

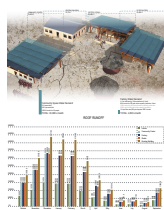
PureMadi II is coming to Alumni Hall on Friday, February 8<sup>th</sup>. Tickets and more info will be available at [www.puremadi.com](http://www.puremadi.com)



*We've been busy over the past 9 months. Here's an update of some of the exciting things we've been doing...*

#### An Annual Newsletter

Issue 1 – 2013



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# Inaugural Celebration

*The inaugural celebration of PureMadi was held on Friday, February 10<sup>th</sup> at Alumni Hall on the Grounds of the University of Virginia*

Although PureMadi has been gaining momentum for the last year or two, things became very real on February 10<sup>th</sup> at Alumni Hall. On this wintery Friday evening on the Grounds of the University of Virginia, 250 supporters gathered to celebrate the work of PureMadi. Our guests enjoyed food, music, and presentations about our new organization.

## Beleza Brasil kicks things off...

As guests flowed into the Jefferson Ballroom in Alumni Hall, they probably first heard the South-American inspired sounds of Beleza Brasil while being greeted and checked in by volunteers from the Charlottesville Junior League. Many enjoyed a complimentary glass of beer or wine while perusing



**Caroline Hackett (CEE '013) speaks about the hundreds of water quality analyses that were performed as part of our filter factory feasibility study.**

the ceramic filter displays, speaking to our many student participants, or surveying our 60-plus silent auction items provided by members of our central Virginia community.

After settling in at dinner tables, guests were briefed on PureMadi's ongoing and future work by Rebecca Dillingham (Assistant Professor of Medicine and Director of UVA's Center for Global Health), student

participants Caroline Hackett (CEE '13) and Lydia Abebe (SIE '07, CEE '10), and James Smith (Professor of Civil and Environmental Engineering). Dinner guests included the Deans of Engineering and Nursing along with Senior Vice Provost J. Milton Adams. Members of the Albemarle High School Key Club then swept through the crowd with ceramic filter pots and collected donations for filters for rural South African families. Each \$20 donation will provide a filter to a family, and some guests donated enough to purchase 50 filters!

## And then the real fun began...

PureMadi's own Jim Smith then joined his bandmates in 180 to lead the crowd for two hours of dancing to popular songs from the 1950s to the present while guests continued to bid on silent auction items. During a short break, Out of Focus, a four-person jazz combo composed of Albemarle High School students and a silent auction item themselves, gave prospective bidders a chance to see and hear what they were bidding on.

The evening was a great success, raising over \$15,000 for PureMadi and informing thousands of people about our work. Thanks to all of you who contributed to this wonderful inaugural celebration!



## Walmart



PureMadi won first place and a \$20,000 grand prize at the National Walmart Better Living Business Plan Challenge, held on April 13 at Walmart headquarters in Bentonville, Arkansas.

The better living challenge competition was developed to provide business students from around the nation with an opportunity to invent sustainable products and business solutions.

The team presented a business plan to establish PureMadi as a local South African business, which would generate revenue for the women's cooperative producing the filters and reinvest in new filter factories in South Africa and the developing world.

The team members were civil and environmental engineering students Caroline Hackett and Lydia Abebe, who you heard from at this year's fundraiser, economics student Molly Tyeryar, and Darden Business School students Layton Hill and Bennett Graham.

The team first defeated eight other teams in the regional competition in Washington, D.C. They then successfully competed against the other regional winners in Arkansas. Congratulations to the team!

## Mitchell



In early July, I arrived in Limpopo Province to begin working on an independent ethnographic project mentored by Lisa Schutt and Catarina Krizancic from UVA's Anthropology Dept. and Vhonani Netshandama, the Director of Community Engagement at the University of Venda (UNIVEN). Part of what I sought to accomplish with my project was a way in which to begin unpacking the local interests, perspectives and daily lives of the women living within the Mukondeni village. What I left with was an entirely new appreciation and respect for the Mukondeni potters.

My experience was enhanced by the home stay I was able to complete with the Head of the Cooperative. I was able learn a wealth of information pertaining to the Cooperative, the daily routines of village members, cultural and religious practices, the structure of the village and, most importantly, the women themselves.

The most rewarding part of my visit was the relationship I developed with my host and family. Each weekday after returning home from a day at the cooperative we would sit together and watch South African soap operas and eat dinner together. These simple interactions fostered a kinship that is often hard to achieve in so short a time.

## JPC



PureMadi received support from the Jefferson Public Citizens Program at the University of Virginia for the third straight year. This program is the brainchild of Vice Provost Milton Adams, and is designed to initiate undergraduate students, in combination with a graduate mentor and faculty advisor, into community-based research. This year's team was composed of undergraduate students Caroline Hackett (CEE '13), Molly Tyeryar (ECON '12), Theresa Hackett (COMM '14), David Harsh (COMM '13), Rebecca Kelly (CAS '13) and Sydney Schrider (CEE '14), along with graduate-student mentors Lydia Abebe (SIE '07, CEE '10) and Carly Krause (EVSC '06, CEE '10). UNIVEN students also worked with the team during July.

This year's team had a productive year. They collected survey data from over 200 residents of Thohoyandou and Louis Trichardt (the two largest cities near our ceramic filter factory) to inform marketing strategies. The team is currently analyzing these data as we move towards commercializing our filter sales in the region. They also were intrinsic in completing our factory infrastructure, as they assisted with the kiln modifications, built a soak tank for filter testing, constructed a concrete pad for our mixer, and identified an optimum "recipe" for our filters. More details about our factory infrastructure appear later in this newsletter.





# Filter Factory Infrastructure

*Some improvements still need to be made, but we are now concentrating on making filters*

*We are designing our filter factory to produce and sell 500 to 1000 filters per month. This requires significant equipment and infrastructure, and we are close to having everything ready for production.*

Over the past year, we have constructed an open-air structure for factory operations, installed a borehole with a submersible pump for a reliable water supply, built a kiln (pictured above), constructed a soak tank for filter testing (photo right), and installed a hammer mill, mechanical mixer, and filter press. We have also constructed wooden shelves capable of storing hundreds of filters. This work has been greatly facilitated by the members of the Rockingham, VA and Louis Trichardt, South Africa Rotary Clubs. Here is a quick tour through our production process...

Filters are produced from mostly local materials and labor. The Mukondeni Pottery Cooperative is located just a few hundred meters from a significant clay deposit in a historic riverbed. Professor Francis DaCosta from UNIVEN's Geology Dept. and an expert in small-scale mining operations, estimates that the formation is several kilometers in length and 6-10 meters deep. The clay is ideal for filter

manufacturing, and is air-dried and passed through a hammer mill until it has the consistency of a fine powder. Sawdust, normally a waste product, is obtained from a local sawmill and passed through a sieve to capture only the finest particles. The clay and sawdust are mixed with water and pressed into the shape of a pot using a filter press that was locally manufactured. After air drying, the filters are placed in our kiln.

The kiln is wood fired and can hold close to 100 filters. Firing temperature is monitored in real time with a digital pyrometer and retrospectively using pyrometric cones inside the kiln.

After firing, filters are saturated with water and then tested for flow rates. Filters must have flow rates between 1.5 and 3.0 L/hr. If the flow rate is too low, the end user will not want to use the filter because it will not produce enough water. If the flow rate is too fast, there is concern that the filter has a crack or other macro-pores that would prevent adequate removal of pathogenic microorganisms.

After passing the flow test, filters are painted with a colloidal silver solution. Silver nanoparticles lodge

in the filter pore space and act as disinfecting agents to make the filtered water microbiologically safe to drink.

Finally, select filters are tested for the removal of coliform bacteria. Filters are then combined with plastic lower receptacles with spigots and packaged for distribution and sale. Each filter can provide safe drinking water to a family of 5 or 6 and removes both turbidity and waterborne pathogens.



**Filters in our soak tank (left). Martha, one of the Mukondeni potters, touches up a filter after pressing (right).**





# Initiative reCOVER

*Architecture team works to design a better ceramic filter factory*

Over the past 10 months, Professor Anselmo Canfora and graduate student Erin Root from the School of Architecture have been guiding a student team to develop optimal designs for our ceramic filter factory. Their work has been extraordinary.

The Initiative reCOVER architecture team joined with PureMadi and the Water and Health in Limpopo program in January of 2012, with the objective of designing an improved ceramic water filter factory and community center for the Mukondeni Pottery Cooperative. The spring semester of 2012 began with preliminary research of the social and cultural practices of the Venda people. The design studio looked specifically at traditional building practices and the function of the landscape in the region of Limpopo. In addition, precedent studies of ceramic-filter-making facilities were studied to better understand the spatial requirements for the manufacturing process. From this body of research, a preliminary schematic design was developed.



**Architectural rendering of the PureMadi Mukondeni filter factory and community center design.**

Supported by a Jefferson Public Citizens grant, a reCOVER design team traveled to South Africa the summer of 2012 to visit the Pottery Cooperative and meet with the project stakeholders. The team first met with the women of the Co-op to learn about their vision for the facility's future. In addition, the team met with University of Venda partners, political leaders, and local building experts to discuss cultural and environmental issues that may impact the design of the factory facility. Moreover, visits to important cultural and natural landmarks, as well as factories and

farms, gave the architecture team an opportunity to better understand historical and current characteristics of the Venda region. Sociopolitical issues surrounding water access, security concerns, climatic impact, educational needs, social customs, and cultural values were prevalent topics of discussion throughout the visit and underscored the influence these issues would have on the design of the project.

Upon returning to the United States, the reCOVER team compiled observations and analyzed drawings

made during the visit to Limpopo and reevaluated the previous design strategy. As a result, the design team has selected design options that will promote sustainability and improve operations at the co-op.

The reCOVER design team continues to work to bring together academic, civic and professional priorities to benefit the common good of the Mashamba community. In partnership with university initiatives in South Africa and the US, non-profit organizations specialized in water filtration and pottery production, and professional architectural and engineering firms, the design team is focused on a multi-phased, multi-sectorial implementation strategy of the ceramic water filter factory, science resource center, and landscape design. The team is currently in the process of finalizing design revisions in order to complete the design development phase of the project and transition to construction documentation.



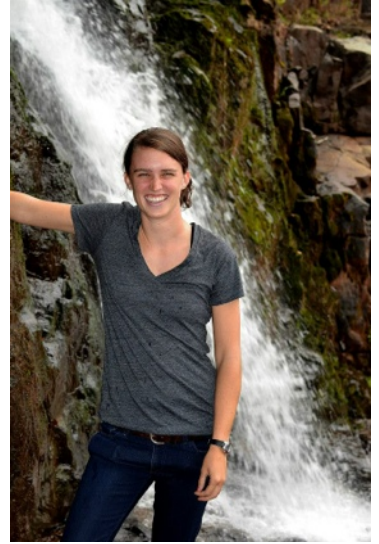
# Rachel Schmidt selected as a Fulbright Fellow

*Rachel Schmidt completed her BS in Civil and Environmental Engineering this past May, and just a few short months after that, she was on her way to South Africa as a Fulbright Fellow to help coordinate our ceramic filter factory operations in partnership with Dr. John Mudau at the University of Venda. Here is a brief update from Rachel...*

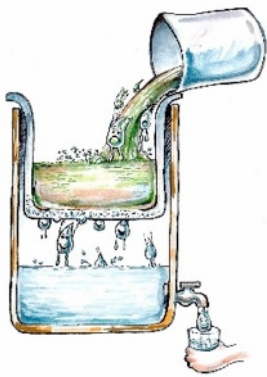
When I received the email awarding my Fulbright scholarship (after anxiously refreshing my email hundreds of times per day) – I nearly ran across Grounds to Professor Smith's office – I was so excited! It seemed unreal as it began to sink in... Instead of spending the next school year at UVA, I will be halfway around the world, in rural South Africa. It seems like I was completing paperwork and clearances all summer, and now I can't believe that I've been in Venda for nearly 2 months! I have been able to cuddle baby white lions, explore nearby waterfalls, eat at more Braai's than I can count, play Ultimate Frisbee near the Indian Ocean, and actually learn how to make the ceramic water filters from the women at Mukondeni. Wow.

As I reflect on the last 2 months, I am delighted with how much we have accomplished. The challenging and ever-fragile "skills and knowledge transfer," which development experts focus on, happens so naturally at Mukondeni. I accredit this to the slowly established, mutually trusting relationship which PureMadi and our partners have formed with the potters over the last few years. As a result, the women and I trusted one another from the start. That's not to say that there have not been challenges along the way. The most difficult aspect for me is the language barrier; there are times when I feel that if I understood the cause of the confusion then I could enable us to find a solution in which everyone ends up well-informed. Unfortunately, sometimes these discussions end in disagreement and misunderstanding, causing unnecessary obstacles down the road. Regardless, the women have taught me so much about the hands-on side of filter creation, from preparing the materials appropriately, to operating the new machinery, to basic kiln firing. On a daily basis I learn new aspects of their culture, language, traditional foods, lifestyles, and games the kids want to play.

I hope that over the next 7 months we can achieve even more, and that we will form an even stronger relationship based on trust and friendship. I will certainly keep you posted on my experiences through the next PureMadi newsletter. In the meantime, thank you so much for all of your support! It will be so wonderful when we can write to you that the children and families of Mashamba are finally beginning to have access to clean water, every single day! – Rachel Schmidt, CEE '12



## What Are These Ceramic Filters Anyway?



In the developed world, we have the luxury of having sophisticated water treatment plants and extensive water distribution systems that provide high-quality water with chlorine residuals right to our household taps. In most of the developing world, communities find it difficult to maintain centralized water treatment systems. As a result, residents drink water that may frequently contain pathogenic organisms like *E. coli*, *Cryptosporidium parvum*, or *Giardia lamblia*. The World Health Organization has indicated that the best way to improve water quality in the developing world is to decentralize our approach to water quality treatment. In other words, we need treat water at the household, or point-of-use level.

PureMadi is working at the interface between water, societal, and human health disciplines to promote the production and sale of ceramic water filters for point-of-use water treatment. Ceramic filters are manufactured by combining clay, water, and sawdust in appropriate proportions, pressing this mix into the shape of a 10-liter pot and firing the pots in wood-fired kilns that reach temperatures up to 1000 °C. During firing, the clay hardens into a ceramic, and the sawdust combusts, leaving behind micron-sized pores for water flow. The filters are also treated with colloidal silver, which is an aqueous suspension of zero-valent silver nanoparticles. These 10-20-nm-diameter silver particles have strong antimicrobial properties and become lodged in the pore space of the ceramic filters. The filters can now be suspended in a 20-L plastic receptacle and untreated water can be poured into the filter pot. The water slowly passes through the filter (about 1.5-3 L/hr) and turbidity and microbial pathogens are removed by the combined effects of physical filtration and chemical disinfection. The lower receptacle serves as a safe-storage container to reduce the possibility of recontamination of the treated water.

## Donate

To contribute to PureMadi, please visit [www.PureMadi.org](http://www.PureMadi.org) and click on our "Donate" link. All donations are fully tax deductible. PureMadi is operating as a 401(3)(c) not-for-profit organization under the umbrella of the UVA Fund managed by the University of Virginia Alumni Association. All donations go to PureMadi's activities in South Africa.

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