

Michigan State Student Teams Secure Third and Fourth Place in the Environmental Challenge International

(Written By Becky Larson, Felix Yeboah, Indumathy Jayamani, Biao Chang, Ziqiang Yin, Megan Massa, Jonathan Libby, Elizabeth Brown, and Adarsh Menon)

After a tough competition with 11 teams in the Environmental Challenge International at the 2009 A&WMA 102nd Annual Conference & Exhibition, MSU student teams were able to capture third and fourth place. The competition began early in 2009 with a real-life problem definition concerning Moochville, a theoretical town in Michigan's Upper Peninsula, facing a municipal solid waste handling issue as the local area landfill was quickly running out of space.

The objective of the competition was to design a MSW management plan that was able to treat and/or dispose of MSW adhering to specific environmental, economic, and social aspects in addition to production of renewable energy and sustainability as set forth by the local community, the college, and various role players.

To participate in the competition teams were required to submit a technical paper prior to the A&WMA Annual Conference detailing their selected design and management plan. Judges reviewed the papers and then had the opportunity to ask probing questions and pose theoretical situations concerning the various design aspects during the poster session (where student teams were required to prepare a technical poster), and the final presentation. Their questions gave the judges' insight into the students' knowledge and preparation. During the AWMA Annual Meeting, attended by numerous professionals, students were given a theoretical addition/change to the problem, typical of real-life design situations. In this year's challenge, the added complication was the treatment/disposal of fly ash from the college's coal power plant. This addition assessed the ability of each team to use the conference resources to determine the most practical and efficient design change to meet the new demands.

Teams evaluated various engineering designs including, landfills, mechanical biological treatment (MBT), incineration, and plasma arc technologies to

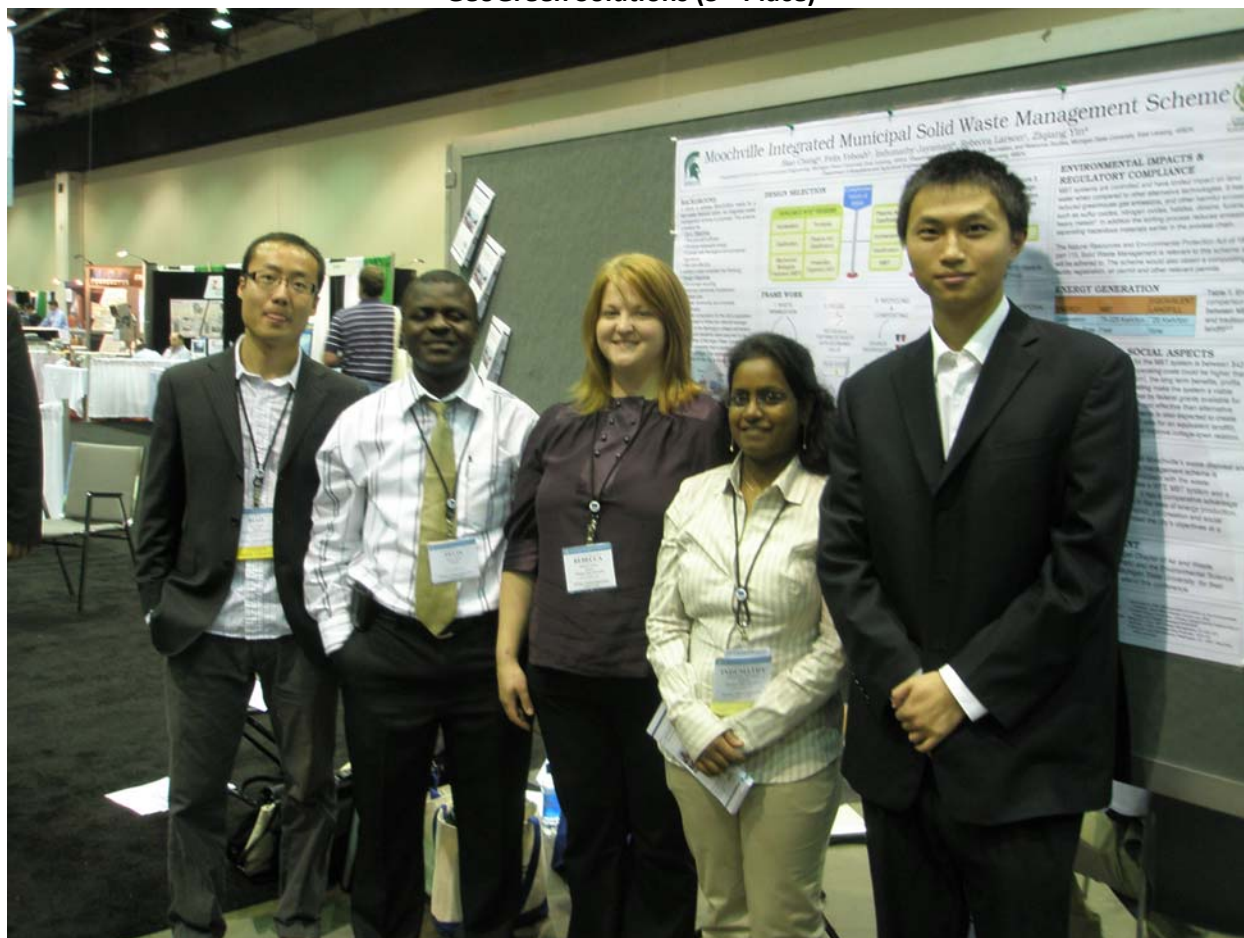
name a few. Each team evaluated the specific technologies for the various objectives that they outlined and selected the most efficient design. In addition, reduction in waste, recycling and reuse, and social programs were integrated into designs.

Each of the two MSU teams developed an engineering design in combination with a social and holistic community management plan to present as a problem solution. Megan Massa, Adarsh Menon, Elizabeth Brown, and Jon Libby made up Garbage Gurus Inc., and won fourth place with their bioreactor landfill design. The novel features of their design included a landfill gas-to-energy plant, a geo-exchange system to utilize the heat generated by the biological processes in the landfill, and a leachate recirculation system to boost the gas generation capability. GeoGreen Solutions, comprised of Felix Yeboah, Indumathy Jayamani, Ziqiang Yin, Biao Chang, and Becky Larson, secured third place using a MBT technology paired with an intensive recycling, reuse, and waste reduction strategy.

The successes of both teams are a result of hard work and detailed research and analysis of the design. Each of the teams spent many hours evaluating various technologies and every aspect of the management plan. The experience expanded the knowledge base of each participant about the difficulties in real-life design and the many aspects that come into play, particularly those outside of the technical realm. The teams would like to thank the East Michigan Chapter for their support in attending and participating in the competition, as well as Dr. Susan Masten, Scott McQuiston, and Ruthie Levy for their encouragement and support.

We would also like to acknowledge financial support from the Departments of Civil and Environmental Engineering, Chemical Engineering and Materials Science, Biosystems and Agricultural Engineering, and the Environmental Science and Policy Program.

GeoGreen Solutions (3rd Place)



From left to right: Biao Chang, Felix Yeboah, Becky Larson, Indumathy Jayamani, and Ziqiang Yin

Biao Chang is currently a master student in Environmental Engineering at Michigan State University. Biao received his bachelor's degree in environmental science from Peking University, China. As an Engineer in Training (EIT), Biao's interests vary from air quality modeling to water/wastewater treatment and water quality modeling. Biao is a member of the Society of Environmental Toxicology and Chemistry (SETAC) and the Air & Waste Management Association (A&WMA). He has previously authored and co-authored several peer-reviewed journal papers on issues of air quality. Biao plans to do more work on water quality issues in the future. He has several papers in preparation related to emerging water contaminants, and he will continue to PhD study on mathematical modeling related to water quality issues.

Felix K. Yeboah received his Bachelors in Natural Resource Management at Kwame Nkrumah University of Science and Technology, Ghana and is currently completing a graduate degree (Community, Agriculture, Recreation and Resource Studies, MS) at Michigan State University focusing on Natural Resource and Environmental Policy. As a John M. Gunn exchange scholar for 2006 at Washington and Lee University, VA, Felix helped to design and implement a comprehensive recycling program and the signing of the Talloires Declaration to promote a campus sustainability culture. He is now working with a team of researchers exploring strategies to promote environmental sustainability initiatives on campus as part of MSU environmental stewardship program. He plans to pursue a PhD in Environment and

Resource Economics and eventually return to his home country. Ultimately, he hopes to positively impact Ghana's and other nation's environmental and natural resource policies and practices so that there can be improved quality of life for resource dependent individuals and improved environmental quality.

Rebecca Larson received her bachelors and masters degrees from the Department of Biosystems and Agricultural Engineering at Michigan State University. Becky is currently a Ph.D. student within the same department. Her focus is on nutrient management, bio-waste processing and treatment, non-point source pollution treatment and control, and biological/soil treatment technologies. Current research includes field and laboratory studies on the attenuation of agricultural runoff by vegetated filter strips. A member of the American Society of Agricultural and Biological Engineers (ASABE), and Air & Waste Management Association (AWMA), she has published a number of peer reviewed journal articles and conference papers. Becky plans to continue her research in a university setting with goals of becoming a faculty member.

Indumathy Jayamani is a masters student in Environmental Engineering at Michigan State University (MSU). She received her Bachelor's degree (Rank: 1/61) in Civil Engineering from Anna University, India. Having been a web maintenance software engineer at Infosys Technologies Ltd, India and a Research Assistant at MSU, Indu has acquired valuable experience in both computing and technical skills. During her

undergraduate degree she worked on rain water harvesting, residential construction and medical waste management projects. Her graduate research work seeks to identify biomarkers for RDX biodegradation. Currently an Environmental Steward at MSU, her areas of interests include remediation, sustainability, waste management and community outreach. As an Engineer In Training (EIT), Indu is a member of the American Society of Civil Engineers (ASCE) and the Air & Waste Management Association (AWMA). She will intern at the Office of Campus Sustainability this fall '09 on The Green Certification Initiative for Science and IT. She is seeking employment in areas of hazardous waste remediation and solid waste management.

Ziqiang Yin is first-year master student majoring in Environmental Engineering at Michigan State University. He received his bachelor's degree in Environmental Engineering from Zhejiang University, China where his undergraduate dissertation was awarded as the "Excellent Graduate Dissertation." Currently, Ziqiang is working on the Balkan Endemic Nephropathy (BEN). The cause of BEN remains a mystery, but researchers seem to agree that exposure to one or more environmental agents is at least partially responsible. By utilizing certain technique of Geographic Information System (GIS), several assumptions from previous literature can be confirmed or denied by the correlation analysis. After then, he will continue his research by using some methods of Geo-chemistry and toxicology, and ultimately figure out the etiology of BEN.

Garbage Gurus Inc (4th Place)



From left to right: Adarsh Menon, Jonathan Libby, Elizabeth Brown, and Megan Massa)

Adarsh Menon recently graduated with a BS in Civil Engineering with an Environmental Specialization from MSU. He will be joining the Pennsylvania Dept. of Transportation as a Civil Engineer Trainee in August. His future plans are to pursue a MS in Environmental Engineering and become actively involved in A&WMA and ASCE as a young professional.

Jonathan Libby recently received his LEED accreditation which he plans to use to develop designs that will promote biodiversity and reduce environmental impacts. He currently works on the municipal infrastructure team at C2AE in Lansing, and will be graduating with a BS in Civil Engineering this December. Jon plans to continue to stay involved with A&WMA as well as American Society of Civil Engineers (ASCE).

Elizabeth Brown is pursuing a BS in Chemical Engineering at MSU. She would like to have an impact on the environment and considers the success in the Environmental Challenge International as a first step towards her goal.

Megan Massa is an undergraduate student in Chemical Engineering, with an option in Environmental Engineering, at Michigan State University. She is currently co-president of the student chapter at MSU. Megan's interests lie in waste management, remediation, and alternative energies among other things. She is working at Granger Waste Management Co. for the summer, and looks forward to a career as an environmental professional.