Kathleen Suozzo
Rensselaer’s First Female Environmental Engineering graduate

Kathy Suozzo became RPI’s first female environmental engineering graduate in 1971 and now has over thirty years of engineering expertise in environmental and civil disciplines with emphasis in municipal facilities design, water and wastewater treatment processes, their associated physical facilities and regulatory compliance.

Since 1986, Kathy and her civil-engineer husband James, have managed their own civil and environmental engineering consulting firm. The evolution of that business has resulted today in a 40+ person engineering and facilities operation, Cedarwood Engineering Services and Delaware Operations. Mrs. Suozzo now functions as a senior engineer at Cedarwood.

Typical projects she has directed throughout her career include: environmental studies, water and wastewater treatment facilities design, municipal buildings from the design phase through progress inspections to completion and occupancy, and facilities commissioning. Her experience includes projects throughout New York State, New England, Washington State, Florida State, and other nutrient-sensitive watersheds.

Prior to forming her own firm in 1987, Ms. Suozzo worked with the NYS Department of Environmental Conservation as a Water Quality Engineer. In addition she has been affiliated with several industrial facilities and has taught high school science classes in Upstate New York.

Recently returning to Rensselaer to lecture in Dr. Nyman’s Intro to Environmental Engineering course, Ms. Suozzo spoke eloquently of her education and preparation for a career in water and she continues to pursue advanced course work along the spectrum of related fields. Ms Suozzo also became the latest member of the CEE Department’s Advisory Council.

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When asked what inspires **Dr. Philippe Baveye** about environmental engineering he preferred to use the term passion. He is passionate about the environment and how we human beings choose to live in it. In a perfect universe human beings would have found a way to live in harmony with their environment and only engage in sustainable activities that preserve our environment for future generations. Baveye sees the profession of environmental engineering becoming increasingly more active in preventing problems rather than focusing on cleaning them up. This would be a huge shift in how we structure the education system in regards to understanding how the entire environmental system works and foreseeing future problems before they arise. The prospect of a complete renewal of environmental engineering education in a very different institutional and intellectual context, enthuses me and should be exciting to all environmental engineers.

Prof. Baveye has been at Rensselaer for three years, serving as the Kodak Chair Professor, and has focused his research in three key areas. The first is engaged in leading a global effort to change the perspective researchers adopt when they consider the functioning of soils, for example in terms of carbon sequestration or filtration of water on its way to aquifers. Traditionally, the approach that is adopted is strictly macroscopic. But that has all changed in recent years due to the advent of instruments like x-ray and gamma-ray scanners. In a second related area, he is collaborating with a number of economists regarding “ecosystems services”. This entails analyzing in some detail the possible consequences of assigning price tags to some aspects of environmental systems and not others. The last area of research, for which funding is currently being sought, concerns Environmental Education and moving to a “problem-based approach” which has students repeatedly confronting real practical environmental issues which forces students to first define the problem, seek additional information for often ill-defined problems and then hone analytical skills to model and then evaluate potential solutions. This approach would much better prepare any prospective environmental engineering student to handle the realities of practice.

If not in academe, Prof Baveye would have a farm, a tractor and grow his own food! While it was growing he would continue his passion of writing articles and books on a variety of topics. One of these topics happens to be working on a new open access journal dealing with soil processes.

Environmental Engineering for **Dr. Yuri Gorby** is clearly the heart of an intersection of disciplines. While advancing the emerging field of "Electromicrobiology", Prof. Gorby believes that one must have knowledge of biology, chemistry, and engineering and a good amount of persistence to address emerging issues related to environmental impact of human activity.

Prof. Gorby was installed as the Howard N. Blitman Professor of Civil and Environmental Engineering at Rensselaer a little over a year ago. His current research spans topics from environmental impact of acid mine drainage to the use of electrically conductive protein filaments called bacterial nanowires as models for nanomaterial development. Dr. Gorby supports a number of graduate and undergraduate researchers through federally funded projects and through the undergraduate research program at Rensselaer.

In a recurring theme for environmental engineers remaining close to their roots, Dr. Gorby, if not in academe, would probably be a farmer, promoting sustainable agriculture while still integrating science with the problems facing society today.
Dr. James Kilduff has been with Rensselaer since the fall of 1996. He has a passion for environmental engineering as the branch of engineering with a mandate to protect human populations from adverse environmental factors and to improve and maintain the environment for the protection of human health and natural ecosystems. As asserted by the National Science Board, the environment—intact, functioning ecological systems—is essential for individual development, the health and well-being of citizens and communities, and the generation of new wealth.

Kilduff’s research focuses on processes to purify water. With graduate student Alison Kennicutt, he is developing statistical models, so-called quantitative structure activity relationships (QSARs), to predict the efficacy of water treatment processes. These models correlate molecular properties, encoded as “descriptors,” with molecular transformation by oxidants, adsorption by activated carbon surfaces, or capture by porous polymeric membranes. Emphasis is on purifying water that contains emerging contaminants—such as pharmaceuticals and endocrine disruptors—that have recently been found in lakes, rivers, and streams across the U.S. QSAR models that relate contaminant properties with removal or transformation in water treatment processes provide a scientific basis for managing water utilities, guiding process selection, design, and communicating with the public. This work is being funded by the Water Research Foundation.

Membrane processes offer versatile and effective ways to improve water quality. Membranes reject the passage of contaminants through a combination of their pore size and electric charge. As a result, contaminants accumulate on the membrane surface, reducing their ability to process water—due to fouling. This flow rate decline can be exacerbated by bacteria that colonize the surfaces and grow biofilms. With Catalina Alvarado, he is investigating ways to mitigate flux decline and biofouling. In collaboration with Dr. Georges Belfort at RPI, surface modification of commercial membranes is pursued using UV and plasma-promoted surface polymerization. A second approach, in collaboration with Dr. Gorby, is to develop new strategies for the control of biofilm growth. This project is funded by NYSERDA and the DOE National Energy Technology Laboratory, in collaboration with Texas A&M University.

What inspires Dr. Marianne Nyman about Environmental Engineering, is being able to be outside and do something good for the environment. Making the world a better place and giving back to the community is her motivation. Prof. Nyman has been with Rensselaer for almost 15 years and currently has three projects in the works. The goal of her research program is to advance the study of hydrophobic organic compounds (HOCs) including their fate, transport and remediation. Several projects that address this goal are:

Gain a better understanding of fate and transport models by using field sampling, experimentation and modeling. This first project studies the combined effects of reaction processes (e.g., biodegradation, photodegradation and sorption/desorption processes) and transport behavior in lakes and freshwater estuaries, in order to develop accurate models for the fate and transport of HOCs. By identifying and understanding factors that contribute to the fate processes, by using biotechnology to enhance the rate of the biodegradation processes, and by developing ways to identify these components in natural water systems, we can better assess remediation of the contaminated environment.

Develop and characterize better, faster, more practical, more cost efficient, and novel sediment remediation processes. The second project tests the feasibility of a hybrid approach for remediation of contaminated sediments or soils. This hybrid technique involves an application of peroxy-acids for treatment of contaminated sediments and soils. This unique advanced-oxidation process (AOP) takes advantage of the synergistic effects of enhanced pollutant desorption and solubility, as well as subsequent pollutant transformation that ultimately leads to more efficient biodegradation.

Develop innovative removal methods for volatile HOCs. Deterioration of indoor air quality (IAQ) is an increasing problem in building, and shelters contributing to the welfare public health. Interdisciplinary work is needed in the development of a phytoremediation system in the removal of volatile organic compounds (VOCs) like formaldehyde and benzene. Both of these compounds are considered toxic and/or carcinogenic. Developing an integrated system to be connected to heating, ventilation, and air conditioning (HVAC) units in a building is an aim of this research in collaboration with RPI’s CASE. In order to address these issues engineers need to work closely with scientists and architects to use innovation in solving this very important societal problem.

If not an academic, Dr. Nyman would choose to be an artist, architect or a middle or high school teacher. If she could go back to college now, she would like to study medicine.
Civil & Environmental Engineers key to RPI’s EWB Chapter

Founded in 2010 Engineers Without Borders EWB @ RPI is making its mark. Currently the organization is focusing on developing a clean and reliable water supply for a small community (350) on the remote island in Bocas Del Toro, Panama. Due to the lack of clean drinking water the community experiences health problems such as kidney pains, skin lesions, dehydration, diabetes, and severe headaches. Working with the community, EWB members performed an alternative analysis on three different water system options utilizing community opinions, technical data, and a feasibility analysis. A rainwater catchment system was the best solution to the community’s water problem.

A pilot rainwater catchment system will be constructed on a large, public and currently unutilized roof. This pilot system is intended to supplement the water supply of the community’s school and school cafeteria. This pilot scheme will be constructed on the next visit to Panama in 2014 and will also function as a model for the community as it extends the program to their own homes and take ownership of both the scheme and their future.

Chapter members have traveled to Panama on three assessment trips where great progress was made: field and lab water testing, mapped the community and surrounding area via GPS, started a Water Board within the community, held community meetings, and partnered with Engineers Without Borders - Panama. Partnering with the Floating Doctors, a Peace Corps volunteer, the Ministry of Health of Panama, the University of Panama, and the Technical University of Panama has established valuable networks for the community and EWB’s work in Panama.

(Pictured are RPI EWB chapter members interacting with members of the Bocas del Toro community in Panama)

Environmental Graduate Students and Current Projects

Catalina Alvarado— (Colombia) Reduction of Different types of Fouling in Water Treatment Membranes via Surface Modification and Biofilm Inhibition

Derek Belanger— (USA) Practical Applications for Treating Complex Wastes

Justin Donlon – (USA) The process of decision-making in situations involving complex environmental problems, specifically assess the extent to which techniques like multicriteria decision analysis and Bayesian Belief Networks can assist decision makers in cases involving contaminated soils or soil degradation.

Claire Superak – (USA) Effect of vanillin on quorum sensing of Aeromonas hydrophila in porous media

Allison Kennicutt– (USA) Evaluating Influencing Factors on Fate and Transport of Organic Contaminants in Water Treatment Processes Using Computational Chemistry Modeling Techniques (WRF)

Paul Pagnozzi– (USA) Environmental Toxicology of Atorvastatin and Alendronate