



December, 2009



## Annual Report



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



## **2009 Annual Report**

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

#### **Mission**

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 both existing and emerging water resource issues.

#### **Unique and Distinctive Features**

CEES has built its program and reputation around excellence in water resources and ecosystem restoration research. Key to our success has been the development of a research network founded on strong corporate, governmental and community partnerships and collaborations. This framework is strengthened by the mutual benefit realized by all partners and helps to support IUPUI's core value of community engagement as an urban research university.

In order to maximize the efficient use of resources, CEES is pursuing 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 places 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 to identify watershed issues associated with Major Moves and other economic development initiatives, the 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 USEPA collaborative watershed models and other federal models
3. Facilitate a 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. Maintenance of CEES' Regional Water Quality Monitoring Network and enhanced 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

### **2009 Research Project Activities**

#### ***Publications***

- Robertson, A.L., Li, L., Tedesco, L.P., Wilson, J.S., and Soyeux, E. (2009) Using a Partial Least Squares (PLS) Method for Estimating Cyanobacterial Pigments in Eutrophic Inland Waters, *SPIE Optics and Photonics Conference Proceedings*, SPIE Paper Number: 7454-7.  
(<http://spiedigitallibrary.aip.org/dbt/dbt.jsp?KEY=PSISDG&Volume=7454&Issue=1>)
- Babbar-Sebens, M., and Karthikeyan, R., 2009, Consideration of sample size for estimating contaminant load reductions using load duration curves, *Journal of Hydrology*, Volume 372, Issues 1-4, Pages 118-123.
- Babbar-Sebens, M., and Mukhopadhyay, S., 2009. Reinforcement Learning for Human-Machine Collaborative Optimization: Application in Ground Water Monitoring, *Proceedings of the IEEE Systems, Man, and Cybernetics (SMC) Conference*.
- Harrison, J., Maranger, R., Alexander, R., Giblin A., Jacinthe, P.A., Mayorga, E., Seitzinger, S., Sobota, D., Wollheim, W., 2009, The regional and global significance of nitrogen removal in lakes and reservoirs. *Biogeochemistry* 93:143-157.
- Jacinthe, P.A. and Tedesco, L.P., 2009, Impact of Elevated Copper on the Rate and Gaseous Products of Denitrification in Freshwater Sediments. *Journal of Environmental Quality*, 38: 1183-1192.
- Vidon, P., Hubbard, L.E., and Soyeux, E., 2009. Impact of sampling strategy on stream load estimates in till landscapes of the Midwest. *Environmental Monitoring and Assessment*, DOI: 10.1007/s10661-008-0635-5 (Online).

## **Abstracts**

- Babbar-Sebens, M., Minsker, B.S., "Interactive Genetic Algorithm with Mixed Initiative Interaction for Water Resources Optimization," Proceedings of the 8th International Conference on Hydroinformatics, Concepción, Chile, 2009.
- Bencic, D.C., Alwan, A., Dorkin, J., Biales, A.D., Flick, R.W., Batt, A., Tedesco, L.P., and Lazorchak, J.M., Assessment of Exposure of Fish to Emerging Contaminants in the Eagle Creek Watershed. Society of Environmental Toxicology and Chemistry North America 30<sup>th</sup> Annual Meeting, New Orleans, LA, November, 2009.
- Tedesco, L.P., Clercin, N., Cowan, A., and Gray, M., Cyanobacterial Ecology and Toxicity in Three Eutrophic Public Drinking Water Supply and Recreational Use Reservoirs, Central Indiana, USA. 29<sup>th</sup> Annual International Symposium, North American Lake Managers, Hartford, Ct, October, 2009.
- Cowan, A.M., Tedesco, L.P., Clercin, N., and Gray, M., Eutrophication and Cyanobacterial Ecology in three Eutrophic Public Drinking Water Supply Reservoirs, Central Indiana, USA. 29<sup>th</sup> Annual International Symposium, North American Lake Managers, Hartford, Ct, October, 2009.
- Hoffmann, J.E. and Tedesco, L.P., 2009. A Regional Approach to Improved Water Resource Planning: The Upper White River Watershed Alliance. Indiana Association of Floodplain and Stormwater Managers Annual Meeting, Patoka, IN, September, 2009.
- Anderson, M., Babbar-Sebens, M., Lobligois, F., Rampnoux, N., Soyeux, N., and Tedesco, L.P., 2009. Combining a conceptual hydrologic model (SWAT) and a hydrodynamic model (Telemac 3D) to simulate reservoir dynamics in Eagle Creek Reservoir, Indiana. 5<sup>th</sup> International SWAT Conference, Boulder, CO, August, 2009.
- Robertson, A.L., Li, L., Tedesco, L., Wilson, J. and Soyeux, E., 2009. Using a partial least squares (PLS) method in predicting cyanobacterial pigments in eutrophic inland waters. SPIE—The International Society for Optical Engineering, Optical Engineering + Applications. San Diego, CA, August. Abstract 7454-7.
- Robertson, A.L., Li, L., Tedesco, L., Wilson, J. and Soyeux, E., 2009. Comparing band ratio, semi-empirical, modified Gaussian models in predicting cyanobacterial pigments in eutrophic inland waters. UCOWR/NIWR Conference on Urban Water Management: Issues and Opportunities. Chicago, IL, July (Oral Presentation). Abstract 15-3.
- Barr, R.C., Bender, A., Babbar-Sebens, M., and Tedesco, L.P. 2009, Reevaluating Indiana's Flood Management Strategies: Lessons from the Mississippi River Floods of 1993: 30th Annual Indiana Water Resources Association Symposium, Columbus, IN, 2009 May.
- Hatcher, C. and Filippelli, G., 2009. Mercury in Stream Sediments in Marion County, Indiana Environmental Health Summit, Indianapolis, IN, 2009 May.
- Hatcher, C. and Filippelli, G., 2009. Hg(T) Concentrations in Soils and Stream Sediments in Central Indiana. North-Central GSA, Rockford, IL, 2009 April.
- Tedesco, L.P., Barr, R.C., Hall, B.E., and Hernly, F.V., 2009, The Lilly ARBOR Project at 10: Results from a long-running experiment in urban riparian restoration: First Annual Chapter Meeting of the Midwest-Great Lakes Society for Ecological Restoration Chapter, Indianapolis, 2009 April.
- Barr, R.C., Hall, B.E., and Tedesco, L.P., 2009, Climate Change and Natural Areas Restoration: What does predicted climate change mean for natural areas restoration?: First Annual Chapter Meeting of the Midwest-Great Lakes Society for Ecological Restoration Chapter, Indianapolis, 2009 April.

- Tedesco, L.P., Vidon, P., Gray, M., and Hall, B.E., 2009, Towards An Understanding of Water Quality in a Mixed Agricultural and Urban Watershed: Eagle Creek Watershed, Indiana: 2009 USDA CSREES National Water Conference, St. Louis, 2009 February.
- Turco, R., Tedesco, L.P., Prokopy, L., Wilson, J., Frankenberger, J., Shively, J., Pascual, D., Arabi, M., Oliver, A., Weinkauff, D., Spencer, A., Hall, B., Barr, R., and Webber, J., 2009, CEAP Watershed-scale Evaluation of BMP Effectiveness and Acceptability: Eagle Creek Watershed Indiana: 2009 USDA CSREES National Water Conference, St. Louis, 2009 February.
- Tedesco, L.P., Hall, B.E., and Gray, M., 2009, Towards An Understanding of Water Quality in a Mixed Agricultural and Urban Watershed: Eagle Creek Watershed, Indiana: USEPA Surface Water Monitoring and Standards Meeting, Chicago, 2009 February.
- Bencic, D.C., Alwan, A., Dorkin, J., Biales, A.D., Flick, R.W., Batt, A., Tedesco, L.P., and Lazorchak, J.M., 2009, Assessment of Exposure of Fish to Emerging Contaminants in the Eagle Creek Watershed: USEPA Surface Water Monitoring and Standards Meeting, Chicago, 2009 February.
- Tedesco, L.P., and Hoffmann, J., 2009. A Regional Approach to Improved Water Resource Planning: The Upper White River Watershed Alliance. 2009 Indiana Lake Management Society Annual Meeting, Indianapolis, page. 55.
- Tedesco, L.P., 2009, Beanblossom Bottoms, A Wetland Gem in Southcentral Indiana: Amos Butler Audubon Society, Indianapolis, 2009 January.
- Tedesco, L.P., Watershed-Scale Evaluation of BMP Effectiveness and Acceptability: Eagle Creek Watershed, Indiana. Indiana Association of Soil and Water Conservation Districts Annual Meeting, Indianapolis, 2009 January.
- Tedesco, L.P., A Regional Approach to Improved Water Resource Planning: The Upper White River Watershed Alliance. Indiana Lake Management Society, Indianapolis, 2009 January.

### ***Graduate Theses***

- Gidley, S.L. Using high resolution satellite imagery to map aquatic macrophytes on multiple lakes in northern Indiana. Thesis Indiana University Purdue University Indianapolis, 2009. IDeA: IUPUI Digital Archive. Indiana University Purdue University Indianapolis University Library, Indianapolis, IN. 08 Dec, 2009. <http://hdl.handle.net/1805/2027>.

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

- Water Quality and Human Health Conference, Indianapolis, May 2009  
Central Indiana Water Resources Partnership Science Meeting, Indianapolis, April 2009



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

- "Cyanobacteria Occurrence and Toxicity in Midwestern Drinking Water Reservoirs", Project WET, Hoosier Riverwatch, Project WILD Facilitator Training, Indianapolis, IN, December, 2009.
- "What We Know, What We Think We Know, and What We Don't Know: A Water Quality Primer for Central Indiana", Upper White River Watershed Alliance Annual Meeting, Indianapolis, December, 2009.
- "Assessing Watershed Processes on a Holistic Basis to Evaluate Water Quality in Eagle Creek Watershed", Eagle Creek Watershed Alliance, Indianapolis, November, 2009.
- "Modification of Indiana's Hydrologic Cycle," 3rd IMAGINE Conference for Middle School Students "Water: The Lifeblood of Humanity". November 13, 2009,
- "Blue-Green Algae in Indiana: An Emerging Threat and the Need for Statewide Monitoring and a Public Information Plan", Environmental Quality Service Council, Indiana State Legislature, Indianapolis, October, 2009.
- "Water and the Hydrologic Cycle," Pond Pro Workshop. Ecological Solutions for Better Pond Management. Marion County Soil and Water Conservation District. August & September, 2009.
- "Indiana's Modified Hydrologic Cycle", Indiana Association of Floodplain and Stormwater Managers Annual Meeting, Keynote Address, Angola, IN, September, 2009.
- "Algal Ecology and Blue-green Algae Toxins in Geist Reservoir", Geist/Fall Creek Watershed Association Public Meeting, Fishers, May, 2009.
- "Watershed Loading of Nutrients to Geist Reservoir from Fall Creek Watershed: The Role of Storm Transport", Indiana Department of Environmental Management/Indiana Department of Natural Resources Watershed Assessment Teams, Indianapolis, May 2009.
- "Optimization for Management of Contaminated Water Resources" at Department of Agricultural and Biological Engineering at Purdue University, West Lafayette, IN, April 2009.
- "Navigating Your Career in Academia" at Department of Agricultural and Biological Engineering at Purdue University, West Lafayette, IN, April 2009.
- "Introduction to Indiana's Water Resources and Challenges for Sustainable Water Quality", 2009 Environmental Health Summit, Keynote Address, Indianapolis, May, 2009.
- "Algal Ecology and Blue-green Algae Toxins in Morse Reservoir", Morse Waterways Association Public Meeting, Cicero, April, 2009.
- "The Development of Hyperspectral Remote Sensing Tools for Prediction of Cyanobacteria in Public Drinking Water Supply Reservoirs, Central Indiana, USA and South Australia", Melbourne Water, Victoria, Australia, March, 2009.
- "The Development of Hyperspectral Remote Sensing Tools for Prediction of Cyanobacteria in Public Drinking Water Supply Reservoirs, Central Indiana, USA and South Australia", United Water South Australia, Adelaide, Australia, March 2009.
- "Water and the Hydrologic Cycle", Hendricks County, Indiana Master Naturalist Course, Danville, IN, March, 2009.
- "Modification of Indiana's Hydrologic Cycle", Hendricks County, Indiana Master Naturalist Course, Danville, IN, March, 2009.
- "Ecology and Toxicity of Three Central Indiana Water Supply Reservoirs", Veolia Water Indianapolis, Technical Advisory Group, Indianapolis, IN, March, 2009.
- "Challenges for Sustaining and Improving Water Resources in Indiana", IUPUI Women's History Month, Keynote Address, Indianapolis, March, 2009.

"Challenges for Sustaining and Improving Water Resources in Indiana", Cutting Edge Lecture Series, IUPUI, March, 2009.

"Towards an Understanding of Water Quality in a Mixed Agricultural and Urban Watershed: Eagle Creek Watershed, Indiana", USEPA Surface Water Monitoring and Standards Meeting, Chicago, February, 2009.

"Wetland Functions and Importance", Sullivan County Wetlands Workshop, Sullivan, IN, February, 2009.

"Beaver and Natural Areas Restoration", The Stewardship Network Webinar, February, 2009.

"Beanblossom Bottoms, A Wetland Gem in Southcentral Indiana", Amos Butler Audubon Society, Indianapolis, IN, January, 2009.

"A Regional Approach to Improved Water Resource Planning: The Upper White River Watershed Alliance", Indiana Lake Management Society, Indianapolis, January, 2009.

### ***Research Grants***

Eagle Creek Watershed Implementation Project – L. Tedesco  
 EPA 319 Grant Program/ Indiana Department of Environmental Management  
 10/09 – 9/12 \$655,375 (\$393,225 grant dollars)

Towards the Development of a Decision Support System for Managing Eutrophication and Human Health Impacts in Central Indiana Reservoirs – M. Babbar-Sebens  
 Central Indiana Water Resources Partnership  
 08/09-08/11 \$94,480

Testing Bio-optical Algorithms for Remote Sensing of Inland Water Quality  
 L. Li, J. Wilson, and L.P. Tedesco  
 NASA  
 6/09-7/13 \$569,820

Greenhouse Gas Budget and Methane Dynamics in a No-tillage Chronosequence  
 P.A. Jacinthe, W.A. Dick, and R. Lal  
 USDA-NRI, Air Quality  
 5/09-4/12 \$399,986

Greenhouse Gas Emissions from Riparian Zones Across a Regional Hydrogeomorphic Gradient  
 P. Vidon, P.A. Jacinthe, and M.E. Baker  
 USDA-NRI, Air Quality  
 3/09-2/12 \$399,689

Performance Analysis of Selected Mitigation Systems Used to Attenuate Diffuse Pollution Occurring during Baseflow and High Flow Events from Agricultural Fields (Aquisafe 2)  
 L.P. Tedesco, P.A. Jacinthe, and M. Babbar-Sebens  
 KompetenzZentrum Wasser Berlin  
 1/09-12/12 €150,000 (~\$216,200)

A Model to Identify Constructed Wetland Sites to Maximize Nitrate Reduction and Flood Mitigation.

L.P. Tedesco and M. Babbar-Sebens

Indiana State Department of Agriculture

1/09-1/10      \$38,000

Sustaining Water Resources: Environmental Impacts of Chemical Loadings and Transport during Floods

L.P. Tedesco, M. Babbar-Sebens, and P.A. Jacinthe ( IUPUI)

K. Clay, S. Hall, H. Reynolds, and T. Royer (IU-Bloomington)

Indiana University - Bloomington – IUPUI Intercampus Collaboration in Environmental Research

1/09 – 6/10      \$50,333

Upper White River Watershed Alliance's Watershed Management Planning Project

L.P. Tedesco, Co-PI with Empower Results, LLC. and Context, LLC.

Indiana Department of Natural Resources, Lake and River Enhancement Program

1/08-12/09      \$89,000

Cyanobacterial Ecology and Toxicology of Central Indiana Reservoirs

L.P. Tedesco and N. Clercin

Veolia Water Indianapolis

1/09-12/09      \$158,982

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

7/07-6/09      \$49,995

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. Grutmacher (KWB); and E. Soyeux (Veolia) (with P. Vidon and P-A Jacinthe – IUPUI)

7/07-9/09      \$265,608

### ***Research Contracts***

Development of Restoration and Mitigation Plans for Streams and Wetlands on Indianapolis Park Properties

Indianapolis Parks Foundation, Inc.

12/07-12/12      \$13,500 + work package amendments

6/09-6/10      Amendment 1 - \$119,460



IUPUI Sustainability Benchmarking and Water Resource Research and Training  
Veolia Water Indianapolis, LLC.  
1/08 – 6/09     \$112,447

### **2009 Science Education and Public Outreach Activities**

#### ***Abstracts***

Furge, B.A., Tedesco, L.P., Salazar, K.A., Middle-school Environmental Education, Research Grade Technology, and the Digital Age, 38th Annual Meeting North American Association for Environmental Education, Portland, Oregon, October 2009.

Salazar, K. A., Barr, R.C., and Tedesco, L.P., 2009, Fostering Environmental Restoration and Stewardship through Service-Learning: First Annual Chapter Meeting of the Midwest-Great Lakes Society for Ecological Restoration Chapter, Indianapolis, April 2009.

Salazar, K.A. and Furge, B.A., 2009. Discovering the Science of the Environment: Integrating Technology and Environmental Education in Outdoor Learning Environments, Hoosier Association of Science Teachers, Indianapolis, IN, February 2009.

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

Discovering the Science of the Environment Teacher Professional Development Institute, Indianapolis, June, 2009.

Discovering the Science of the Environment Winter Workshop, Indianapolis, February, 2009,

Eagle Creek Watershed Alliance Project WET / Veolia Waterbox Teacher Training, Indianapolis, February, 2009.

#### ***Invited Talks***

“IUPUI Sustainability” Campus Community Life Presentation, December, 2009.

“Campus Sustainability Town Hall”, IUPUI, October, 2009.

“Eagle Creek Reservoir and Watershed” Presentation and Tour, Project WET and Indy Parks From Source to Tap Workshop, Indianapolis, IN, June 2009.

“Indianapolis E-Waste Program,” WISHT-TV Daybreak Interview, April, 2009.

“Environmental Service Learning and Discovering the Science of the Environment,” Eagle Creek Watershed Alliance Project WET / Veolia Waterbox Teacher Training, Indianapolis, February, 2009.

“IUPUI Campus Sustainability Initiative”, Campus Carbon Neutral Workshop, IU Law Environmental Law Society, IUPUI, January, 2009.

### ***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.

#### **Spring and Fall 2009 Service Learning Tracking:**

- 20 Projects
- 595 Students
- 5 Project Partners
- 10 Courses
- 15 Sections
- 4 Departments
- 3 Schools

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

The 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.

During the Spring and Fall 2008 field seasons, science and technology programs with the Discovering the Science of the Environment trailer engaged:

- **19 schools**
- **9 different grade levels**
- **2,815 students**

### ***Education Outreach Events***

National FFA Tour, October 2009

Water Quality Awareness Day, October 2009

IUPUI White River Float Trip, September 2009

Discovering the Science of the Environment Professional Institute, June 2009

IUPUI Tox Away, April 2009

Mayor's Lunch for Indy Parks, March 2009

Pike Community Schools Math and Science Night, February 2009

Discovering the Science of the Environment Winter Workshop, February 2009

Hoosier Association of Science Teachers Conference and Presentation, February 2009

### ***Education and Teaching Grants***

#### **Wetlands Education Workshops**

Indiana Department of Environmental Management  
J.F. New and Associates, Inc.  
5/08-9/08                      \$8,999

#### **The GK-12 Urban Educators Program at IUPUI: Teaching and Learning Science through Research**

K. Marrs, L.P. Tedesco, A. Gavrin, J. Watt, P. Crowell, S. Rhodes  
National Science Foundation  
2/08-2/12                      \$2,993,160

### **Awards and Recognitions**

Outstanding Achievement Award for Outstanding Contribution to Indiana's Water Resource Community,  
Indiana Water Resources Association, Tedesco

Indiana Water Conservationist of the Year, Indiana Wildlife Federation, Tedesco

Howard Michaud Award for Lifetime Achievement in Environmental Education, Environmental  
Educators of Indiana, Tedesco

### **Advisory Boards and Committees**

#### ***Professional***

State of Indiana, Natural Resource Conservation Service, State Technical Committee, 2009-  
present, Tedesco

State of Indiana, Department of Environmental Management, Nutrient Technical Advisory  
Group, 2009 – present, Tedesco

State of Indiana, Department of Agriculture, Technical Advisory Group, 2009 – present, Tedesco

Indiana State Water Monitoring Council Board of Directors, Founding Member, 2008 – present,  
Tedesco

Laura Hare Charitable Trust, Trustee, 2006 – 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

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

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

State of Indiana Water Pollution Control Board, Department of Environmental Management,  
Wetland Science Advisory Group, 2004 -2009, Tedesco

State of Indiana Solid Waste Management Board, Gubernatorial Appointee, 2003-present, Tedesco

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

Indianapolis Tree Board, 2006-present, Barr

Veolia Water Indianapolis Technical Advisory Board, 2003 – present, Tedesco

## ***University***

Permanent Reviewer, University Research and Sponsored Programs Grant Program, 2008 – present, Tedesco  
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  
Mexico Interest Group, 2008-present, Salazar  
Staff Council, 2008-present, Salazar  
Center for Research and Learning, Board of Directors, 2004 – 2009, Tedesco

## ***School***

Bachelor's of Science in Environmental Science, Program Director, 2006 - present, Tedesco  
Technology Committee, 1993 – present, Tedesco, Hall

## **Student Activities**

### ***Scholarship Awards***

Jennifer Cusick , Carl H. Johnson Achievement Scholarship

Jacob Lemon, Central Indiana Technical and Environmental Societies Scholarship

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

Slawa Bruder

Research Focus: Managing Eutrophication and Human Health Impacts in Central Indiana Reservoirs  
Advisor, Dr. Meghna Babbar-Sebens

Angie Cowan, *GK-12 Scholar*

Research Focus: Physicochemical and biological assessment of Eagle Creek, Geist and Morse Reservoirs, Indiana.

Advisor, Dr. Lenore Tedesco

Andrew Gamble

Research Focus: Use of multivariate techniques to analyze water quality or water flow in the White River Watershed, Indiana.

Advisor, Dr. Meghna Babbar-Sebens

Susan Gidley

Research Focus: Use of Quickbird Satellite Imagery to map aquatic vegetation in northern Indiana lakes.

Advisor, Dr. Jeffrey Wilson

Joseph Johnstone

Research Focus: Examining nutrient export patterns during storms in Eagle Creek Watershed, Indiana.

Advisor, Dr. Philippe Vidon

Deborah Morrison

Research Focus: Correlating high lead blood levels in children in an urban setting using geospatial analysis and geographically referenced health data.

Advisor, Dr. Gabriel Filippelli

Tony Robertson

Research Focus: Development of Bio-optical and Modified Gaussian Models for the prediction on cyanobacterial concentration.

Advisor, Dr. Lin Li

Andrea Schilling, *GK-12 Scholar*

Research Focus: Determining Paleo-ice flow paths using Zircon geochronology, West Antarctica.

Advisor, Dr. Kathy Licht

Allyson Smith, *GK-12 Scholar*

Research Focus: Investigating nutrient conversion from agricultural runoff using constructed wetlands.

Advisor, Dr. Pierre-Andre Jacinthe

Mike Stouder

Research Focus: Investigation of nutrient export dynamics in a large scale watershed dominated by agriculture, Upper White River Watershed, Indiana.

Advisor, Dr. Lenore Tedesco

Shuangshuang Xie

Research Focus: Remote Sensing of Global Warming Affected Inland Water Quality

Advisor, Dr. Meghna Babbar-Sebens

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

Dustin Asche, BS, Construction Engineering Management Technology

Daniel Bowman, BS, Psychology - *Funding by Sam H. Jones Community Service Scholarship Program as Service Learning Assistant*

Jennifer Cusick, BS, Mechanical Engineering - *Funding by Sam H. Jones Community Service Scholarship Program as Service Learning Assistant*

Jacob Lemon, BS, Environmental Science

W. Ryan McAtee, B.G.S.

Shruthi Munsunuri, MS, Biomedical Engineering

Mark Sparks, BS, Geology

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

## **Appendices**

CEES Community 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

### Robert Bowen

Chairman and Chief Executive Officer  
Bowen Engineering Corporation  
*bob@bowenengineering.com*

### William Brown

Director of Sustainability  
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*brownwm@indiana.edu*

### Susan Cornacchione

Vice President of Development  
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### Vince Griffin

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### Tim Hewitt

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### Lori Kaplan

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### Neil B. Myers

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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*

## Staff

### Robert Barr

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

### Nicolas Clercin

Research Scientist  
*Algal Ecology, Limnology*  
*nclercin@iupui.edu*

### Brooke Furge

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

### Bob E. Hall

Systems Engineer  
*Wetland Restoration, Water Quality Monitoring, GIS,*  
*Remote Sensing, Technology*  
*bhall@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  
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# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise

### **Dr. Meghna Babbar-Sebens**

*Assistant Professor of Earth Sciences, IUPUI*  
Water Resources and Environmental Systems Analysis,  
Environmental Risk Assessment and Management, Contaminant Fate  
and Transport Modeling, Uncertainty Analysis, Surface and Groundwater  
Hydrology, Optimization, and Decision Support Systems

Ph.D., University of Illinois at Urbana-Champaign, 2006  
M.S., University of Illinois at Urbana-Champaign, 2002  
B.E., Indian Institute of Technology, Roorkee, India, 2000

Research is focused on the fate and transport modeling of water-borne contaminants, and assessment and management of associated ecological and human health risks. Dr. Babbar-Sebens research focuses on a) analysis of uncertainty when models are used to conduct spatially referenced systems-scale environmental assessments, b) incorporation of uncertainty analysis within decision support systems used for risk assessment and management, and c) optimization of planning and management strategies for emergency response and water-borne disease prevention.

### **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**

*Professor, Dean of the IUPUI School of Liberal Arts*  
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.

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# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

### **Dr. Ross A. Brittain**

*Adjunct Faculty, IUPUI*

*Indiana Director of Bird Conservation, National Audubon Society*

*Applied Ecology, Wetland Ecology, Ornithology, Conservation Biology, Community Ecology*

Ph.D., Indiana University at Bloomington, 2009

M.P.A. & M.S.E.S, Indiana University at Bloomington, 2006

B.A., Indiana University at Bloomington, 1991

Design spatially-explicit and species-specific bird conservation plans for the State of Indiana as the Director of Bird Conservation for the National Audubon Society. Coordinate and conduct land stewardship activities and monitoring research of bird species of concern as part of ongoing adaptive management strategies in Important Bird Areas across Indiana. Coordinate research of Northern Saw-whet Owl (*Aegolius acadicus*) migrations patterns and demographics across Indiana. Use stable isotopes of C, N and D to assess avian food webs and habitat relationships.

### **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.

### **Nicolas Clercin**

*Research Scientist, Phytoplankton Ecology*

*Center for Earth and Environmental Science, IUPUI*

*Limnology, Phytoplankton ecology, Cyanobacteria, Toxicology, Nutrients Cycling, Algae Taxonomy*

M.S., University of Rennes, France, 2005

B.S., University of Rennes, France, 2002

Research interests focus on the ecology of freshwater phytoplankton with emphasis on understanding the environmental factors triggering the growth of the microalgae. Algae blooms in freshwater are predominantly cyanobacteria (blue-green algae), some of which produce potent cyanotoxins and pose a potential risk to human health through exposure from recreational use, drinking water, fish consumption, and other vectors.

### **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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# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

### **Dr. Sapna Deo**

*Assistant Professor, Chemistry and Chemical Biology, IUPUI*

Ph.D., University of Kentucky, Lexington, 2000

Ph.D., University of Bombay, India, 1994

B.S., University of Bombay, 1992

Dr. Deo's research is at the interface of analytical chemistry and biological chemistry with the goal of developing novel bioanalytical techniques employing luminescent and fluorescent proteins. Specifically, she is working on development of sensing systems for different classes of RNAs, including microRNAs, mRNAs, rRNAs, and siRNAs. Research capitalizes on high sensitivity of detection associated with luminescent proteins and combining it with one step detection methods such as protein reassembly and bioluminescence resonance energy transfer in order to develop highly sensitive as well as fast detection methods for nucleic acids. The research interest of her group is interdisciplinary in nature, utilizing analytical chemistry, molecular biology, and protein engineering tools in the development of sensing technologies for targets of biomedical, diagnostics, and environmental relevance.

### **Dr. Gabriel Filippelli**

*Professor of Earth Sciences, IUPUI*

*Chairperson, Department of Earth Sciences, IUPUI*

*Environmental Chemistry, Paleoceanography, 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.

### **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.

### **Dr. Dominique M. Galli**

*Associate Professor in Department of Oral Biology, Indiana University School of Dentistry*

*Faculty Fellow, Office of the Executive Vice Chancellor and Dean of Faculties*

*Periodontal Pathogens*

PhD. in Microbiology, Ludwig Maximilians-Universität

M.S. in Biology, Ludwig Maximilians-Universität

Research is focused on the use of plasmids and other mobile genetic elements to develop molecular biological and genetic tools that will allow for an investigation of the functionality and regulation of putative *Aa* virulence traits. The use of these genetic tools has been crucial in the initiation of the following three projects: *Aa*-neutrophil interaction, Characterization of biofilms formed by *Aa*, Conjugative transfer in mixed biofilms.

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# 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. 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.

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# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

### **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. 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.

### **Kara Salazar**

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

M.S.Ed., IUPUI, 2007  
M.P.A., Indiana University, 2002  
B.S., Indiana University, 1999

Efforts include developing, implementing, and evaluating environmental science curriculum, outreach programs, and institutes for K-12 students and teachers, university students, community members, and environmental professionals with emphasis placed on urban and multicultural education. Outreach programs include environmental service learning coordinated in conjunction with community partners and the Discovering the Science of the Environment program. Environmental science research interests include wetland, riparian, and prairie restoration projects, wetland delineation, vegetation monitoring, and environmental sustainability efforts.

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# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

### **Dr. Joshua Smith**

*Assistant Professor of Educational Psychology, IUPUI*

*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.

### **Dr. Lenore Tedesco**

*Associate Professor of Earth Sciences, IUPUI*

*Director, Center for Earth and Environmental Science*

Water Resources, Wetland Ecosystem Restoration, Environmental Education, Sedimentology

Ph.D., University of Miami, 1991

B.A., Boston University, 1984

Research focuses on regional watershed and water quality issues with a focus on surface water and drinking water resources. Current research efforts are evaluating the distribution of emerging contaminants and cyanobacteria toxins in central Indiana surface waters. Wetlands and wetland restoration including evaluation of restoration strategies and wetland function are important research interests. This includes studies of urban riparian reforestation, fen wetland restoration, and on the distribution of anthropogenic pollutants. 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 interests.

### **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. Gwen M. White**

*Adjunct Faculty, IUPUI*

Water Resources, Communication & Public Relations

Ph.D., University of Minnesota, 1996

M.S., University of Maryland, 1988

B.A., Goshen College (Indiana), 1984

Research focuses on water resource management, land use impacts, conservation biology, invasive species, and marine ecology. Outreach activities include development and implementation of communication plans, public relations campaigns, strategic planning, public participation, collaborative consensus-building, environmental education, and policy analysis for natural resource agencies and organizations.

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# CENTER FOR EARTH AND ENVIRONMENTAL SCIENCE

## Research Expertise, Continued

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**Dr. Jeffrey S. Wilson**

*Associate Professor of Geography, IUPUI*

*Chair, Department of Geography*

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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# CEES Partners in Research, Education, and Philanthropy

## Research Partnerships

- 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 State Department of Agriculture
- Indiana University School of Medicine – Center for Environmental Health
- Veolia Environment Research Centers – Paris, Adelaide, and Berlin

## Not-for Profits

- Central Indiana Land Trust Incorporated (CILT)
- Sycamore Land Trust
- 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

## Foundations

- Dr. Laura Hare Charitable Trust\*
- Nina Mason Pulliam Charitable Trust\*
- Eli Lilly and Company Foundation\*
- Duke Energy Foundation\*
- Hoover Family Foundation\*
- Nicholas H. Noyes, Jr., Memorial Foundation\*
- Efroymsen Fund of the Central Indiana Community Foundation\*
- UPS

*\*Denotes Major Donor*

## State and Local Government

- IDNR – Natural Resources Education Center
- Indiana State Department of Health
- Natural Resources Conservation Service
- Indiana State Museum
- City of Indianapolis - Department of Public Works – Office of Environmental Services
- City of Indianapolis, Office of Sustainability
- Indy Parks and Greenways
  - Environmental Education Outreach 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
- Marion and Boone County Health Departments

## Corporations

- Eli Lilly and Company\*
- Veolia Water Indianapolis\*
- Veolia Water North America
- Dow AgroSciences\*
- IPL\*

## 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 Charter Schools
- Indiana School for the Blind

**Center for Earth & Environmental Science**
**REVENUE & EXPENSE REPORT - FISCAL YEAR 2005-2010**

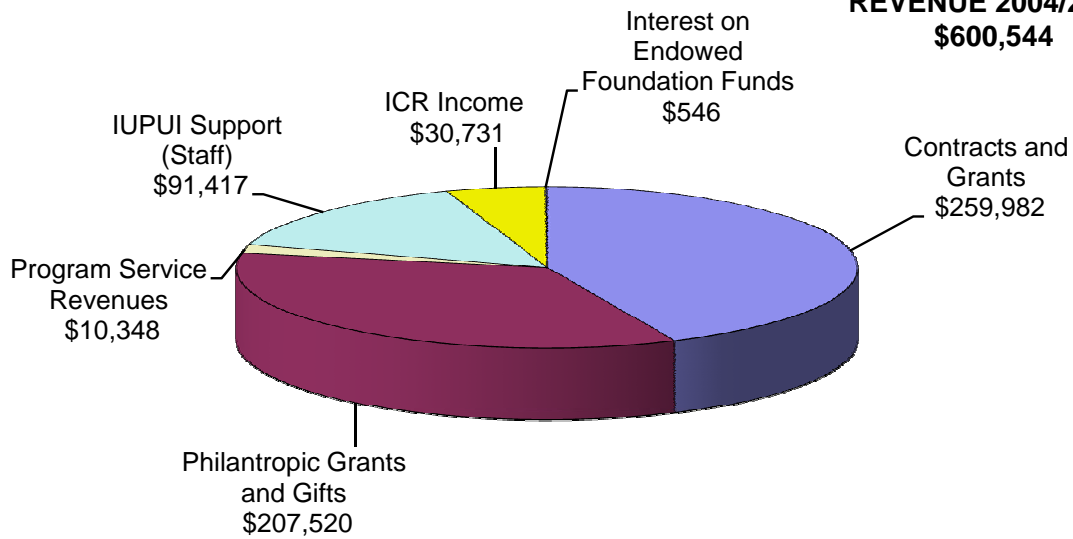
	FISCAL YEAR 2004/2005	FISCAL YEAR 2005/2006	FISCAL YEAR 2006/2007	FISCAL YEAR 2007/2008	FISCAL YEAR 2008/2009	FISCAL YEAR 2009/2010
<b>REVENUE</b>						
<b>SOURCE</b>						
Government Grants and Contracts	\$ 9,982	\$ 64,128	\$ 158,916	\$ 218,286	\$ 126,336	\$ 140,375
Non-government Grants and Contract:	\$ 250,000	\$ 366,622	\$ 336,683	\$ 590,333	\$ 497,597	\$ 443,531
Foundation Gifts	\$ 189,850	\$ 35,000	\$ 200,350	\$ 118,000	\$ 101,050	\$ 141,000
Corporate Gifts	\$ 3,670	\$ 2,725	\$ 104,000	\$ 121,000	\$ 15,579	\$ 1,050
Individual Gifts (36, 42, 29,27,22)	\$ 14,000	\$ 27,008	\$ 6,490	\$ 8,898	\$ 4,490	\$ 4,390
Program Service Revenues	\$ 10,348	\$ 22,080	\$ 30,602	\$ 44,291	\$ 69,812	\$ 5,100
IUPUI Support (Staff)	\$ 91,417	\$ 102,799	\$ 69,218	\$ 72,746	\$ 73,361	\$ 73,361
ICR Income	\$ 30,731	\$ 61,462	\$ 61,462	\$ 30,731	\$ -	\$ 3,390
Interest on Endowed Foundation Funds	\$ 546	\$ 659	\$ 764	\$ 822	\$ 813	\$ 739
<b>TOTAL</b>	\$ 600,544	\$ 682,483	\$ 968,485	\$ 1,205,107	\$ 889,038	\$ 812,936
<b>EXPENSES</b>						
<b>ITEM</b>						
Faculty Salaries	\$ 54,081	\$ 78,082	\$ 103,813	\$ 154,674	\$ 145,550	\$ 117,160
Student Academic Salaries	\$ 24,700	\$ 66,500	\$ 52,234	\$ 50,967	\$ 37,714	\$ 16,250
Professional Salaries	\$ 105,808	\$ 125,523	\$ 138,285	\$ 149,902	\$ 109,623	\$ 132,346
Biweekly, and Hourly Wages	\$ 41,671	\$ 101,719	\$ 125,178	\$ 92,494	\$ 41,431	\$ 64,559
Benefits & Payroll Taxes	\$ 59,879	\$ 74,321	\$ 71,438	\$ 100,986	\$ 102,059	\$ 78,904
Student Fee Remission	\$ 5,693	\$ 13,893	\$ 31,184	\$ 13,149	\$ 11,848	\$ 14,565
Consultants\Professional Fees\Subcontracts	\$ -	\$ 2,500	\$ 52,100	\$ 33,033	\$ 75,857	\$ 48,063
Office Supplies and Expenses	\$ 11,770	\$ 19,766	\$ 16,107	\$ 26,910	\$ 13,231	\$ 10,460
Printing, Copying	\$ 595	\$ 6,123	\$ 7,094	\$ 11,134	\$ 7,209	\$ 2,813
Research, Lab and Field Supplies	\$ 55,850	\$ 112,460	\$ 44,156	\$ 76,628	\$ 91,884	\$ 220,534
Equipment <\$5,000 & Maintenance	\$ 63,281	\$ 73,172	\$ 64,042	\$ 100,336	\$ 21,350	\$ 14,108
Capital Equipment	\$ 23,558	\$ 52,721	\$ 17,110	\$ 72,814	\$ 7,621	\$ -
Travel & Training	\$ 22,569	\$ 29,219	\$ 29,071	\$ 41,889	\$ 38,167	\$ 23,361
Project Development	\$ 4,003	\$ 10,634	\$ 5,684	\$ 14,083	\$ 8,850	\$ 6,203
ICR Expenses	\$ 88,893	\$ 99,602	\$ 90,652	\$ 148,022	\$ 58,745	\$ 49,127
<b>TOTAL</b>	\$ 562,351	\$ 866,235	\$ 848,148	\$ 1,087,021	\$ 771,141	\$ 798,453
<b>NON-REVENUE GENERATING FUNDS</b>						
Endowed Foundation Funds	\$ 14,320	\$ 16,103	\$ 19,407	\$ 21,056	\$ 13,485	\$ 15,558
Account Reserves (Encumbered Grant Funds)	\$ 297,216	\$ 150,945	\$ 337,219	\$ 214,891	\$ 140,008	\$ 220,176
In-Kind Support	\$ 127,617	\$ 198,026	\$ 181,073	\$ 331,488	\$ 247,141	\$ 264,957
<b>TOTAL</b>	\$ 439,153	\$ 365,074	\$ 537,699	\$ 567,435	\$ 400,633	\$ 500,691

^ Income actual based on existing grants/gifts

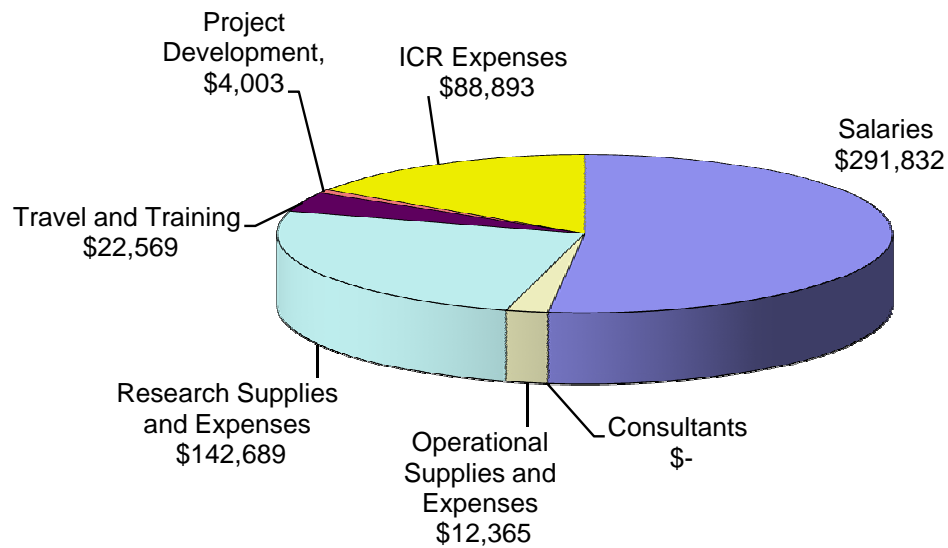
Revenue from contracts and grants is based on award amount evenly divided among fiscal years of award. This does not match expenses.

Note - no Internal Grant Funds Shown

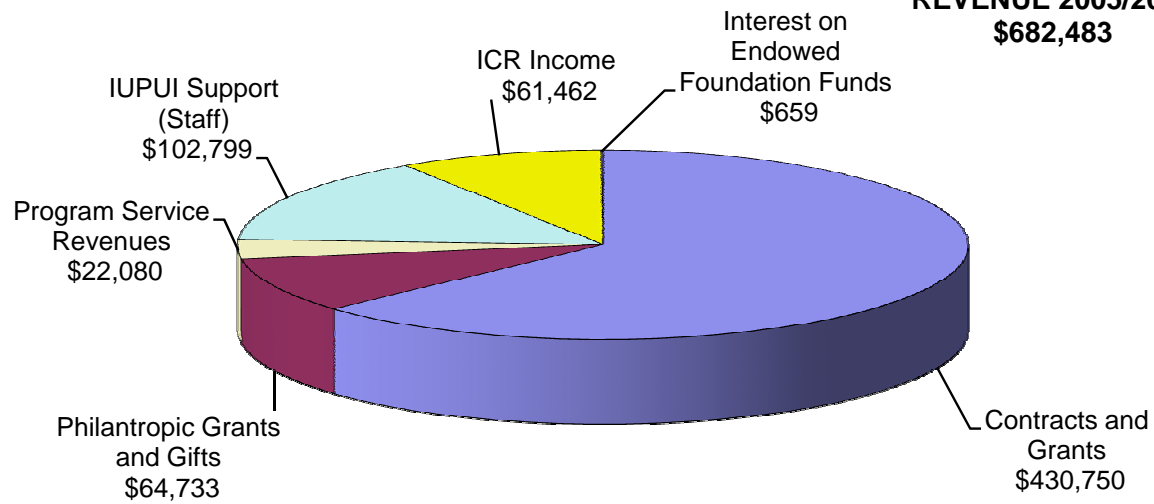
**REVENUE 2004/2005**  
**\$600,544**



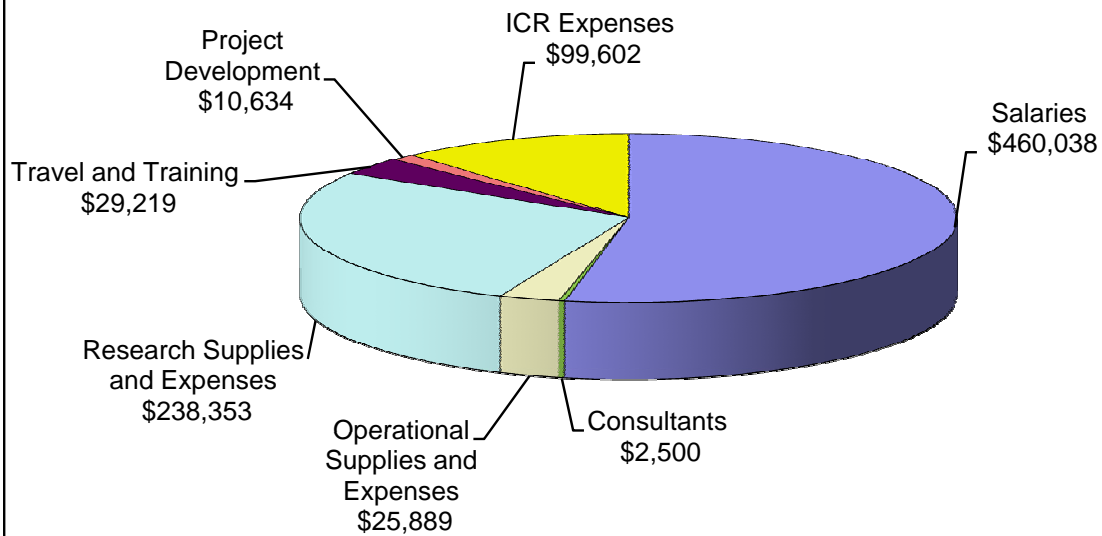
**EXPENSES 2004/2005**  
**\$562,351**



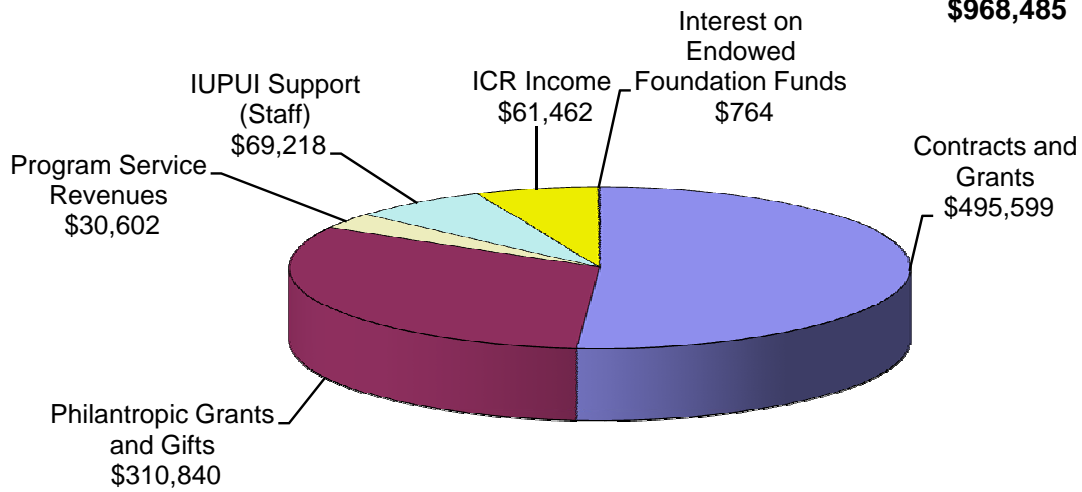
**REVENUE 2005/2006**  
**\$682,483**



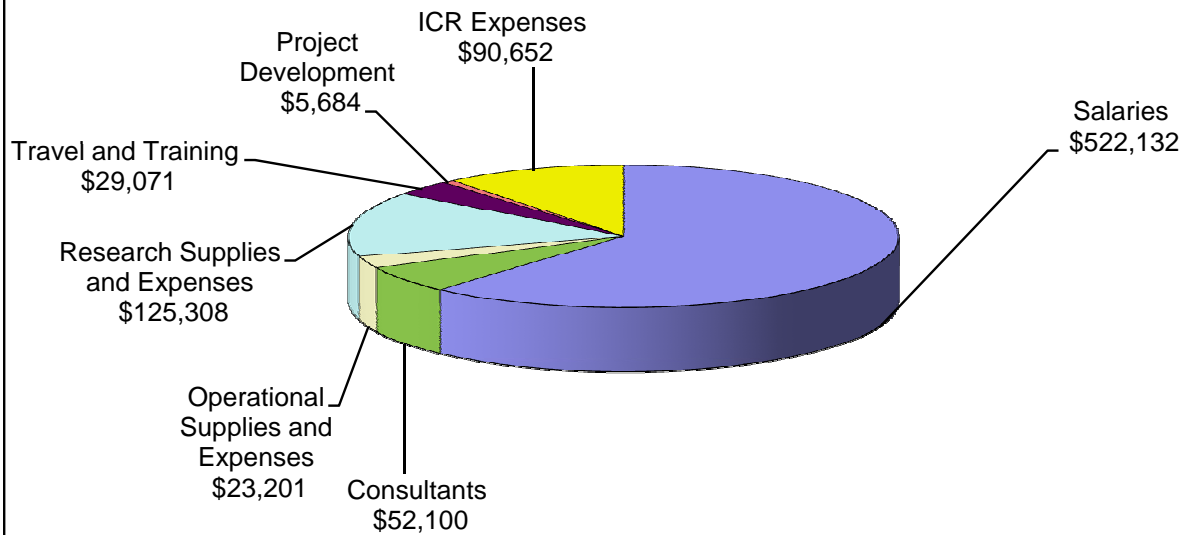
**EXPENSES 2005/2006**  
**\$866,235**



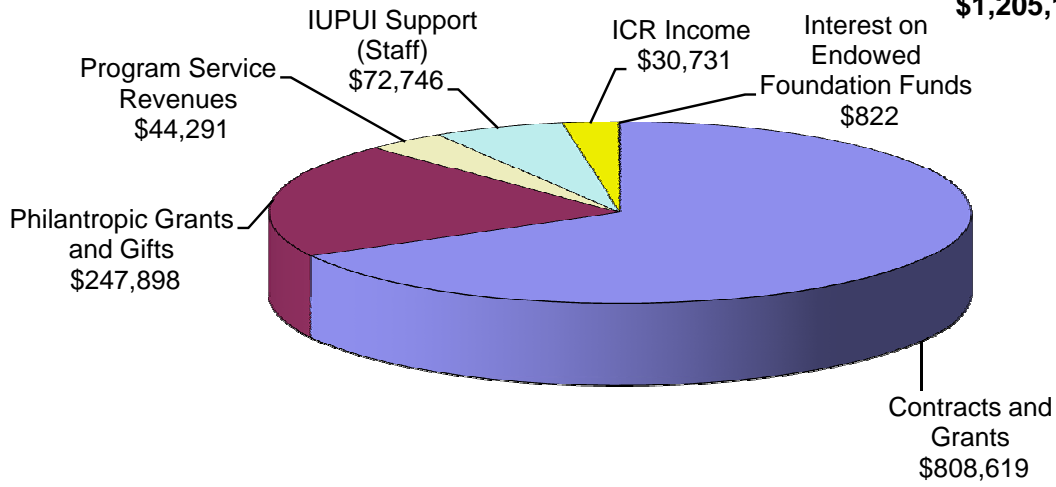
**REVENUE 2006-2007**  
**\$968,485**



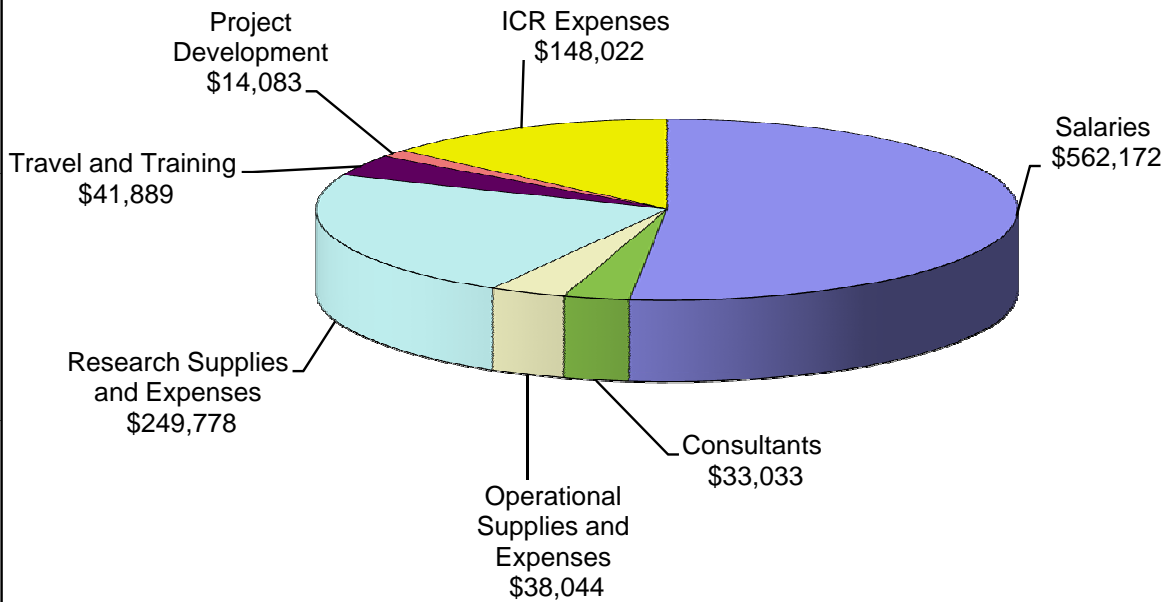
**EXPENSES 2006-2007**  
**\$848,148**



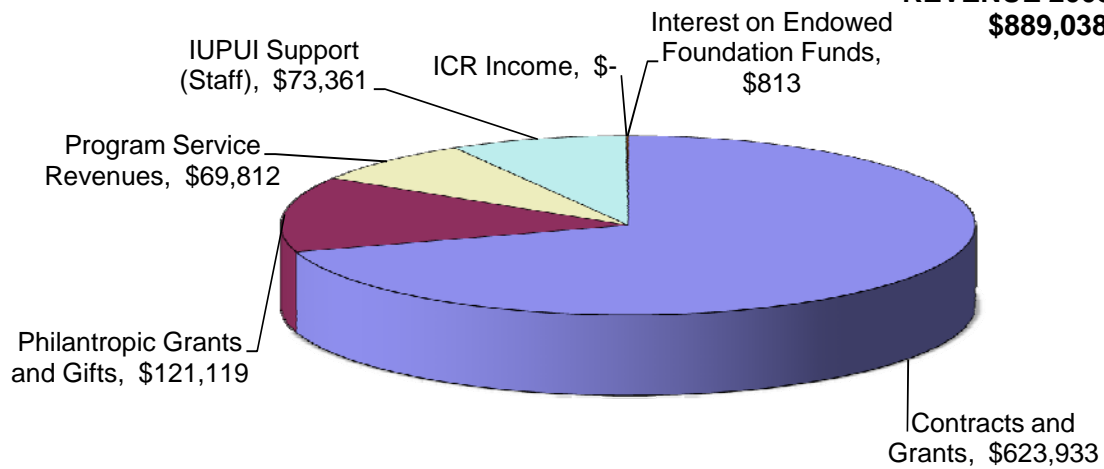
**REVENUE 2007-2008**  
**\$1,205,107**



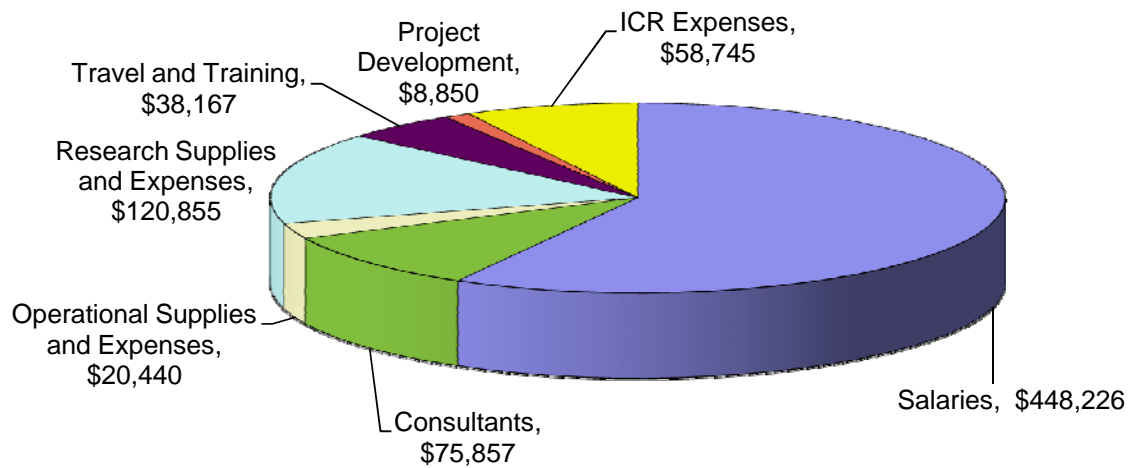
**Expenses 2007-2008**  
**\$1,087,021**



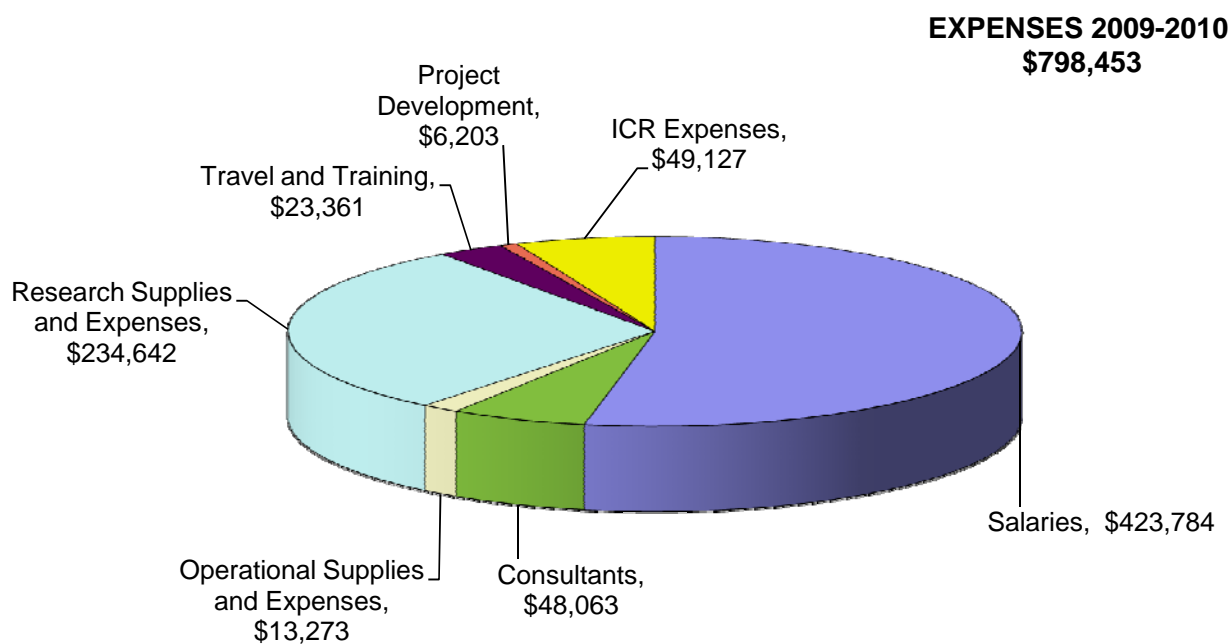
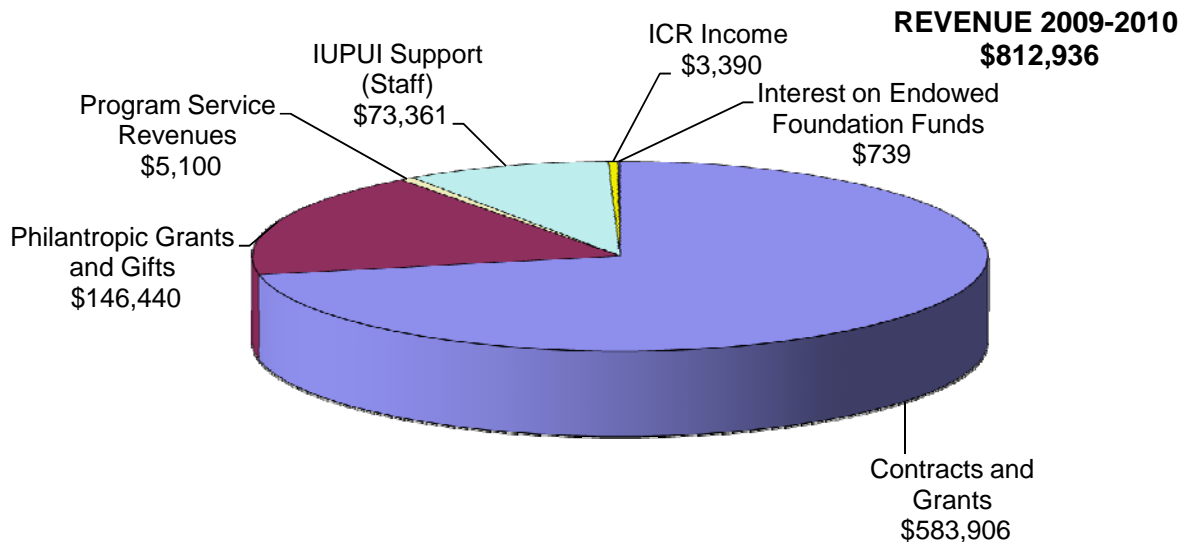
**REVENUE 2008-2009**  
**\$889,038**



**EXPENSES 2008-2009**  
**\$771,141**









CEES



2009