



## J-WAFS Food & Water News

April 2017

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## J-WAFS News

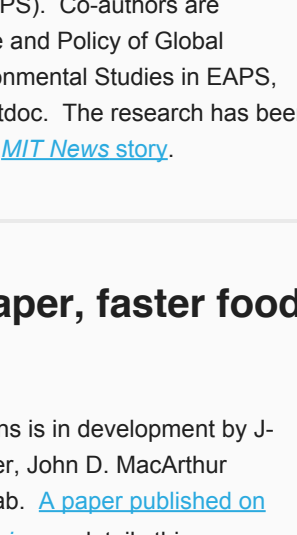
### Stay tuned: New J-WAFS Fellowship for Water Solutions to be announced next week

This spring J-WAFS will be launching a new doctoral fellowship for students pursuing research in water and water supply at MIT. We will be seeking faculty nominations for outstanding PhD students who are pursuing solutions-based research dedicated to solving the pressing global water supply challenges of our time. 2017-2018 will be our inaugural year and we will be funding one graduate student. The call for nominations will be announced next week and nominations will be due on **Wednesday, May 10th, 2017 at 5:00 PM EST**. More information will be posted on our website and distributed to the MIT community next week.

### J-WAFS welcomes two new hires to our program

**Andi Sutton, Communications and Program Manager**

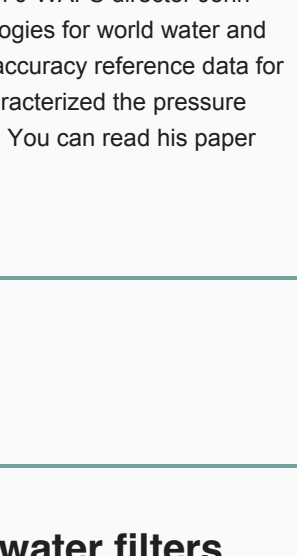
Andi comes to us from the Consortium for Graduate Studies in Gender, Culture, Women, and Sexuality (GCWS) at MIT where she served as program manager for 12 years. While there she handled all communications and outreach, events production, curriculum development, financial management, and institutional strategic planning. Having also served as an independent consultant to several emerging consortia across the US, Andi brings to us a passion for interdisciplinary and institutional collaboration.



Andi is also an awarded and internationally-exhibiting artist. Since 2003, she has been producing collaborative participatory public art works focused on food justice, water quality, and climate change. If you find [crocheted salt marsh floatants](#) anchored in the Boston Harbor or come across the bumpy gourd [Bitter Melon](#) at a contemporary art museum, they may just be collaborative works of Andi's.

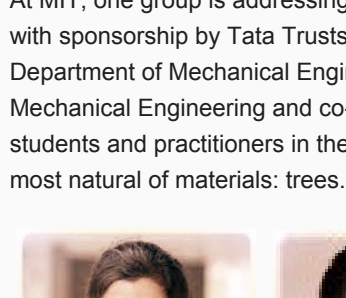
**Kenny Luu, Financial Coordinator**

Kenny came to J-WAFS from the MIT Energy Initiative (MITa) where he worked for over three years as a financial assistant II. Prior to MIT, Kenny worked at State Street Corp. where he handled mutual funds and managed one of State Street's many overseas clients. In his current role at J-WAFS he is responsible for our finances and assists with other administrative tasks. His responsibilities include financial projections, reporting and analysis, and proposal and budget preparation. A graduate of UMass Amherst with a degree in economics, Kenny brings to us 10 years of financial management and organization experience which will be key as J-WAFS continues to grow. In his spare time, he enjoys working out, hiking, food, travel, movies and gaming, and catching up on the latest tech and science news.



We hope you will join us in welcoming Andi and Kenny. We're delighted to have them join our team. We'd also like to thank **Selene Victor, Thomas Pelkey, Evan Young, and Haden Quinlan** for their help over the past year launching our J-WAFS newsletter and providing website support.

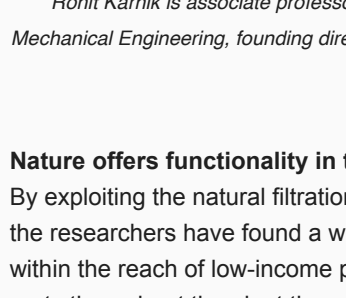
### MIT researchers found climate change to likely worsen drought conditions in Africa



In a [paper published on March 15 in the online journal Earth's Future](#), J-WAFS-funded researchers at MIT found that climate change will likely worsen drought conditions in parts of Africa, dramatically reshaping the production of maize throughout sub-Saharan Africa as global temperatures rise over the next century. The lead author of the paper is Amy Dale, a postdoc in MIT's Department of Earth, Atmospheric and Planetary Sciences (EAPS). Co-authors are Kenneth Strzepek, research scientist in MIT's Joint Program on the Science and Policy of Global Change, Susan Solomon, the Lee and Geraldine Martin Professor of Environmental Studies in EAPS, Megan Lickley, an EAPS graduate student, and Charles Fant, a former postdoc. The research has been supported with a J-WAFS seed research grant awarded in 2015. Read the [MIT News story](#).

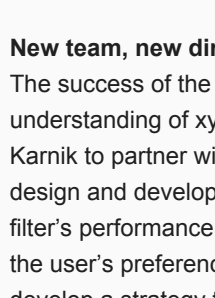
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### J-WAFS Solutions project could offer cheaper, faster food testing using smartphone technology



A new safety test for foodborne pathogens is in development by J-WAFS Solutions grantee Timothy Swager, John D. MacArthur Professor of Chemistry at MIT, and his lab. [A paper published on March 23rd in the journal ACS Central Science](#) details this new way to perform food safety sensing – using a novel type of liquid droplet that can bind to bacterial proteins. This interaction, which can be detected by either the naked eye or a smartphone, could offer a much faster and cheaper alternative to existing food safety tests. The lead author of this paper is Qifan Zhang, a graduate student in Swager's lab. Co-authors are Suchot Savagutran, an MIT postdoc; Peter Seeberger, director of the Max Planck Institute of Colloids and Interfaces in Germany; Paulina Kaplonek, a graduate student at the Max Planck Institute, and Prof. Swager. Read the [MIT News story](#) for additional details about this work.

### PhD student Kishor Nayar wins best poster award



Congratulations to PhD student Kishor Nayar for winning the Best Poster Award at MIT Water Night.

Kishor is an MIT PhD candidate in the research lab of J-WAFS director John Lienhard where he is developing sustainable technologies for world water and food security. He has experimentally obtained high accuracy reference data for the surface tension of seawater and theoretically characterized the pressure dependence of seawater thermodynamic properties. You can read his paper [here](#).

## J-WAFS Highlight

### Looking to Nature for Inspiration: making water filters from tree xylem



Access to clean, safe drinking water is an urgent and growing problem in the world. Microbial contamination is a major threat to health, particularly in regions lacking access to piped water supply systems. Diseases caused by water-borne pathogens lead to childhood malnutrition, stunted growth and development, and mortality.

Filtration systems can help, but the available types are not suitable for all situations. In fact, in many developing countries, filters are more common in urban and semi-urban areas than in rural areas where unsafe water is a serious problem. In villages in Uttarakhand, Northern India, the most common sources of water are mountain springs piped to housing settlements or collected directly using plastic, copper, or reused oil and paint containers. Most residents do not filter water due to a common misperception that the available spring water is pure and therefore safe.

At MIT, one group is addressing the problem, with support from the J-WAFS Solutions program along with sponsorship by Tata Trusts through the Tata Center. Rohit Karnik, associate professor in the Department of Mechanical Engineering, and co-PI Amy Smith, senior lecturer in the Department of Mechanical Engineering and co-director of D-Lab, have joined forces to lead a team of graduate students and practitioners in the development of an innovative low-cost water filter designed from the most natural of materials: trees.

The project team includes (from left): PhD students [Kritika Ramchander](#) and [Luda Wang](#) in the Department of Mechanical Engineering, research & evaluation manager [Kendra Leith](#), and research associate [Megha Hegde](#), both of whom are with D-Lab.

[Rohit Karnik](#) is associate professor of Mechanical Engineering and [Amy Smith](#) is senior lecturer in the Department of Mechanical Engineering, founding director and co-director of D-Lab, and director and principal investigator of the International Development Innovation Network.

### Nature offers functionality in the form of plant xylem

By exploiting the natural filtration capabilities of xylem tissue found in the sapwood of coniferous trees, the researchers have found a way to create a simple water filtration technology that is likely to be well within the reach of low-income populations. Plant xylem is a porous tissue that conducts fluids from the roots throughout the plant through nanoscale pores that are ideal for filtering pathogens. Building on scientific studies of xylem's sap conducting characteristics, Karnik's group determined in a 2014 study that plant xylem could filter bacterial contaminants from water. They identified conifers to be best suited for this purpose because of the way their xylem is structured.

Once sapwood xylem tissue had been proven as an accessible and effective material for removing pathogens from water, turning it into a low-cost household water filter for low-income and impoverished communities was the next challenge. Because xylem is easily available, cheap, biodegradable and disposable, and the construction of xylem filters is fairly simple, it holds great promise in providing access to safe drinking water to people in resource-limited settings.

### New team, new directions

The success of the 2014 study, made possible by the support of the Tata Center, advanced the team's understanding of xylem as a material for water filtration. The J-WAFS Solutions funding has enabled Karnik to partner with practitioners from MIT's D-Lab, adding market research, field testing, and product design and development expertise to the team. Karnik's group continues the work of validating the filter's performance in the lab, while D-Lab researchers have begun working in the field to understand the user's preferences and to assess the filter's usability and affordability. Ultimately, they intend to develop a strategy to scale product manufacturing for commercialization.

The advantages of the filter have so far been proven: good rejection of bacteria, simple to make, cost-effective with a low filter replacement cost, light-weight, easy to transport, can be manufactured locally with minimal infrastructure, and is eco-friendly. One technical challenge needed to be addressed, however, having to do with permeability loss once the membrane dries out with resulting uncertainties around operational attributes. Kritika Ramchander explained the problem: once the xylem is cut from a tree, "the xylem tissue undergoes structural changes mainly because all the active transport mechanisms cease to function. As a result of these changes, the flow rate through the filter drops and the rejection ability (or the ability of the filter to remove contaminants) deteriorates." The team has investigated various filter preservation techniques to address this issue. For instance, soaking the filters in ethanol helps preserve the structure and functionality of xylem.

### From the lab to the field

Since last year, the team has been working with Himmothoan Society, a local NGO in Uttarakhand, North India, to field test their filters using local water samples. This past January the D-Lab team returned to do field surveys and preliminary co-design. They interviewed and surveyed consumer groups, with support from People's Science Institute, a local non-profit research and development organization there. In total, they interviewed 270 households as well as 16 key stakeholders that included public health care officials and NGOs. They also ran five focus groups and two co-design workshops, which allowed the team to see the kind of designs residents imagined for the filters. Ultimately, this helped prepare them to develop a roadmap for manufacturing the filter and testing its performance. A key finding that came out of their fieldwork was that misperceptions about water purity kept people from investing in water filtration more than issues of affordability did.



### Future plans

The research team is completing data analysis of the field study results as they continue technical studies and field tests of their filter. They are planning to conduct new field studies later this spring, with supported fundraising efforts to develop, pilot, and test the product in several villages around India. They will also perform a market research study in an urban location.

The group is hoping to test a complete filter prototype by the end of the summer and evaluate its performance with water from different sources and with different contaminants. They plan to continue with additional iterations in order to arrive at an appropriate design, eventually leading to manufacture at a larger scale and distribution. Finally, they will soon publish a manual on how to make these filters.

According to Kritika Ramchander, the project has received a lot of interest from people in other places like Puerto Rico and Singapore, and they might be piloting it in other countries such as Colombia in the future.

Different implementation models are being considered and evaluated. At some point in the future they hope to make the manufacturing protocol of these filters widely available so that anyone who is interested can make filters, presenting income opportunities alongside the availability of safer drinking water for local communities.

**About the J-WAFS Solutions program.** Sponsored by Community Jameel, the J-WAFS Solutions program provides commercialization grants to help develop products and services that will have a significant impact on water and food security, with related economic and societal benefits.

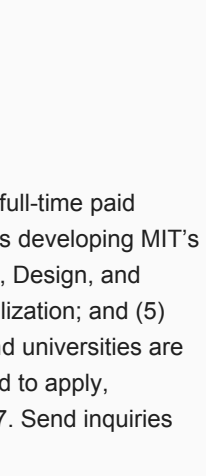
The program, managed by the MIT Deshpande Center for Technological Innovation, is in its second year. Like direct Deshpande grants, the goal of the funding is to advance a technology to the point where it can attract customer interest and investments to commercialize a product and launch a spinout company, and/or to license the technology to an existing entity. Funds support work to refine and enhance an innovation, systematically explore potential markets, and assess commercial viability, whereby the technology and market risks are sufficiently reduced.

## Upcoming J-WAFS and Other MIT Events

### MIT Water Innovation Prize final pitch night

On Monday, May 1st, watch finalists compete in the [MIT Water Innovation Prize](#) and their chance to win up to \$30,000 in innovation grants. This prize is organized by the [MIT Water Club](#) and supported by J-WAFS along with other corporate sponsors. The finalist teams will pitch innovations that address the world's water challenges. Attendees will join for dinner, the pitches, and keynote addresses by Mark Duey, Latin America Regional Director at Water for People, and Kerl Waters, Co-Founder and CEO of Callopo.

**Hosted by:** MIT Water Club with sponsors (including J-WAFS)  
**When:** May 1st, 6 – 9 PM (Dinner at 6, pitches at 6:30 PM)  
**Where:** MIT Media Lab, 6th Floor (75 Amherst Street, Cambridge, MA)  
[More info and registration](#)

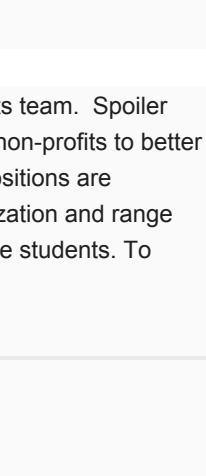


### Rabobank-MIT Food and Agribusiness Innovation Prize award ceremony

[Join us](#) on May 2nd for the final pitch event and the award ceremony of the second annual Rabobank-MIT J-WAFS and the MIT Food and Agriculture Club, and is a premier business-plan student competition. The student finalist teams will pitch their business plans to compete for \$25,000 in prize money, RaboResearch advisory support, introductions to Rabobank global offices and corporates in Rabobank's network, airfare to and participation in Rabobank's F&A Next event in Holland, and other in-kind and start-up support services throughout the year.

Admission is free but [RSVP is required](#). There will be a reception following the pitches and judges' awards. For more information about the Prize, visit [our website](#).

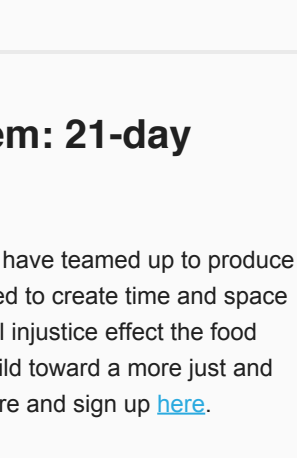
**Hosted by:** MIT Food and Agriculture Club (sponsored by J-WAFS and Rabobank)  
**When:** May 2nd, 7 – 10 PM  
**Where:** MIT Samberg Conference Center, ES2, 6th floor  
[More info and registration](#)



### Speciation and biogeochemical cycling of arsenic in a minerotrophic peat wetland

Organic-rich sediments often contain high levels of arsenic, a potentially toxic and carcinogenic trace element, which can be released into groundwater or surface water. In this lecture, Ruben Kretzschmar – professor of soil chemistry at the Institute of Biogeochemistry and Pollutant Dynamics, Department of Environmental Systems Science, ETH Zurich – will present his research on arsenic in wetland systems. More information is available [here](#).

**Hosted by:** Professors Lydia Bourouiba and Benjamin Kocar, MIT  
 Department of Civil and Environmental Engineering  
**When:** April 10th, 5pm (pre-lecture reception: 4:30pm)  
**Where:** 1-190



### River Garden: a documentary screening on the Indus river basin

Join for a screening of "River Garden". This documentary film explores the history and anthropology of the River Indus in Pakistan and emphasizes the unique role played by humans through time as agents of change (or "gardeners") within the water development nexus. The film will be introduced by Abubakr Muhammad, director of the Water Informatics Technology Center at the Lahore University of Management Sciences (LUMS). The post-screening discussion will be moderated by James Wescoat, Aga Khan Professor in the Department of Architecture at MIT.

**Hosted by:** Aga Khan Program for Islamic Architecture, MIT Center for Advanced Urbanism, and LUMS Centre for Water Informatics and Technology  
**When:** April 11th, 4 – 6 PM (refreshments provided)  
**Where:** City Arena, 9-255

## Boston-area Water and Food Events

### Tufts University future of food and nutrition conference

Mark your calendars for the 10th annual multidisciplinary Future of Food and Nutrition Graduate Student Research Conference, hosted by the Friedman School of Nutrition Science and Policy at Tufts University. This year, the keynote address will be delivered by Helena Bottemiller Evich, senior food and agriculture reporter at POLITICO, on the topic of the future of US food policy. Check out the [conference website](#) for more details and registration information.

**Hosted by:** Friedman School of Nutrition Science and Policy at Tufts University  
**When:** April 7th (welcome reception, 4:30-6:00PM), April 8th (8:30AM-5:00PM, reception to follow)  
**Where:** Boston Marriott Copley Place, Boston, MA

### Farmworker awareness week at Tufts Friedman School

On April 19th, farmworker activists from The Coalition of Immokalee Workers (CIW) will speak at the Friedman School Seminar to share about their Campaign for Fair Food and how it connects to US nutrition, agriculture, and food systems policies.

**When:** April 19th, 12:15-1:15 PM  
**Where:** Behrakis Auditorium, 150 Harrison Avenue, Boston MA 02111

### New England Water Innovation Network (NEWIN) Boston water pitch night

[BeCause Water](#) is hosting NEWIN Water Pitch Night in Boston on April 20th. Join NEWIN and members of the local water innovation community for an evening of water technology pitches and networking focused on hydropower and marine hydrokinetic technology. Entrepreneurs, academics, technologists and investors are invited to join #WaterPitchNight to get a glimpse of local innovation and connect with other water professionals. This event is free for NEWIN members and \$29 for non-members and tickets are required. [Click here more information](#).

**When:** April 20th, 5:30 PM – 8:30 PM  
**Where:** CIC, 50 Milk Street, Boston, MA 02110

### Water: Systems, Science, and Society (WSSS) symposium

Water markets have potential: potential for uniting urban and rural stakeholders in environmental stewardship, potential for inspiring public-private partnerships, and potential for flexible solutions to a variety of regional water-based issues. The WSSS Symposium offers a series of talks featuring experts in both water quality and quantity markets. The day will start with an interactive demonstration of how markets work, and from there delve into opportunities and challenges facing water markets today. This symposium is organized by students in the second year of the WSSS program in the Tufts Institute of the Environment. Visit their [website](#) and [Facebook](#) pages for more information, and [register here](#).

**When:** April 21st  
**Where:** Tufts University

## Funding and Other Opportunities

### MIT Office of Sustainability Summer Fellowshipships

**Application Deadline:** April 7th  
**Apply at:** <http://sustainability.mit.edu/jobs>

The MIT Office of Sustainability (MITOS) is currently seeking student applicants for 5 full-time paid Sustainability Fellowshipships for summer 2017. Join a dynamic, collaborative office that is developing MIT's next generation vision of campus sustainability. **Open Positions:** (1) Communications, Design, and Outreach; (2) Urban Living Lab; (3) Sustainable Procurement; (4) Analytics and Visualization; and (5) Climate Change Resiliency. MIT students preferred, but students from all colleges and universities are welcome to apply. For detailed information about each position and qualifications, and to apply, visit: <http://sustainability.mit.edu/jobs>. Applications must be received by: Friday, April 7. Send inquiries to [ofsjobs@mit.edu](mailto:ofsjobs@mit.edu).

### NWRI Clarke Prize for Excellence in Water Research – nominations due April 15, 2017

The National Water Research Institute (NWRI) is accepting nominations for the Twenty-Fourth Annual Athalie Richardson Irvine Clarke Prize for excellence in water research. The Prize, which includes \$50,000 and a medalion, rewards scholarly and practical achievements in water research, established in 1994, the Clarke Prize recognizes outstanding individuals who are significantly and actively contributing toward any of the following areas: the discovery, development, improvement, and/or understanding of issues associated with water quality, quantity, technology, or public policy. **The deadline to submit nominations is April 15, 2017.** More information about the Clarke Prize nomination process, including the nomination guidelines, review criteria, and application cover sheet, may be found at [www.nwri-usa.org/nominations.htm](http://www.nwri-usa.org/nominations.htm).

### Interns, Spoiler Alert

[Spoiler Alert](#), an MIT-based startup, is actively looking for a handful of interns to join its team. Spoiler Alert is a Boston-based software company that enables food businesses, farms, and non-profits to better manage unsold inventory and recover value from surplus food and organic waste. Positions are available in software engineering, business development, marketing, and data visualization and range from full-time (summer) to part-time opportunities for both undergraduate and graduate students. To learn more about the roles and to apply, visit [www.spoileralert.com/careers](http://www.spoileralert.com/careers).

### Safi Organics seeks students to join their team

Safi Organics (aka Takachar), one of the 2016 Rabobank-MIT Food & Ag Prize winners, is seeking interested students to join their team. Short (3-month) full-time paid summer internships are potentially available. Safi Organics utilizes MIT technology to downsize and decentralize the fertilizer production process in emerging markets, making it feasible to set up localized production plants in rural villages. If interested, please contact [trashicash@mit.edu](mailto:trashicash@mit.edu).

### Young Earth Solutions (YES) research grant competition

The 2017 Barilla Center for Food & Nutrition's 2017 [YES! \(Young Earth Solutions\) Research Grant Competition](#) seeks groundbreaking research ideas that have a high impact potential for the sustainability of food systems. Emerging experts are encouraged to submit studies that are innovative, have a promise of significant impact, and can meet global research needs. Project submissions can be related to new or ongoing research. **Proposals must be submitted online through the BCFN website by June 28, 2017, 11:59 pm CET.** Winners receive a €20,000 research grant for a one-year investigation.

### Explore the effect of race on the food system: 21-day racial equity challenge

The [Interaction Institute for Social Change](#) and [Food Solutions New England](#) have teamed up to produce the [21-day Racial Equity Food Buying Challenge](#). The Challenge is designed to create time and space to build more effective social justice habits and discover how racial and social injustices affect the food system. The goal is to collectively discover ways to dismantle racism and build toward a more just and equitable system. The 21-day Challenge launches on April 9th. Find out more and sign up [here](#).

