamber of Commerce  
*vgriffin@indianachamber.com*

### Tim Hewitt

Chief Strategy Officer  
Veolia Water North America  
*tim.hewitt@veoliawaterna.com*

### Lori Kaplan

Business Development  
JF New  
*lkaplan@jfnew.com*

### Neil B. Myers

Principal  
Williams Creek Consulting, Inc.  
*nmyers@williams creek.net*

### Barbara Simpson

Citizen Volunteer  
*barbsimp@comcast.net*

### Ellen E. Tobias

Executive Director  
Elanco Manufacturing  
Eli Lilly and Company  
*tobiasee@lilly.com*

### John Wilkins

Retired Manager, Environmental Affairs  
Eli Lilly and Company  
*jw6222@earthlink.net*

## Staff

### Robert Barr

Research Scientist  
*Hydrology, Fluvial Geomorphology, Wetland Science*  
*rbarr@iupui.edu*

### Brooke Furge

Education Specialist  
*Environmental and Outdoor Education*  
*bfurge@iupui.edu*

### Eileen Hack

Research Project Coordinator  
*Watershed Management, Aquatic Ecosystem*  
*Monitoring and Restoration,*  
*Pathogens and Emerging Contaminants*  
*hacke@iupui.edu*

### Bob E. Hall

Systems Engineer  
*Wetland Restoration, Water Quality Monitoring, GIS,*  
*Remote Sensing, Technology*  
*bhall@iupui.edu*

### Denise Lani Pascual

Research Scientist  
*Reservoir Limnology, Phytoplankton Ecology,*  
*Nuisance Blue-Green Algae*  
*dpascual@iupui.edu*

### Kara Salazar

Education Outreach Coordinator  
*Environmental Service Learning, Environmental*  
*Science Education, Ecosystem Restoration*  
*salazark@iupui.edu*

## Center for Earth and Environmental Science

### Dr. Lenore P. Tedesco, Director

Indiana University-Purdue University Indianapolis  
723 West Michigan Street, Room SL118, Indianapolis, IN 46202-5132  
(317) 274-7154 Fax (317) 274-7966

E-Mail: [cees@iupui.edu](mailto:cees@iupui.edu) Web Site: [www.cees.iupui.edu](http://www.cees.iupui.edu)





# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise

### **Dr. M. Pauline Baker**

*Associate Professor, School of Informatics and Computer Science Department, IUPUI*

*Director of the Visualization and Interactive Spaces Lab, IU*

*Information Technology, Computer Graphics, Visualization, Human-Computer Interaction*

Ph.D., University of Illinois, 1990

M.S., Syracuse University, 1977

B.A., Cornell University, 1974

Research focus is on the use of advanced computer-graphics and user interaction methods for creating hardware and software environments for data exploration and for learning. Dr. Baker has particular interest in using ubiquitous computing technologies (sensors, mobile devices, etc.) to design learning environments suitable for informal education venues such as museums and discovery centers.

### **Robert Barr**

*Research Scientist*

*Center for Earth and Environmental Science, IUPUI*

*Hydrology, Fluvial Geomorphology, Wetland Science, Ecosystem Naturalization*

B.A., IUPUI, 2002

B.A., IUPUI, 1991

Develop, implement, and coordinate hydrologic analysis of aquatic ecosystems, with particular emphasis on the physical hydrology of streams and wetlands and the systems analysis of watersheds. Outreach activities include conducting continuing education workshops for environmental science professionals and community members. Teach or coteach courses in stream and wetland ecosystems for graduate and undergraduate students. Primary research interests are stream and riparian corridor naturalization in the glaciated Midwestern United States and the hydrologic linkages between depressional wetlands and primary headwater streams.

### **Dr. William Blomquist**

*Associate Professor of Political Science, Management, and Institutions, IUPUI*

*Adjunct Associate Professor of Public and Environmental Affairs, Water Resources Policy, IUPUI*

*Water Resources, Watershed Management*

Ph.D., Indiana University, 1987

M.A., Ohio University, 1979

B.S., Ohio University, 1978

Research focuses on water management institutions and policies. Dr. Blomquist has studied and written about groundwater management agencies in Southern California; state water laws and agencies in Arizona, California, and Colorado; watershed management agencies in the United States; and river basin management organizations in other countries. His newest project is an exploration of the legal and political barriers to the development of desalination facilities in coastal areas of the U.S.

### **Dr. Timothy S. Brothers**

*Associate Professor of Geography, IUPUI*

*Physical Geography, Biogeography*

Ph.D., University of California, LA, 1985

M.A., University of California, LA, 1981

B.A., University of California, Davis, 1978

Research focuses on human alteration of natural vegetation, and the geography of the Caribbean. He has studied causes and consequences of deforestation in the Dominican Republic and comparative vegetation change in Haiti and the Dominican Republic.

### **Dr. Kay Connelly**

*Assistant Professor of Computer Science, Indiana University*

*Lead, Security for Ubiquitous Resources Group (SURG), IU*

*Associate Director, Center for Applied Cybersecurity Research, IU*

PhD, University of Illinois at Urbana-Champaign, 2003

MS, University of Illinois, 1999

B.S. and B.A., Indiana University, 1995

Research includes user acceptance of ubiquitous and mobile computing technologies where there is a delicate balance between such factors as convenience, control and privacy. She is currently investigating the following application domains: Convenience applications such as automatically configuring a cell phone's notification mechanism depending on the physical and social context of the cell phone owner; Health care applications to empower both the ill and the healthy to manage and improve their own health; Work and learning applications such as a tool to assist students in gathering environmental data while simultaneously supporting data analysis in the field.



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**Dr. Lenore P. Tedesco, Director**

*Indiana University-Purdue University Indianapolis*

*723 West Michigan Street, Room SL118, Indianapolis, IN 46202-5132*

*(317) 274-7154 Fax (317) 274-7966*

*E-Mail: cees@iupui.edu Web Site: www.cees.iupui.edu*



# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

### **Dr. Gabriel Filippelli**

*Professor of Earth Sciences, IUPUI*

*Chairperson, Department of Earth Sciences, IUPUI*

*Environmental Chemistry, Paleocceanography, Paleoclimatology*

Ph.D., University of California, Santa Cruz, 1994

B.S., University of California, Davis, 1986

Research includes biogeochemical cycling in the environment and the connections between geochemistry and the geologic record of global climate change. Current research involves determining the effects of climate on weathering and terrestrial nutrient cycling; examining carbon and nutrient cycles on glacial/interglacial time scales; assessing industrial heavy metal inputs to near-urban wetlands; and examining the connection between soil lead, climate, and children's health.

### **Dr. Timothy R. Filley**

*Assistant Professor, Biochemistry, Purdue University*

*Biogeochemistry*

Ph.D., The Pennsylvania State University, 1997

B.S., Loyola University of Chicago, 1990

Research interests are primarily associated with the cycling of organic matter and nutrients in agricultural and forest soils, the processes controlling the formation of soils and the stabilization of soil organic matter, and controls on the export of organic matter in watersheds as dissolved, colloidal and particulate organic matter. With respect to watershed biogeochemistry, Dr. Filley is particularly interested in the controls that land use and hydrology (in the form of punctual hydrologic events) have on the nature and reactivity of allochthonous organic matter.

### **Brooke Furge**

*Education Specialist*

*Center for Earth and Environmental Science, IUPUI*

*Environmental Education*

B.A., Oberlin College, 2004

Efforts include designing, developing and implementing environmental science education outreach programs to Central Indiana schools and teachers through the Center for Earth and Environmental Science's *Discovering the Science of the Environment* program. Programs focus on local, technology-infused field science research experiences utilizing a mobile technology trailer, digital handheld data input devices, on-site student data upload, and comprehensive data sharing via the web.

### **Eileen Hack**

*Research Scientist, Project Coordinator*

*Center for Earth and Environmental Science, IUPUI*

*Watershed Management, Environmental Education, Aquatic ecosystem monitoring and restoration, Human and environmental health impacts of pathogens and emerging contaminants*

M.P.H. University of Miami, 1999

M.S. Entomology, Clemson University, 1980

B.S. Biology, College of William and Mary, 1975

Research interests include impacts of urbanization on stream and lake water quality and aquatic ecosystems, the effectiveness of practices designed to improve urban water quality, surface water quality impacts on human and environmental health, and riparian and wetland restoration projects. A particular interest is the role of pathogens and emerging contaminants on human and environmental health. Responsibilities include promoting and implementing collaborative partnerships among a variety of stakeholders to address water quality problems on a watershed scale. Effective public education and outreach programs and tools that promote individual responsibility for water quality stewardship will also be a focus.



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(317) 274-7154 Fax (317) 274-7966

E-Mail: [cees@iupui.edu](mailto:cees@iupui.edu) Web Site: [www.cees.iupui.edu](http://www.cees.iupui.edu)



# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

### **Bob E. Hall**

*Research Scientist, Systems Engineer, Technologist  
Center for Earth and Environmental Science, IUPUI  
Environmental Remote Sensing, Ecosystem Monitoring,  
Environmental Restoration, Data and Systems Administration, and Design*

M.S., IUPUI, 2000  
B.S., Ball State University, 1994

Efforts revolve around facilitating faculty research with hydrologic monitoring of wetland, riparian, and lake ecosystems. Research includes: evaluating restoration strategies and efforts; environmental mapping, modeling, and visualization; data and environmental sensor network design, administration, and maintenance; and graphic, publication, and website design.

### **F. Vincent Hernly**

*Research Scientist, Laboratory Coordinator, Department of Earth Sciences, IUPUI  
Glacial Stratigraphy, Soils, Geomorphology*

M.S., IUPUI, 1997  
B.S., IUPUI, 1992

Research is on Quaternary stratigraphy of the Midwest, with special emphasis on the use of paleosols as a stratigraphic tool and environmental indicator. Current interests are in the use of soils as wetland indicators, and in questions related to the development and persistence of hydric soils associated with both wetland restoration and wetland drainage.

### **Dr. Pierre-André Jacinthe**

*Assistant Professor of Earth Sciences, IUPUI  
Environmental Soil Science, Soil Biochemistry, Soil Geomorphology*

Ph.D., Ohio State University, 1995  
M.S., Ball State University, 1991  
B.S., State University of Haiti, 1985

Research interests include nitrate transformations in wetlands, carbon sequestration in natural and managed ecosystems, nutrient cycling and soil-atmosphere exchange of trace gases (carbon dioxide, methane and nitrous oxide) as related to land-use and management practices. His research has also focused on fates of eroded carbon (mineralization, entrapment in terrestrial deposits), and linkages between water, erosion and the global carbon cycle. A recently funded project involves application of selective oxidation procedures, stable carbon isotope and radiocarbon techniques to partition carbon pools in reclaimed mine soils into fossil and recently deposited carbon fractions.

### **Dr. Stephen J. Jay**

*Professor of Medicine and Public Health  
Chair Department of Public Health, Indiana University School of Medicine  
Public Health Policy, Environmental Epidemiology*

M.D., Indiana University School of Medicine, 1966  
B.S., Wabash College, 1962

Research focuses on public health policy, including historical frameworks for policy development; origins of public health tobacco control legislation; and public health systems. Dr. Jay works with collaborative partners in the Indiana Medicine-Public Health Initiative and the Mid-America Public Health Training Center ([www.maphtc.iupui.edu](http://www.maphtc.iupui.edu)) to address public health infrastructure in the Midwest. Development of education and training resources for MPH students and other graduate students and health practitioners in the areas of epidemiology, including environmental epidemiology, public health policy, and behavioral health education is a priority for Jay's Department of Public Health.



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E-Mail: [cees@iupui.edu](mailto:cees@iupui.edu) Web Site: [www.cees.iupui.edu](http://www.cees.iupui.edu)



# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

### **Dr. James E. Klaunig**

*Professor and Director of Toxicology  
Department of Pharmacology and Toxicology, Indiana University School of Medicine  
Environmental Toxicology and Chemical Carcinogenesis*

Ph.D., University of Maryland, 1980  
B.S., Ursinus College, 1973

Research has focused on the mechanisms of chemically induced carcinogenesis and toxicology with emphasis on environmental toxicology and carcinogenesis. This has involved studies into the role of oxidative stress/oxidative damage, Kupffer cell activation, modulation of gap junctions, and cell growth/apoptosis in this process with emphasis toward human risk assessment.

### **Dr. Lin Li**

*Assistant Professor of Earth Sciences, IUPUI  
Planetary Earth Sciences  
Environmental Remote Sensing*

Ph.D., Brown University, 2002  
M.E., Brown University, 2001  
M. S., Institute of Remote Sensing Application, Academy Sinica, 1989  
B.S., Jilin, University, China, 1986

Research involves lunar and planetary Earth Sciences, environmental remote sensing and global climate change. Recent research focuses on wetland vegetation classification and invasive plant mapping with hyper-spectral remote sensing data, lunar soil mapping and impact mixing with multi-spectral imagery, and using radiative transfer models to derive the biochemical and biophysical parameters of vegetation and soils from hyperspectral remote sensing and MODIS data. Additional research interests involve the development/improvement of digital image processing algorithms for material classification and discrimination, and of radiative transfer modeling for the retrieval of material properties.

### **Dr. Kathy Licht**

*Assistant Professor of Earth Sciences, IUPUI  
Quaternary Earth Sciences, Glacial Earth Sciences, Geomorphology*

Ph.D., University of Colorado, 1999  
M.S., University of Colorado, 1995  
B.S., St. Norbert College, 1992

Research focus is on reconstructing the history of the Antarctic and Laurentide Ice Sheets over the past 30,000 years. Previous work has utilized sedimentology and stratigraphy to reconstruct ice extent, as well as  $^{14}\text{C}$  dating to constrain the timing of ice advance and retreat. A recently funded Antarctic project linked the mineralogical, geochemical, and isotopic characteristics of the sediments from Ross seafloor sites that were once covered by glacial ice to sediments collected from the source areas of ice in East and West Antarctica to determine past ice flow paths. This type of study contributes to the understanding of changes in ice sheet dynamics through time. Current projects also include studies of lake sediments in northern Indiana and southern Michigan to determine how regional climate has changed since the end of the last ice age.

### **Dr. Greg Lindsey**

*Associate Dean and Duey Murphy Professor of Rural Land Policy  
School of Public and Environmental Affairs, IUPUI*

Ph.D., M.A., The Johns Hopkins University, 1992  
M.A., Northeastern Illinois University, 1987  
B.A., University of Illinois, 1977

Teaching and research interests are in the areas of environmental, land use, and water resources planning and management. He has published articles on a number of substantive environmental issues, including greenways, land use, stormwater management, and erosion and sediment control.



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E-Mail: [cees@iupui.edu](mailto:cees@iupui.edu) Web Site: [www.cees.iupui.edu](http://www.cees.iupui.edu)





# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

### **Dr. Joseph Pachut, Jr.**

*Associate Professor of Earth Sciences, IUPUI*

Invertebrate Paleontology, Paleoecology, Biometrics, Evolution

Ph.D., Michigan State University, 1977

B.A., State University of New York, Oneonta, 1972

Research interests involve understanding the patterns of evolution in fossil organisms using quantitative data analysis techniques. Included are analyses of the paleoecology of ancient ecosystems, patterns of growth and development in colonial animals that lived under different paleoenvironmental conditions, a statistical evaluation of the "genetics" of fossil colonial organisms, fossil biodiversity patterns and changes in the tempo and mode of evolutionary changes throughout geologic time.

### **Denise Lani Pascual**

*Research Scientist, Center for Earth and Environmental Science, IUPUI*

Reservoir Limnology, Phytoplankton Ecology, Nuisance Blue-Green Algae

Doctoral Candidate, University of Michigan

M.P.H., University of Michigan, 2002

B.S., Creighton University, 1996

Research focuses on the eutrophication of urban reservoirs, including nutrient loading, nutrient dynamics, phytoplankton ecology, and the impacts of algal metabolite production (e.g. toxins and taste and odor causing compounds) on human health. Specific interests are in the ecology of heterocyst-forming blue-green algae and the use of ambient available nutrient stoichiometry to predict phytoplankton species composition in urban reservoirs as a means to better protect these drinking water resources. Current research includes a nutrient mass balance study and nutrient and phytoplankton monitoring on Eagle Creek Reservoir, Indianapolis. Other research interests include phytoplankton-zooplankton interactions, the use of remote sensing techniques to understand spatial and temporal changes in phytoplankton abundances, and the fate and transport of *E. coli* in Midwest watersheds.

### **Dr. Jose Ramos**

*Associate Professor of Electrical and Computer Engineering, IUPUI*

Hydrology and Water Resources

Ph.D., Georgia Institute of Technology, 1985

MSCE, Georgia Institute of Technology, 1979

BSCE, University of Puerto Rico at Mayaguez, 1978

Research focuses on the optimal planning and operation of water resource systems. This includes the use of optimization techniques for finding optimal operating policies of multi-reservoir systems, optimal irrigation scheduling, and optimal control of large-scale sewer networks. Additional research interests address problems related to rainfall-runoff modeling, unit hydrograph separation techniques, and hydrologic routing techniques for use in real-time river flow forecasting. Dr. Ramos has developed accurate forecasting models for the Nile River, based on multivariate data analysis extensions specifically for dynamical systems. He is currently working on developing a graphical user interface for conducting space-time series analysis of hydro-environmental data. This is important for tracking the spread of epidemics, to understand the spatial dependence of hydrologic networks, and to forecast the spatial and temporal behavior of hydro-environmental data. This research will make use of geographical information systems to develop the spatial weights commonly used in computing the space-time autocorrelation function of the data.

### **Dr. Yvonne Rogers**

*Chair of Human-Computer Interaction, Open University, UK*

Ph.D., University of Wales (UK), 1988

MSc., University College London, 1984

Research and teaching interests include the areas of human computer interaction (HCI), Computer supported cooperative work (CSCW) and pervasive computing. Research focuses on augmenting and extending everyday learning and work activities with interactive technologies that move "beyond the desktop". This involves designing enhanced user experiences through appropriating and assembling a diversity of technologies including mobile, wireless, handheld and pervasive computing.



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# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

### **Dr. Gary D. Rosenberg**

*Associate Professor of Earth Sciences, IUPUI*  
Biomineralization, Evolution, Historical Earth Sciences,  
History of Geologic Thought

Ph.D., University of California, Los Angeles, 1972

B.S., University of Wisconsin, 1966

Research uses digital electron microscopy to produce high magnification images of the minerals and matrices that organisms deposit in shells, teeth, and bone as well as to draw maps of the distribution of elements within those materials. He is interested in determining how the external environment and the internal physiology of the organism have influenced the shape, structure, and composition of skeletons throughout the course of evolution, how various human afflictions alter skeletal development, and how pollution influences growth. Research also explores connections between the development of modern geological thought and the evolution of western culture as recorded in art history. He is developing public outreach programs in Earth Sciences at Fort Harrison State Park in collaboration with faculty at IUPUI and the University of Southern Indiana.

### **Kara Salazar**

*Research Scientist, Education Outreach Coordinator*  
*Center for Earth and Environmental Science, IUPUI*  
Environmental Service Learning, Environmental Education,  
Wetland and Riparian Ecosystem Restoration

M.P.A., Indiana University, 2002

B.S., Indiana University, 1999

Research interests include implementation and monitoring of central Indiana wetland and riparian restoration projects, wetland delineation, site mapping, amphibian monitoring, as well as vegetation and water quality data collection and analyses. A focus is on developing and implementing science-based curricula and outreach programs at CEES local research sites for K-12 students and teachers, university students, community members, and environmental professionals. Outreach programs include the CEES environmental service learning program for IUPUI earth and environmental science students coordinated in conjunction with community partners.

### **Dr. Dwight A. Schuster**

*Assistant Professor of Education, IUPUI*

Ph.D., Pennsylvania State University, 2005

M.A.T., Cornell University, 1998

B.S., Wheaton College, 1994

Research interests include university-based professional development, science pipeline, tiered-mentorship in K-12 science education, and partnerships between scientists and K-12 schools.

### **Dr. Joshua Smith**

*Assistant Professor of Educational Psychology, IUPUI*  
*Associate Director, Center for Urban and Multicultural Education*  
Educational Transition, Research Design, Evaluation, Urban Education, Case Method Pedagogy

Ph.D., University at Albany, 2002

M.S., University at Albany, 1997

B.A., University at Albany, 1994

Courses offered include Educational Psychology in the Teacher Education Program and graduate courses in qualitative and quantitative research methods. Research interests include student transition from middle school to high school, and the transition from high school to college. He currently coordinates six program evaluations in the Indianapolis region.



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# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

### **Dr. Lenore Tedesco**

*Associate Professor of Earth Sciences, IUPUI*  
*Director, Center for Earth and Environmental Science*  
Wetland Ecosystem Restoration, Environmental Education,  
Sedimentology, Records of Environmental Change

Ph.D., University of Miami, 1991  
B.A., Boston University, 1984

Research focuses on wetland restoration including evaluation of restoration strategies and wetland function. This includes studies of urban riparian reforestation, fen wetland restoration, and on the distribution of anthropogenic pollutants. Additional research interests address regional watershed and water quality issues. Dr. Tedesco is working with the Pervasive Technology Labs and CEES staff to develop an autonomous environmental monitoring network measuring water quality throughout central Indiana. Environmental education based on restoration research and environmental monitoring is an important part of her research interest.

### **Christopher Thomas**

*Lecturer in Earth Sciences, IUPUI*  
Earth Science Education, Science Communication, Petrology

M.S., Vanderbilt University, 2001  
B.S., Juniata College, 1999

Focus is on undergraduate environmental education in both the lecture and laboratory environment. Interests are also in science and technical communication as it relates to raising public understanding of the process of science and environmental science research. He is developing curriculum for introductory laboratories, and designing and distributing online courses in environmental science and Earth Sciences. Within Earth Sciences, his research interests are in the geochemistry of rock formation. Mr. Thomas worked in the defense industry as a software technical writer and, is near completion of a Masters in Science Communication from Miami University.

### **Dr. Philippe Vidon**

*Assistant Professor of Earth Sciences, IUPUI*  
Hydrology, Biogeochemistry, Wetlands, Riparian Zones

Ph.D., York University, Toronto, Canada, 2004  
M.S., National Institute of Agronomy, France, 1997  
B.S., Pierre and Marie Curie University, France, 1995

Research focuses on the hydrological and biogeochemical functioning of wetlands and near-stream zones. He is interested in determining how landscape characteristics affect the ability of these ecosystems at mitigating pollution by anthropogenic contaminants in rural areas. Interests also include research on structures to mitigate floods and improve water quality in freshwater systems at the watershed scale.

### **Dr. Xianzhong Wang**

*Assistant Professor of Biology, IUPUI*  
Plant Physiological Ecology, Soil and Environmental Sciences

Ph.D., The Ohio State University, 1999  
M.S., Institute of Soil Science, Academia Sinica, 1989  
B.A., Zhejiang University, China, 1986

Research focuses on the effects of global environmental changes, including rising CO<sub>2</sub> concentration in the atmosphere, on plant physiology and growth at different organizational levels. Research is interdisciplinary in nature and aims at understanding the responses of plants to environmental disturbances caused by human activities.

### **Dr. Jeffrey S. Wilson**

*Associate Professor of Geography, IUPUI*  
Geographic Information Systems, Environmental Remote Sensing

Ph.D., Indiana State University, 1998  
M.A., California University of Pennsylvania, 1994  
B.S., California University of Pennsylvania, 1991

Research interests are in environmental remote sensing, geographic information systems, and human/environment interactions. Current research involves remote sensing of cities; 3D modeling of urban environments; land cover dynamics and urban sprawl; and relationships between the physical environment and human health.



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# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

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**Dr. Ikuho Yamada**

*Assistant Professor of Geography and Informatics, IUPUI*

Geographic Information Systems, Spatial Statistics, Public Health

Ph.D. University at Buffalo, The State University of New York, 2004

M.E., University of Tokyo, Japan, 1999

B.E., University of Tokyo, Japan, 1997

Research interests include geographic information systems, spatial statistics, and applications of these methodologies to health-related issues. She is particularly interested in impacts of physical and social environments on public health problems. Methodologically, she has been attempting to incorporate structures of transportation networks, which have a strong influence on certain spatial phenomena, into traditional spatial analysis.



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# CEES Community Partners in Research and Education

## **CEES Partners in Research**

- Purdue University
- Indiana Water Resources Research Center
- United States Geological Survey – Indiana Water Science Center
- Indiana Department of Environmental Management
- Indiana Department of Natural Resources
- Indiana University School of Medicine – Center for Environmental Health
- Veolia Environment Research Centers – Paris, Adelaide, and Berlin

## **CEES Partners in Education**

### **Not-for Profits**

- Central Indiana Land Trust Incorporated (CILTI)
- Science Education Foundation of Indiana
- Indiana State Fair
- Keep Indianapolis Beautiful (KIB)
- WFYI Public Television
- Life Science Education Center at Marian College (LSEC)
- Indiana Audubon Society
- Indiana Wildlife Federation
- Friends of White River (FOWR)
- Rotary Club of Indianapolis
- Efroymsen Fund of the Central Indiana Community Foundation
- Nina Mason Pulliam Charitable Trust

### **State and Local Government**

- IDNR – Natural Resources Education Center
- Indiana Department of Environmental Management
- Indiana State Museum
- City of Indianapolis - Department of Public Works – Office of Environmental Services
- Indy Parks and Greenways
  - Hub Naturalist Program
  - Office of Land Stewardship
  - Division of Resource Development - Park Planning and Design
  - Earth Discovery Center of Eagle Creek Park
- Hamilton County Parks
- Noblesville Parks Department
- Zionsville Parks Department
- Marion, Hamilton, Boone, Hendricks County SWCD

### **Corporations**

- Eli Lilly and Company
- Veolia Water Indianapolis
- Dow AgroSciences

### **Universities**

- Butler University
- Marian College - EcoLab
- University of Wisconsin – Madison Arboretum
- Purdue University
- Indiana University
- University of Indianapolis – Center for Excellence in Leadership and Learning

### **Schools**

- Numerous IPS and Township Schools
- Indiana School for the Blind
- Several Indiana Charter Schools



# Center for Earth & Environmental Science

## REVENUE & EXPENSE REPORT - FISCAL YEAR 2005-2007

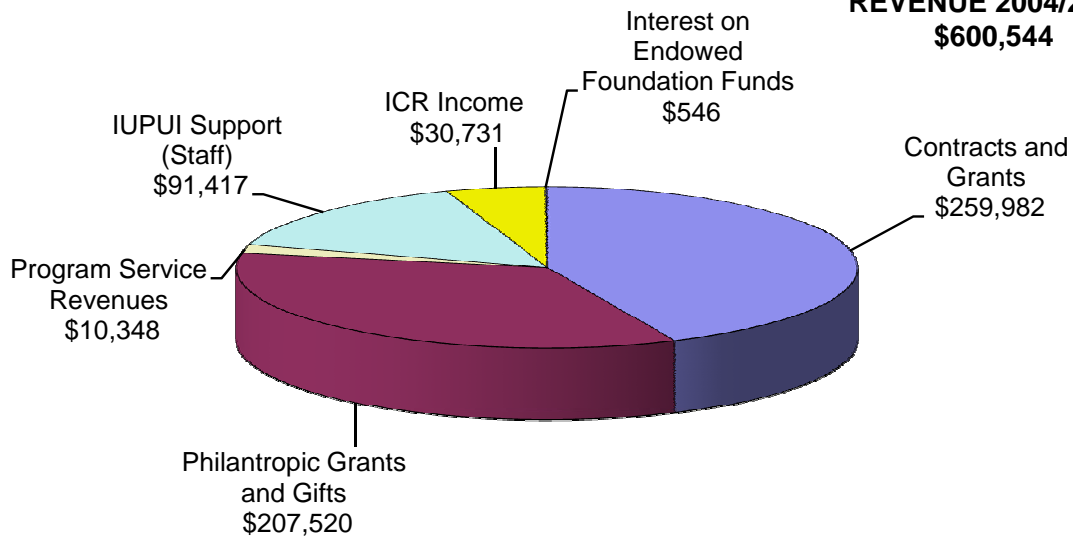
	FISCAL YEAR 2004/2005	FISCAL YEAR 2005/2006	FISCAL YEAR 2006/2007
<b>REVENUE</b>			
<b>SOURCE</b>			
Government Grants and Contracts	\$ 9,982	\$ 64,128	\$ 158,916
Non-government Grants and Contract:	\$ 250,000	\$ 366,622	\$ 336,683
Foundation Gifts	\$ 189,850	\$ 35,000	\$ 200,350
Corporate Gifts	\$ 3,670	\$ 2,725	\$ 104,000
Individual Gifts (36, 42, 29,27)	\$ 14,000	\$ 27,008	\$ 6,490
Program Service Revenues	\$ 10,348	\$ 22,080	\$ 30,602
IUPUI Support (Staff)	\$ 91,417	\$ 102,799	\$ 69,218
ICR Income	\$ 30,731	\$ 61,462	\$ 61,462
Interest on Endowed Foundation Funds	\$ 546	\$ 659	\$ 764
<b>TOTAL</b>	\$ 600,544	\$ 682,483	\$ 968,485
<b>EXPENSES</b>			
<b>ITEM</b>			
Faculty Salaries	\$ 54,081	\$ 78,082	\$ 103,813
Student Academic Salaries	\$ 24,700	\$ 66,500	\$ 52,234
Professional Salaries	\$ 105,808	\$ 125,523	\$ 138,285
Biweekly, and Hourly Wages	\$ 41,671	\$ 101,719	\$ 125,178
Benefits & Payroll Taxes	\$ 59,879	\$ 74,321	\$ 71,438
Student Fee Remission	\$ 5,693	\$ 13,893	\$ 31,184
Consultants\Professional Fees\Subcontracts	\$ -	\$ 2,500	\$ 52,100
Office Supplies and Expenses	\$ 11,770	\$ 19,766	\$ 16,107
Printing, Copying	\$ 595	\$ 6,123	\$ 7,094
Research, Lab and Field Supplies	\$ 55,850	\$ 112,460	\$ 44,156
Equipment <\$5,000 & Maintenance	\$ 63,281	\$ 73,172	\$ 64,042
Capital Equipment	\$ 23,558	\$ 52,721	\$ 17,110
Travel & Training	\$ 22,569	\$ 29,219	\$ 29,071
Project Development	\$ 4,003	\$ 10,634	\$ 5,684
ICR Expenses	\$ 88,893	\$ 99,602	\$ 90,652
<b>TOTAL</b>	\$ 562,351	\$ 866,235	\$ 848,148
<b>NON-REVENUE GENERATING FUNDS</b>			
Endowed Foundation Funds	\$ 14,320	\$ 16,103	\$ 19,407
Account Reserves (Unspent Funds)	\$ 297,216	\$ 150,945	\$ 337,219
In-Kind Support	\$ 127,617	\$ 198,026	\$ 181,073
<b>TOTAL</b>	\$ 439,153	\$ 365,074	\$ 537,699

^ Income actual based on existing grants/gifts

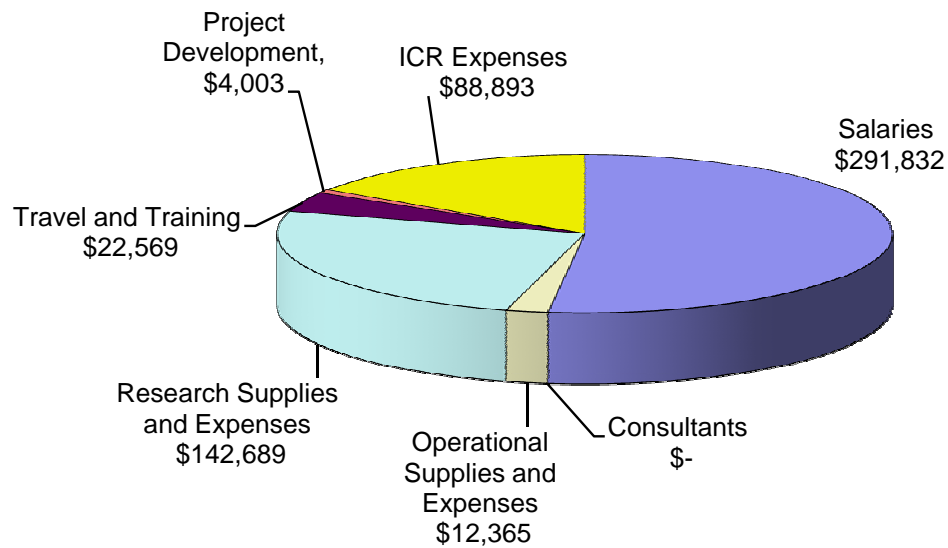
Revenue from contracts and grants is based on award amount evenly divided among fiscal years of award. This does not match expenses.

Note - no Internal Grant Funds Shown

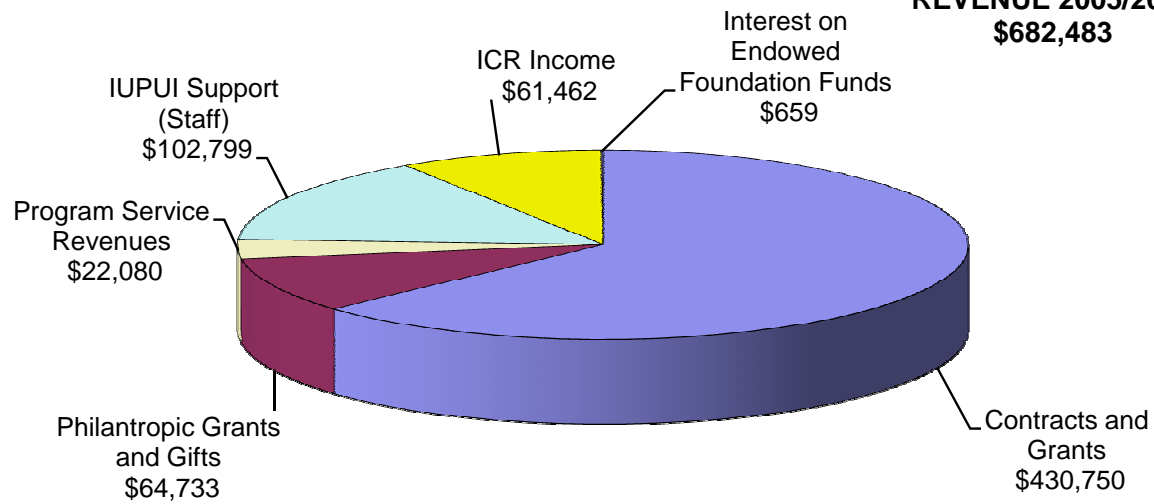
**REVENUE 2004/2005**  
**\$600,544**



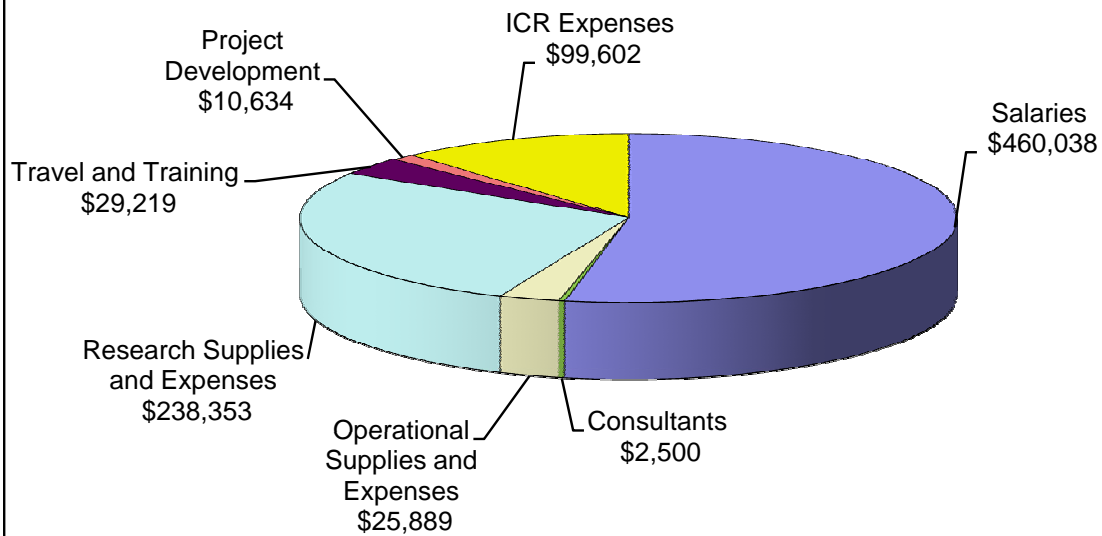
**EXPENSES 2004/2005**  
**\$562,351**



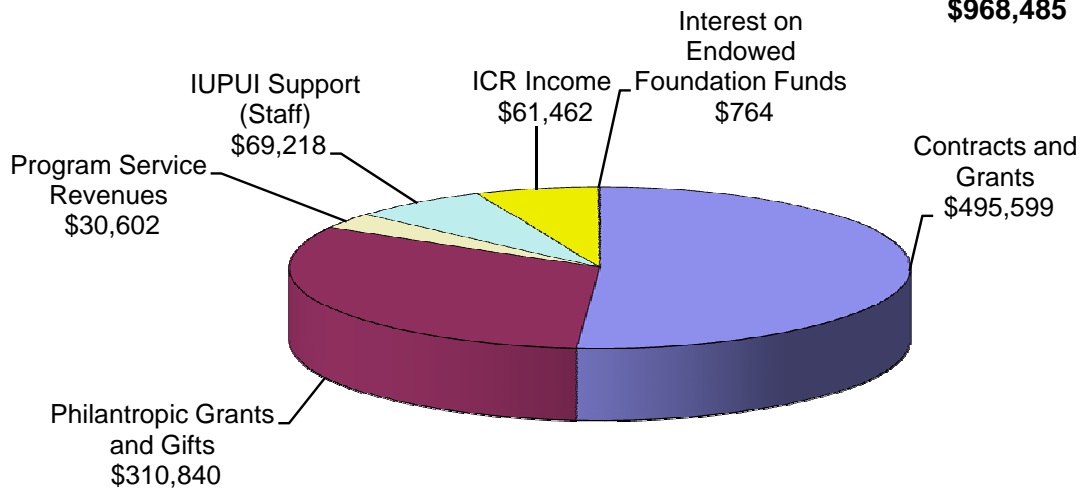
**REVENUE 2005/2006**  
**\$682,483**



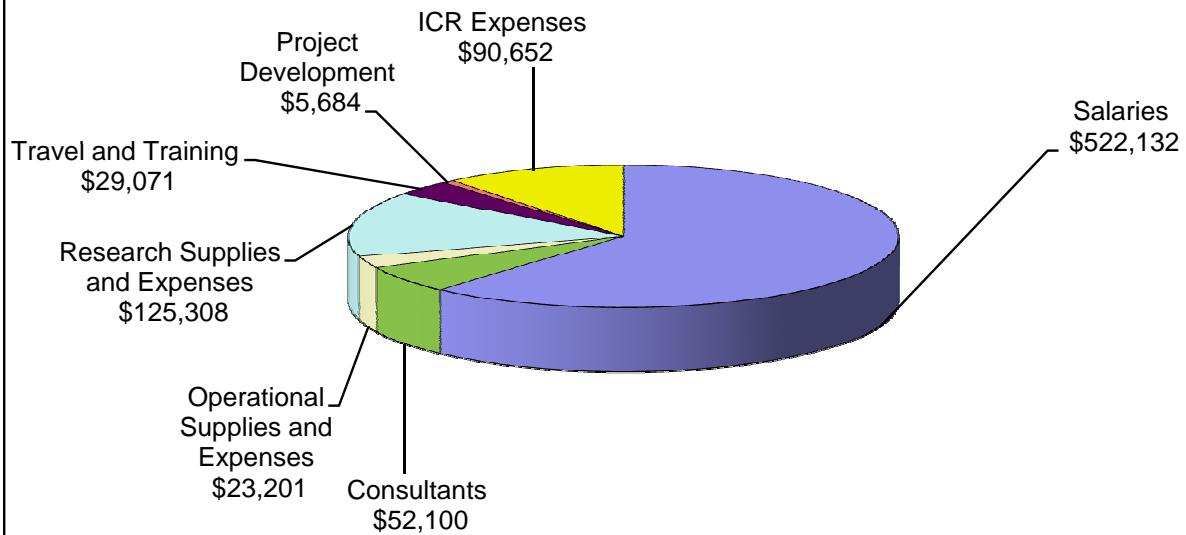
**EXPENSES 2005/2006**  
**\$866,235**



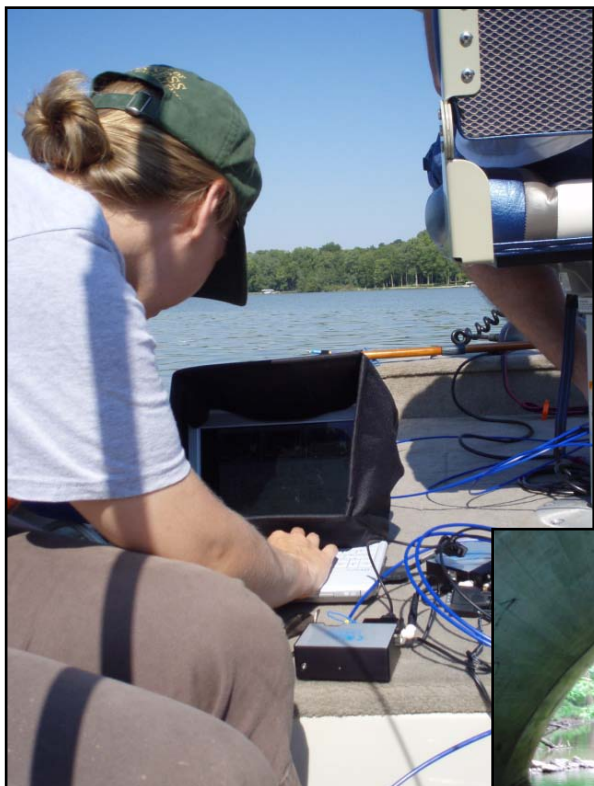
**REVENUE 2006-2007**  
**\$968,485**



**EXPENSES 2006-2007**  
**\$848,148**







# CEES



# 2007