

Active involvement to develop understanding, build water quality awareness, and implement strategic measures within communities in Charlotte-Mecklenburg to engage citizens toward achieving stormwater program goals and improving water quality

Start Date: November 2019

End Date: June 30, 2021

Budget Request: \$75,000

Agency

Regional Stormwater Partnership of the Carolinas -Nonprofit 501c(3)
6012 Bayfield Parkway, Suite 220
Concord, NC 28027
Facilitator for RSPC: Rising Solutions, PLLC
<https://regionalstormwater.org/>

Principal Investigator

Regina C. Guyer, P.E.
President
Rising Solutions, PLLC
Facilitator, Regional Stormwater Partnership of the Carolinas
2414 Westminister Drive
Concord, NC 28027
704-701-2270
Regina.Guyer@RisingSolutionsPLLC.com

Co – Investigators

Philip Otienoburu, PhD
Assistant Professor of Biology
Director, Center for Renewable Energy and Sustainability
Johnson C. Smith University
100 Beatties Ford Road
Charlotte, NC 28216
704-378-1150
potienoburu@jcsu.edu

Kari Guyer, PhD
VP of Chemistry and Engineering
Rising Solutions, PLLC
2414 Westminister Dr.
Concord, NC 28027
704-701-1715
Kari.Guyer@RisingSolutionsPLLC.com

Project Concepts by the Regional Stormwater Partnership of the Carolinas (RSPC) 501c(3)

The Regional Stormwater Partnership of the Carolinas (RSPC), a 501c(3) non-profit organization of 18 municipalities, presents a project concept for actively involving citizens to develop understanding, build water quality awareness, and implement strategic measures within their communities in Charlotte-Mecklenburg.

Research Goal

The project will create a collaborative framework together with local citizens to improve their communities by implementing stormwater program goals and water quality improvement strategies that other SWG members, RSPC members, and municipalities can use to achieve NC Department of Environmental Quality (NC DEQ) permit requirements.

Technical Approach from Awareness to Behavior Change to Improve Water Quality and Quality of Life

Our approach will be to bring a series of project elements to SWG that can inform shared discernment of a final research approach. Our approach will be to bring awareness and understanding of stormwater pollution impacts by using the vivid visual effects of trash and litter as a driver towards community actions. Research shows that less than one third of citizens know that domestic wastewater is treated prior to entering waterways, urban stormwater is not treated, and that they are carried via different pipes (Dean, A.J., et. al, 2016). Another set of research elements and topics for shared discernment is how to manage communication challenges in communities due to language or cultural barriers; possible mistrust of municipal agency staff; misunderstanding of stormwater concepts; or a lack of salience of pollution issues to residents' daily lives. We suggest addressing these challenges by linking the media richness theory (Daft & Lengel, 1984,1986) and the information diffusion theory, within which people undergo a sequential pattern toward adopting behavior change as shown in Figure 1 (Scott, C. et al., 2013). While media campaigns are effective in building awareness and interest, the project will connect directly with local residents with the aim of increasing knowledge and building local capacity at the grassroots. We believe that this approach will give residents greater self-determination and allow them to be better informed champions for change, while organically adopting sustainable practices that will in turn improve their communities. Stormwater pollution mitigation and the proper handling and disposal of solid waste in these local neighborhoods will increase property values, create a healthier environment and provide an avenue for social engagement in the community.



Figure 1: Information Diffusion Process

The Publics

Our proposed research area will be within the Charlotte's Historic West End, which is a bustling majority-minority community in the Northwest part of the city. These neighborhoods are prime examples of how planning "around" and not "together with" these communities have left large numbers of vulnerable residents behind in an otherwise prospering city, with little potential to break free from poverty and become upwardly mobile. For instance, the average family income in this area is only \$41K compared to the Mecklenburg County average of \$68K and an unemployment rate that is almost double the County average. Our target communities in this area will be the 27 neighborhoods along Beatties Ford Road, which have built trust through activities developed by Johnson C. Smith University (JCSU). Our project collaboration will implement stormwater messaging within the JCSU Sustainability program. Previous work conducted in partnership with JCSU has seen the creation of Stewart Creek Environmental Association, a citizen environmental advocacy group. We intend to solicit the support and buy in of community leaders within these neighborhoods in order to forge a stronger alliance with their residents. As community leaders and champions develop a greater understanding of the issues, we anticipate their continued engagement in activities within their own communities to experience litter, trash, and illicit discharge impacts; and become stronger advocates for behavior change and messaging to improve their communities. Research team members and students will engage in community meetings to learn from leaders and collectively participate with residents in developing a framework of best practices on community water quality and stormwater pollution mitigation. As we explore further the research concepts with the SWG, there may be additional publics of focus within underserved communities in Charlotte Mecklenburg.

Research Elements

The first element will be to complete a situation analysis by reviewing the SWG members' current educational outreach programs and materials. Additionally, academic and professional literature will be reviewed, along with website searches of stormwater programs across North Carolina and the U.S. The goal will be to build upon the current knowledge and lessons learned in establishing successful mechanisms and strategies within the Charlotte – Mecklenburg communities. This information will be summarized and discussed with the SWG for dialogue and the development of an action plan

A second key element will be to seek out additional departments and divisions within Charlotte and Mecklenburg County to look at the collective community messaging efforts related to stormwater, illicit discharges, and litter. These could include: Charlotte Housing and Neighborhood Services; Keep Mecklenburg/Charlotte Beautiful; Office of Sustainability; Marketing; Stream Clean Ups; Soil and Water Conservation; Parks and Recreation; and Solid Waste along with the Utility and Maintenance Departments. As collaborations are built, the agencies messaging strategies will be assessed, current materials evaluated for applicability, and new materials conceived.

The third element will be to assess citizen's perspectives and understanding through two focus groups sessions with residents. This will offer the opportunity for candid discussions, so that the project team can assess the levels of knowledge, perceptions, and relative behaviors of the key publics. A meal and gift cards will be offered as incentives. Our goal will be to have underrepresented groups to join in the discussion, so we will seek to consult with neighborhood leaders and other Charlotte-Mecklenburg Agencies to reach these individuals within the communities. In addition to focus groups, survey questions addressing stormwater issues will be given to citizens as they come to dispose of trash and recycle at Mecklenburg County Convenience Centers. The Mecklenburg SW surveys administered in 2018 were completed by 1,325 residents. (See Mecklenburg Co. SW Letter of Support).

The fourth element of our research concept will be to build knowledgeable leadership participants from JCSU with opportunities to gain knowledge in the importance, scientific and educational components of stormwater through interactions with stormwater professionals as Dr. Otienoburu integrates the research work with students in the classroom within ecology and sustainability courses. Laboratory and field experiments with stream water quality testing and evaluations will be completed, along with stream clean-up activities. These students will then become leaders to address stormwater issues and provide outreach and education at schools and during events throughout the communities. The goal will be for one or two JCSU students providing leadership throughout the project working with stormwater professionals and communities; additional students may team with them to provide outreach in five schools and at five events.

Dissemination of Knowledge

The research knowledge gained, and strategies developed will be continued past the research period and would be applicable across the SWG and RSPC memberships along with other communities throughout the state. The following strategies could be used to disseminate the information: i) community leaders' workshop, ii) conference presentation, iii) NCDEQ workshop, and iv) written report and presentations to SWG, WRRI, RSPC, and NCDEQ, and v) presentations for SWG, RSPC, SCAWWA-WEASC STORM, and other interested groups.

Project Timeline

The projected start date is November 2019 with a primary focus during spring semesters 2020 and 2021; while RS and the student leadership team interactions with the community and stormwater groups, outreach and education involvement would be ongoing through June 30, 2020.

Project Deliverables

The project deliverables include i) narrative summary of the secondary research findings, ii) report summarizing citizen's perspective on stormwater from the focus groups and survey results, iii) listing of applicable events and school demonstrations, iv) citizen education and outreach strategies, v) messaging materials which align with collaborative departments vi) research report and presentation, and vii) dissemination presentations.

Measurable Outcomes

The project outcome will be measured quantitatively by the number of participating citizens, number of students, hours of project time, quantity of litter removed, water quality and survey data analysis; along with qualitative evaluations through observations, citizen focus groups and survey comments analysis.

Statement of PI Interest and Qualifications

The Regional Stormwater Partnership of the Carolina (RSPC) mission aligns with the SWG research focus especially as they team together Johnson C. Smith University (JCSU). This collaborative project team has been developed to effectively engage citizens, provide outreach and education, build partnerships, align with community leadership, and seek active involvement toward behavior change while coordinating with services through other departments and agencies toward achieving stormwater program goals and improving water quality.

Regional Stormwater Partnership of the Carolinas (RSPC)

The RSPC is a nonprofit 501c(3) organization uniting 18 local stormwater municipalities in goals to educate and increase awareness about stormwater issues and their impact on our water quality and our environment to the public, local businesses and education centers of our region. It provides collaborations and creates a synergy to provide education and outreach activities as part of the Clean Water Act Stormwater permit requirements. The RSPC member municipalities are Belmont, Bessemer City, Charlotte, China Grove, Cramerton, Dallas, Gastonia, Harrisburg, Lake Park, Lowell, Mecklenburg County, Monroe, Mooresville, Mount Holly, Shelby, Stallings, Statesville, and Town of Stanley. Each municipality adds a strength to the research concept by providing stormwater expertise and venues for applications of research strategies beyond the grant.

Rising Solutions, PLLC (RS)

RS is the Facilitator for the Regional Stormwater Partnership of the Carolinas (RSPC) providing leadership and managing direction. RS is a professional engineering consulting firm which is certified as a Historically Underutilized Business by the State of NC.

Principal Investigator: Regina C. Guyer, M.S., P.E.

Regina Guyer is the President of RS. Her research experience includes a Charlotte-Mecklenburg stormwater citizen's phone survey; on-site surveys at Mecklenburg County Recycling and Convenience Centers for 13+ years; focus groups with citizens in areas of air quality, construction recycling, and fats, oils, and grease; surveys and educational outreach for medicine disposal with Catawba County; along with developing workshops and conference presentations. She provided research leadership for "*Communication Strategies Improving Grease Disposal in Multifamily and Latino Populations*" including focus groups and surveying citizens in Charlotte, Winston-Salem, and Raleigh (Scott, C.et.al, 2013). Her leadership as the Director of the Environmental Assistance Office at UNC Charlotte, created 127 projects with 50 clients providing \$3,360,358 in research funds and 266 student experiential learning opportunities.

Co-Principal Investigator, Kari Guyer Raburn, Ph.D

Kari Guyer Raburn, is the VP of Chemistry and Engineering for RS. Her research leadership spans alternative and conventional energy sources (PhD) as well as understanding perceptions of students about engineering and technology (M.S.), conveyance pipe infrastructure, and microbial retention studies within the public and private sector. Her experience includes citizen perspective evaluations through in person surveying and data analysis.

Johnson C Smith University (JCSU)

JCSU is an independent new urban university rooted in the Historically Black Colleges and Universities (HBCU) tradition and charged with an urgent public mission: to recruit and equip a diverse student body through innovative teaching, learning and faculty mentored and applied research with the knowledge, skills, values, and ethics that will enable them to solve complex problems in a fast changing global economy. It is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award baccalaureate and master's degrees. Beyond traditional academic programs, JCSU employs transformative programs to serve its diverse population including Phasing Up, Metropolitan College, and programs which serves the Hispanic/Latino community and builds community assets in the Northwest Corridor of Charlotte, a historically impoverished area.

Co-Principal Investigator, Dr. Philip E. Otienoburu

Dr. Otienoburu is founding Director of the Center for Renewable Energy & Sustainability at JCSU. He is also Assistant Professor of Biology in the Department of Natural Science and Mathematics. Dr. Otienoburu leads all sustainability initiatives within the university and outward facing projects in the community, including, but not limited to Air and Water Quality, Food access, Transportation and Smart cities. This work has been largely brings together close to 30 neighborhoods in the Historic West End of Charlotte. Dr. Otienoburu will bring his expertise working with the community and will lead and mentor the students involved in different aspects of the project. Dr. Otienoburu teaches Biology, Medical Entomology, Ecology and Sustainability and is faculty advisor for biology majors in the department.

References

Daft, R.L., Lengel, R.H., 1984, Information Richness: A New Approach to Managerial Behavior and Organizational Design. *Research in Organizational Behavior*, 6. 191-233.

Daft, R.L., Lengel, R.H., 1986, Organizational Information Requirements, Media Richness, and Structural Design. *Management Science*, 32, 541-571.

Dean, A.J., Fielding, K.S., Newton, F.J., 2016, Community Knowledge about Water Who has Better Knowledge and Is This Associated with Water Related Behaviors and Support for Water Related Policies? *PLOS ONE* 11 (7): e019063 doi: 10.1371/journal.pone.0159063.

Scott, Clifton ; Oliveira, Maria; Freitag, Alan; Guyer, Regina; Boughton, Maria, 2013 -08, Improving Grease Disposal in Multifamily Housing and Latino Populations, Report 431 - Water Resources Research Institute of the University of North Carolina. Website: <http://www.lib.ncsu.edu/resolver/1840.4/8185>

Regina Guyer, P.E.

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2414 Westminister Dr. Concord, NC 28027
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(704) 701-2270

Professional Preparation

B.S., Chemical Engineering Tennessee Technological University, Cookeville, TN	June 1980
M.S., Engineering – Civil and Environmental The University of North Carolina at Charlotte, Charlotte, NC <i>Thesis: Identification of Some Key Process Control Procedures to Optimize the Quality of Anaerobically Produced Municipal Solid Waste Compost</i>	May 2001
Studies within Infrastructure and Environmental Systems Ph.D. Program The University of North Carolina at Charlotte, Charlotte, NC	2004 - 2010
Professional Engineer - NC License #028836	2003 - Present

Appointments and Experience

President Rising Solutions, PLLC, Concord, NC	2016 - Present
<ul style="list-style-type: none">• Principal Facilitator, Regional Stormwater Partnership of the Carolinas 501c(3) Nonprofit• Principal, Mecklenburg County Land Use and Environmental Services Solid Waste Division<ul style="list-style-type: none">○ Customer Perspective Surveys at the Recycling Centers (EEAO 2004 - 2016) 2017 - Present<ul style="list-style-type: none">▪ Development of survey instrument and on-site customer surveying▪ Data analysis, evaluations, technical reports, and presentation of results○ Feasibility Study for the Implementation of Water Treatment Residuals in Compost• Investigator, USDA Rural Solid Waste Grant Project with UNC Charlotte: Evaluating the effects of solid waste disposal of pharmaceuticals on water resources and defining ways to minimize it 2017 - 2018<ul style="list-style-type: none">○ Leadership in developing community collaborations: Project Lazarus, Catawba County Sheriff's Department, and Cognitive Connection Corporation Prevention Department.○ Development and coordination of drug take back events○ Evaluations and improvements within Sheriff's Department drug take back brochures○ Ways to Minimize the Impact of Disposed Pharmaceuticals on Water Resources, USDA SWM Workshop development and presentations• Principal and Investigator, Charlotte Water Environmental Services and Management Assistance Projects with UNC Charlotte (EEAO 2004 - 2016) 2016-September 2018	

Energy Production and Infrastructure Center (EPIC) Assistant Director - Energy and Environmental Assistance Office (EEAO) Nov 2013 to June 2016

Energy Production Infrastructure Center (EPIC), UNC Charlotte

Executive Director of the Environmental Assistance Office Dec 2004 to Nov 2013

Infrastructure, Design, Environment, and Sustainability (IDEAS) Center, UNC Charlotte

- Manages and monitors multiple projects and/or complex resources, including budget and personnel.
- Applies scientific and engineering knowledge to plan, direct and manage energy and environmental programs for multiple clients.
- Uses expertise in symposium and workshop planning to plan and execute practitioner programs that serve the region and state.
- Responsible for research development with student supervision and mentoring, experimental design and methodology planning, data analysis, scientific interpretation, and report writing.

- Liaison for University partnership with Land Use and Environmental Services Agency (LUESA) of Mecklenburg County– Air Quality, Charlotte Mecklenburg Utilities, and LUESA – Solid Waste in providing environmental assistance and applied research investigations.
- Provides outreach and environmental assistance throughout the region within the areas of Recycling, Solid Waste, Water/Wastewater/Reuse, Sustainability, and Air Quality Initiatives.

Presentations/Publications

- Guyer, R., Household Pharmaceutical Take-Back Methodology Presentation, Ways to Minimize the Impact of Disposed Pharmaceuticals on Water Resources, USDA SWM Workshop, Charlotte, NC, August 14, 2018.
- Guyer, R., Disposal of Pharmaceuticals from Your Home Presentation, Ways to Minimize the Impact of Disposed Pharmaceuticals on Water Resources, USDA SWM Workshop, Charlotte, NC, August 14, 2018.
- Guyer, R. and Keen, O., Evaluating the Effects of Solid Waste Disposal of Pharmaceuticals on Water Resources and Defining Ways to Minimize It - Project Overview Presentation, NC Solid Waste Association of North America 2018 Spring Conference, Asheville, NC, April 24, 2018.
- Han, S, Leach, J, Cobler, D, and Guyer, R., Residential Construction Waste Resources Assessment Phase II, Mecklenburg County Land Use and Environmental Services – Solid Waste, February 22, 2016 and June 25, 2016.
- Guyer, R. Residential Construction Waste Resources Presentation: Construction and Demolition Workshop and Tour at New Hanover County, Carolina Recycling Association 26th Annual Conference, March 21, 2016.
- Guyer, R. Energy Efficient and High Performance Home and Building Inventory Assessment Presentation, NC Building Performance Association Conference, Wilmington, NC, September 2, 2015.
- Guyer, R., North Carolina Energy Efficient and High Performance Home and Building Inventory Assessment, NC Building Performance Association (NCBPA), August 26, 2015.
- Guyer, R., Improving the Knowledge on Energy Efficient and High Performance While Building Value, NC Building Performance Association (NCBPA), August 26, 2015.
- Pfender, M., Gujjar, D., Guyer, R, et.al, Evaluation of Personal Air Quality Monitoring Devices Report, Mecklenburg County Land Use and Environmental Services – Air Quality, June 2015.

Synergistic Activities and Awards

- USDA Rural Solid Waste Management Grant and Workshop, Ways to Minimize the Impact of Disposed Pharmaceuticals on Water Resources: UNC Charlotte, Dr. Olya Keen; Drug Take Back Programs: Catawba County Sheriff’s Office, Sargent Eric Page, Project Lazarus Director, Dr. Corey Richardson, and Cognitive Connection Corporation, Renee Moriarity. Citizen’s perspective surveys: Catawba County Engineering Director, Barry Edwards, Catawba County Waste Reduction Coordinator/Educator, Amanda Kain, 2017-18.
- Regional Stormwater Partnership of the Carolinas, 18 members: Belmont, Bessemer City, Charlotte, China Grove, Cramerton, Dallas, Gastonia, Harrisburg, Lake Park, Lowell, Mecklenburg County, Monroe, Mooresville, Mount Holly, Shelby, Stallings, Statesville, and Town of Stanley. 2017 – present.
- Aquatics Pesticide Workshop developed with the City of Charlotte, Kristen O’Reilly, November 2017.
- Synergistic activities reflected through community awards:
 - 2014 Girl Scouts Women of Distinction Award – Significant Achievements in Environmental Leadership
 - Sustain Charlotte Environmental Educator of the Year 2013
 - William Lee States College of Engineering 2011 Employee of the Year

Collaborators

RSPC Members: Chad Waldrup (Belmont), James Inman (Bessemer), Craig Miller and Sharnelle Currence (Charlotte), Franklin Gover (China Grove), Josh Watkins (Cramerton), Maria Stroupe (Dallas), Robert Cloninger (Gastonia), Rob Donham (Harrisburg), Cheri Clark (Lake Park), Kevin Krouse (Lowell), David Caldwell (Mecklenburg County), Chris Costner (City of Monroe), Jonathon Young (Mooresville), Dave Johnson (Mount Holly), Ben Yarboro (Shelby), Chris Easterly (Stallings), Derek Slocum (Statesville), and Heath Jenkins (Stanley)
 City of Charlotte: Jean Creech, Kim Eagle, Jackie Jarrell, Kirsten O’Reilly, Rob Phocas, Myra Zabec-Thompson
 Mecklenburg County LUESA: Joe Hack, Loretta Hall, Steve Hoffman, Jeff Smithberger, Darren Stienhilber
 Catawba County: Barry Edwards, Amanda Kain UNCC: Sandra Clinton, Olya Keen, Jy Wu, David Young

Philip E. Otienoburu

a. Professional Preparation

Jomo Kenyatta University of Agriculture & Technology, Nairobi, Kenya. BS Biological Sciences 2003

Kenyatta University, Nairobi, Kenya. MPH (ABD). Epidemiology 2005

Ohio State University, Columbus, OH. Ph.D. Medical Entomology 2011

b. Appointments

2015 – Director, Center for Renewable Energy & Sustainability, **Johnson C. Smith University**, Charlotte, NC

2013 – Assistant Professor of Biology, **Johnson C. Smith University**, Charlotte, NC

2012 – Visiting Assistant Professor of Biology, **Johnson C. Smith University**, Charlotte, NC

2011 – 2012, Lecturer & Visiting Scientist, **The Ohio State University**, Columbus, OH

2009 – Graduate Teaching Associate, **The Ohio State University**, Columbus, OH

2008 – Graduate Administrative Associate, **The Ohio State University**, Columbus, OH

2006 – Graduate Research Associate, **The Ohio State University**, Columbus, OH

2006 – The **United Nations** Office for the Coordination of Humanitarian Affairs (OCHA) Policy Development and Studies Branch (PDSB), New York, New York

2004 – 2005 Graduate Research Associate, **Centers for Disease Control** and Prevention (CDC), Kisian Field Station, Kisumu, Kenya

c. Publications

(i) *Five most closely related:*

1. Johnson, A., Menesses, LA, Julius-Williams, D., Booth, A., Brown, D., and Otienoburu, PE. 2017 Rosa Parks Farmers' Market Evaluation. Report to Mecklenburg County Health Department, Charlotte, NC.
2. Otienoburu, PE. Food and Farming in the Carolinas. Report to the Duke Endowment. March 26, 2015
3. Inter Agency Standing Committee (IASC) Gender Handbook in Humanitarian Action. Women, Girls, Boys and Men: Different Needs – Equal Opportunities. December 2006
4. IANWGE. Report of the Fifth Session of the Inter-Agency Network on Women and Gender Equality. New York. April 2006
5. Otienoburu, P. E., Nikbakhtzadeh, M. R., & Foster, W. A. (2015). Orientation of *Anopheles gambiae* (Diptera: Culicidae) to Plant-Host Volatiles in a Novel Diffusion-Cage Olfactometer. *Journal of medical entomology*, 53(1), 237-240.

(ii) *Other significant products*

1. Nikbakhtzadeh, MR. Trebot, J., **Otienoburu, PE.**, and Foster, WA. (2014) Olfactory Basis of Floral Preference of the Malaria Vector *Anopheles gambiae* (Diptera: Culicidae) Among Common African Plants. *Journal of Vector Ecology*, 39 p 372-383.
2. **Otienoburu, PE.**, Ebrahimi, B., Phelan, PL., and Foster, WA. (2012) Analysis and optimization of a synthetic milkweed floral attractant for mosquitoes. *Journal of Chemical Ecology*, 8: p 873-881
3. **Otienoburu, PE.**, Bayoh N., Gimnig, J., Huang, J., Walker, ED., Otieno, MF., Vulule, J. and Miller, JR. (2007) *Anopheles gambiae* oviposition as influenced by type of water infused into black and red soils of Western Kenya. *International Journal of Tropical Insect Science*, **27**: p.1
4. Huang, J., Walker, ED., **Otienoburu, PE.**, Amimo, F., Vulule, J., Miller, JR. (2006) Laboratory tests of oviposition by the African malaria mosquito, *Anopheles gambiae*, on dark soil as influenced by presence or absence of vegetation. *Malaria Journal*, **5**: p. 88.

d. *Synergistic Activities*

1. I have designed and registered a new undergraduate minor in sustainability at Johnson C. Smith University with the aim of increasing minority representation in the green economy. This minor will be offered starting this fall and will be accompanied by new research in food security and environmental sustainability.
2. I have guided the launch of a student-run venture in sustainable food production at the university, participating in sales at three different farmers' markets as well as supplying fresh produce to a restaurant in the city.
3. Was one of the founding partner institutions, together with the Health Department, of a new farmers' market within the food desert area surrounding the university. This market improves food access while ensuring economic sustainability of participating urban farmers.
4. Conducted two international undergraduate research projects in Haiti and Suriname in the area of Sustainable agriculture
5. Board member of the Rosa Parks farmers' market advisory board (since 2015)
6. Board member of the Catawba Riverkeeper Foundation (2014-2018)

Kari Guyer Raburn

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Professional Preparation

- Brigham Young University, Provo, UT** **B.S., Chemical Engineering** April 2007
Specialized Courses: Environmental Chemistry, Reservoir Engineering, Energy & the Environment
- Brigham Young University, Provo, UT** **M.S., Technology Engineering Education** August 2009
Thesis: An Investigation of Middle School Student Interest, Perception, and Attitude Toward Technology and Engineering
- Brigham Young University, Provo, UT** **Ph.D., Chemical Engineering** August 2012
Dissertation: Optimizing Noble Metal Promoter Addition in Cobalt Fischer Tropsch Catalysts

Appointments and Experience

- VP of Chemistry and Engineering** 2017-present
Rising Solutions, PLLC, Concord, NC
- Advances website outreach and Organizes meetings and workshops for *The Regional Stormwater Partnership of the Carolinas*
 - Collects, Analyze, Evaluates, and Writes reports for customer perspective survey data collected at *Mecklenburg County Land Use and Environmental Services Solid Waste Recycling Centers*
 - Evaluates student monthly reports for *Charlotte Water* experiential learning projects
- Adjunct Chemistry Instructor** 2012-present
Rowan Cabarrus Community College, Concord, NC
- Develops and integrates individualized curriculum for Chemistry I and II lectures and laboratories including online, team/community, visual and oral assignments
 - Performs iterative assignments and grading to allow students to reach their personal educational goals
- Fischer Tropsch Catalysis Consultant** 2013-2017
SGC Energia, Pasadena, TX
- Developed novel catalyst preparation method for \$1.5+ million savings
 - Collaborated data from 5+ labs using 10+ analytical techniques
 - Bridged procedures, QC and materials from across scales for 5 orders of magnitude
 - Negotiated service contracts for development and manufacture of catalysts
- Fischer-Tropsch Catalysis Graduate Researcher** 2008 -2012
Brigham Young University, Provo, UT
- Led catalyst research teams of 10+ students across 3 universities and 2 departments
 - Optimized catalyst productivity and preparation including scaling batches to 100 times
 - Implemented parallel reactors to double efficiency of research testing
- Technology and Engineering Education Graduate Researcher** 2007-2009
- Developed Technology and Engineering Attitude Scale (TEAS) survey instrument focused on technology and engineering perception, use, and interest
 - Surveyed 200 middle school students from 4 different schools pre- and post-participation in technology engineering class using TEAS
 - Triangulated quantitative and qualitative information from class visits, interviews, and surveys
- Simulation and Production Engineering Intern** 2006 – 2007
TerraTek, a Schlumberger Company, Salt Lake City, UT
- Analyzed core and log data to aid in the modeling of oil well production
 - Created and revised 50+ engineering reports for clients

Reservoir Engineering Research Assistant

Summer 2005 and Jan-Apr 2007

International Reservoir Simulation Research Institute, Brigham Young University, Provo, UT

- Designed and conducted experiments to simulate gravity induced flow
- Revealed evidence of 3X faster oil/water velocities than conventional reservoir simulation

Civil Engineering Research Assistant

Summer 2004

Environmental Assistance Office, UNC Charlotte, Charlotte, NC

- Collaborated with university, government, and operations team to optimize water quality for nutrients, chemical oxygen demand, and turbidity
- Investigated leakage and infiltration of conveyance pipe infrastructure with a trace dye study for \$2 million maintenance and QHSE project
- Evaluated leaf surface microbial retention implications within water reuse projects

Presentations/Publications

Cook, Kari G. et al.. Effect of Promoter Deposition Order on Platinum-, Ruthenium-, or Rhenium-promoted Cobalt Fischer-Tropsch Catalyst, Journal of Applied Catalysis, Vol 482, July 2014

Cook, Kari G. et al., Reducibility of Alumina-Supported Cobalt Fischer Tropsch Catalysts: Effects of Noble Metal Type, Distribution, Retention, Chemical State, Bonding, and Influence on Cobalt Crystallite Size, Journal of Applied Catalysis, Vol 449, December 2012.

Cook, Kari G., et al. Optimizing Noble Metal Promotion in Co Fischer-Tropsch Catalysts. “The new developments in the field of Synchrotron Radiation” School, Sao Paulo Brazil, January 17-27, 2011.

Hales, H. and **Cook, Kari G.**, The Mechanism of Flow in Reservoir Regions Dominated by Gravity Segregation, Journal of Canadian Petroleum Technology, Vol 50 (1), January 2011.

Cook, Kari G., Terry, R., Wright, G., Shumway, S., An Investigation of Middle School Student Interest, Perception, and Attitude Toward Technology and Engineering, 2009 American Society of Engineering Education Conference, Austin, Texas, June 14-17, 2009.

Synergistic Activities

Developed pedagogical approaches in two main focused on (1) confidence building and presentation skill development and that is implemented in ~10 grade incentivized presentation opportunities for students each class period to come to the front of the class to highlight an aspect of the content being covered (2) perseverance and goal reaching that is implemented by each student writing down their goals for the class and overall during the first week, creating individualized connection between the course content and their overall goals, iterative assignments and testing wherein students make do homework assignments covering missed material from first attempts as well as take another version of tests on the same material.

Led women in engineering groups including founding Chemical Engineering Women’s Club and serving in several Society of Women Engineers leadership positions spanning Regional Conference Lead, monthly social event coordinator, and family-style gatherings.

Collaborators

David Caldwell (Mecklenburg County), Chris Costner (City of Monroe), Rob Donham, (Harrisburg), Franklin Gover (Town of China Grove), Joe Hack (Mecklenburg County), Steve Hoffman (Mecklenburg County), Olya Keen (UNC-Charlotte), Kevin Krouse (Lowell), David Johnson (City of Mount Holly), Craig Miller (City of Charlotte), Derek Slocum (City of Statesville), Jeff Smithburger (Mecklenburg County), Jerry Stahl (The Agency)

Historic Washington Heights est. 1910

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ysamarsh@hotmail.com | www.historicwashingtonheightscharlotte.org

February 11, 2019

Dr. Philip Otienoburu
Johnson C. Smith University
100 Beatties Ford Road
Charlotte, NC 28216

Dear Dr. Otienoburu:

On behalf of The Historic Washington Heights Community Association, I am happy to provide a letter of commitment for your proposed Community Stormwater project, which is entitled “**Active involvement to develop understanding, build water quality awareness, and implement strategic measures within communities in Charlotte-Mecklenburg to engage citizens toward achieving stormwater program goals and improving water quality**”.

The Historic Washington Heights Community Association continues to be a leading voice on environmental advocacy within the West End of Charlotte and has been involved in air and water quality projects within this area. We have partnered with JCSU on these issues in the past and our work has seen our involvement in the creeks and watersheds in and around our neighborhood. Since the focus areas highlighted in your proposal intersect very well with our objectives, we look forward to partnering with your research consortium in providing:

1. Greater awareness on stormwater issues to our residents
2. Actionable recommendations to policy makers based on documented findings from these studies
3. Participation in workshops and training events

We look forward to providing our input and insight in this project.

Sincerely,



Ms. Manjie Marshall

President

Historic Washington Heights Community Association



MECKLENBURG COUNTY

Land Use and Environmental Services Agency SOLID WASTE MANAGEMENT

February 11, 2019

Regional Stormwater Partnership of the Carolinas
6012 Bayfield Parkway, Suite 220
Concord, NC 28027
Facilitator for RSPC: Rising Solutions, PLLC

I was recently made aware of the program application from Rising Solutions, PLLC regarding their research goal of creating a model of how to empower citizens to Improve Water Quality and Quality of Life. One of their research phases directly relates to litter and recycling perspectives and that correlates well to our program activities here in Mecklenburg County's Solid Waste Management Program.

Our group is interested in receiving information that may be obtained regarding citizen's perspectives regarding their understanding of litter, trash, and recycling.

We have had a long and successful relationship with Rising Solutions who have completed many customer surveys at our recycling centers and would be supportive of their continued work in this endeavor for the Regional Stormwater Partnership.

If you have any questions, please feel free to contact me at Jeffrey.Smithberger@MeckNC.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeffrey M. Smithberger", with a long horizontal line extending to the left.

Jeffrey M. Smithberger, Director
Solid Waste Management Program
Land Use and Environmental Services Agency
Mecklenburg County Government