BREAKING BARRIERS
30 AND UNDER: WOMEN IN STEM
2019
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In their careers, the impressive women featured in the Breaking Barriers Under 30 campaign are all addressing significant issues affecting Kenya today: sustainable living conditions, making data more accessible to the public, breaking down scientific concepts, uniting and mentoring other women in STEM, demystifying STEM subjects to young girls and taking science out of the classroom and into public spaces. What surprises and inspires me the most is how intentional and self-aware they all are in leveraging their positions in their fields and society to make a difference. Though what they are each tackling is often linked to wider and deeper problems in Kenya, each of them and their initiatives are marked by hope and a steely determination to be part of the generation that brings real and meaningful change to Kenya and to the world.

NALIKA ODERA
Content Creator, Mawazo Institute
Writer, 30 and Under: Breaking Barriers in STEM
INTRODUCTION

For our last year, as co-sponsors and organisers, of Africa Science Week – Kenya, we chose to focus our theme on ‘Girls and Women in Science.’ We chose this theme in recognition of the continued underrepresentation of girls and women in the sciences, and the pressing need to do more to promote their participation and uptake in science related subjects and career fields. As we explored how to bring this theme to life, we thought it would be a missed opportunity not to shine a light on younger women in science who have already shown demonstrable success and incredible potential in their fields – and so, we put out a call for nominations for Kenyan women who were 30 and under, and breaking barriers in Science, Technology, Engineering, and Mathematics (STEM). The kind of women who, alongside more accomplished and recognised names and faces, represent the future of Kenya’s scientific community.

We called this campaign, 30 and Under: Breaking Barriers in STEM.

Our resulting six female scientists are all young women, aged 30 and under, who are drawn from the fields of technology, geospatial mapping, engineering, and microbiology. Through this campaign, we are sharing stories of how they are using science, technology, and innovation for socio-economic development. We also hope to help to build broader public awareness of the exciting scientific work in which young, Kenyan women are engaged in locally.

The resulting stories are not only inspiring, but also showcase the scientific and technical accomplishments of our Breaking Barriers women, while charting their journeys and ambitious plans for the future. We hope you will enjoy meeting our Breaking Barriers women, as much as we did.

Happy reading!

DR. ROSE M. MUTISO
CEO, Mawazo Institute
Next Einstein Forum
Ambassador

KARI MUGO
Public Engagement Consultant,
Mawazo Institute
Africa Science Week-Kenya
Coordinator
ABOUT AFRICA SCIENCE WEEK

The Next Einstein Forum’s (NEF) Africa Science Week (ASW) is Africa’s annual week-long celebration of science and technology with thousands of individuals – from students to scientists and technologists – actively engaging in coordinated science events across the continent from September to December 2019. This year’s events will take place in 32 countries across the continent. ASW wants to encourage citizens to get involved, participate in the NEF’s 1mil1 campaign and become interested in science and technology, and how it impacts their daily lives. The 2019 Kenya edition of the event, Africa Science Week-Kenya (ASW-Kenya), was held from November 4th to 8th 2019 under the theme, ‘Girls and Women in Science.’

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WOMEN LEADING RESEARCH IN AFRICA

Government of Rwanda
THE TEAM
Meet the Breaking Barriers team.

DR. ROSE M. MUTISO
CEO, Mawazo Institute  
Next Einstein Forum Ambassador

Dr. Rose M. Mutiso is the Co-Founder and CEO of The Mawazo Institute, which supports the next generation of female scholars and thought leaders in East Africa, and promotes public engagement with research. She is also the Research Director of the Energy for Growth Hub, and the current Next Einstein Forum Ambassador representing Kenya. Rose has worked extensively as a researcher and practitioner focused on technology and policy dimensions of energy, environment and innovation issues globally. Most recently, her work has focused on power sector issues in Africa, particularly the links between renewable energy, energy efficiency, and energy poverty.

She is a Materials Scientist by training with research experience in the fields of nanotechnology and polymer physics. Rose is passionate about harnessing science & technology to improve lives, and elevating women to positions of leadership and influence in African society. She earned her BA and BE in Engineering Sciences with a concentration in Materials Science from Dartmouth College, and her PhD in Materials Science and Engineering from the University of Pennsylvania.

KARI MUGO
Public Engagement Consultant, Mawazo Institute  
Africa Science Week-Kenya Coordinator

Kari Mugo is an activist, writer and communications consultant supporting the work of agitators, dreamers and social justice movements working towards a universe of equals. Before joining Mawazo Institute, she was Operations Manager at the National Gay and Lesbian Human Rights Commission, where she oversaw program and staff management. She brings with her four years of experience partnering with nonprofits and local government agencies in Minnesota, USA and Nairobi, Kenya to tell their stories.

Kari is skilled in developing external communications, fundraising and community engagement - and believes in the power of storytelling. She holds a Bachelor of Arts degree in Economics and Political Science from St. Cloud State University.
THE TEAM

Meet the Breaking Barriers team.

NALIAKA ODERA
Content Creator, Mawazo Institute
Writer, 30 and Under: Breaking Barriers in STEM

Naliaka is a freelance writer, editor and social media consultant. She is the Co-Founder and Managing Editor of ‘Of Africa’, an online platform that celebrates women of African descent while fostering editorial talent. She is also a founding member of ‘Social 4 Rookies’, a training and consultancy group that teaches companies and individuals the integral concepts of branding online at a beginners level. She holds a BA from the University of British Columbia and has an ongoing love affair with words. Through ‘Of Africa’ and her consulting, she stresses the importance of people learning vital communication skills to be able to speak for themselves.

MAINA WACHIRA
Research and Communications Assistant
Mawazo Institute and Africa Science Week-Kenya

Maina is a recent graduate of the University of Chicago, where he earned a Bachelor of Arts in Philosophy while exploring his interdisciplinary interests through coursework in mathematics and literature. Before joining Mawazo, he worked on the editorial team of Sliced Bread Magazine, volunteered at Open Books Chicago, and organised on Chicago’s South Side with the Midwest Workers’ Association in order to connect local residents to public utilities and legal help. During his time as a student, the sight of major academic institutions neglecting their local communities sparked his passion for supporting diverse research environments and publicly accessible knowledge.

ARAFA C. HAMADI
Graphic Designer
Africa Science Week-Kenya

Arafa is an interdisciplinary artist, working in the fields of graphic, set and architectural design. They graduated from the University of Edinburgh in 2017, with a degree in Architecture (MArch), after which they began working as a set designer, creating custom pieces for Budweiser, Hennessy, SHELL Tanzania and more. They now work as an art director for various festivals including the Kilifi New Year festival in Kenya. During festival off-seasons, they address the intersections of art and architecture through the creation of immersive installations which have been featured in exhibitions in Mozambique and Tanzania. They also work as a freelance graphic designer, as well as co-host the Tanzanian-based podcast, the Chai Podcast.
Sometimes you are educating people to have a dream. Some don’t even have a dream.

GRACE NZIVO

It is through location analytics that we can analyze big data to unlock patterns and understand behaviour for informed decision making.

YARIWO KITIYO
BREAKING BARRIERS
MEET YARIWO KITIYO

A geospatial consultant and data visualisation expert, who wants to harness the power of data for gender equality

The power of data makes Yariwo Kitiyo come alive. Yariwo is a leading specialist in Geographic Information Systems (GIS) at Esri Eastern Africa where she focuses on spatial analysis and providing geographical solutions. GIS is a computer system designed to capture, store, manipulate, analyze, manage, and display all kinds of spatial or geographical data. Yariwo says she fell in love with it as soon as she first saw the tool. “It is through location analytics that we can analyze big data to unlock patterns and understand behaviour for informed decision making. Just think of any challenge, from gender equity, to emergency response, to transportation, and market segmentation among others, all these have a location component to them.”

For this reason, using data effectively is one of Yariwo’s focuses. Recently, Yariwo has been working on using data to examine gender equity in Kenya. Her belief is that gender-differentiated statistics should look at more than what women’s contributions have been to society, but also clearly outline major gendered issues to help policymakers address them. It is through his kind of approach that we can help improve responses to gender inequality.

To help move this conversation forward, Yariwo also co-founded Women In GIS Kenya, an initiative that creates space for sustainable mentorship of women in data, science, and spatial analytics. Women In GIS Kenya also leverages the power of data analysis for gender equity and frequently works in partnership, to organize mentorship and training programs in universities. During these training programs, students are challenged to come up with practical solutions to newly identified issues within their county using the technical skills they have garnered. Women In GIS Kenya have, so far, partnered with the Kenya Space Agency, Africa Media Hub, Esri Eastern Africa, Pathways International, and the University of Nairobi. Yariwo stresses the importance of working with university students, “I am convinced that building an effective talent pool in universities is a smart investment in the future.”

For Yariwo, data has no real value if it does not lead to actionable solutions. What can be frustrating as a data analyst, is realising that your data is not being seen by the right people. She explains, “It’s quite interesting because even for our [Women In GIS Kenya] technical events, it’s mind-blowing how you will get really great technical people in a room and then no policymaker. It’s a very big gap that you are trying to find a workaround... where we can bring together tech people and policymakers.” To help address this gap, Women In GIS organizes technical sessions that include input from senior-level government officials. Additionally, in 2020, they plan to host frequent breakfast meeting sessions whose sole purpose is to connect data analysis to policymakers.

Yariwo has also interacted with other data analytics tools for analytics and visual data. The idea of the public being able to access vital data is invigorating, and her dream is simple, “I would want to transform data presentation and dissemination from extensive PDFs to comprehensive dashboards. I want a future that is accustomed to data presentation in a user-friendly format that can be consumed by the common mwananchi [average person].” As she works on completing her Masters in GIS and Remote Sensing at the Jomo Kenyatta University of Agriculture and Technology (JKUAT), her career seems linked to that of the future of data in Kenya.

“Data rock stars are the missing link we so urgently need for open governance and policy change,” Yariwo emphasizes. Not only is she a data rock star herself, but Yariwo is also ensuring that the future generation of Kenyans will have no shortage of data scientists.
“In order to advance your career,” Wangari Muchiri, Engineer and Obama Foundation Leader, tells us, “You don’t want to go where you fit in.” This has been the guiding force in her life and a message that she often shares with other young women looking to make an impact in the world. At times pragmatic and at other times an idealist, Wangari found her way into her undergraduate degree and eventual Masters programme in Renewable Energy Engineering by following her mother’s advice, who emphasized that energy would be one of the most significant world issues of the 21st century. Wangari took to the subject quickly, immediately recognizing the relevance of renewable energy in today’s world where coal and nuclear energy are witnessing a decline in popularity as concerns rise over their safety and impact on climate and health. But what Wangari has chosen to do with her specialization, is even more unique.

Wangari currently works with JLL, the international Real Estate firm, applying the concept of sustainability to Real Estate in Kenya. She is also the Head of the Technical Committee at the Kenya Green Building Society, a non-profit membership-based society that advocates for more sustainable and green buildings in Kenya. Wangari sees the promise sustainability holds for Kenya.

“It is a way to become more independent. A lot of our systems, like mobility or coal power, are so tied to what we are bringing in from other nations. Why not look at what we inherently have here and use that to be our enabler? For example,” she says, “Kenya sits on the equator and has some of the highest solar radiation levels in the world. Why are we not using that as a main source of energy and even exporting energy? Being able to generate energy for yourself as a nation is freedom. But more than that, we are always looking for ways to increase employment and improve the economy, energy could be the way that we do that.”

Kenya’s progress in renewable energy is something to be proud of, Wangari emphasizes. “Africa’s largest wind farm has recently opened in Turkana, the move to incorporate solar power has been widespread and Kenya is one of the world’s leaders in terms of the percentage of renewable energy in our energy mix [80%].”

When it comes to Wangari’s long term career plans, she is ambitious in her vision. “I want to completely disrupt the energy sector in Kenya,” she says and plans to sit at the helm of Kenya’s next (and largest) energy company one day. There is a strength and power in thinking differently, Wangari insists. It is only through difference in perspective, that the world moves forward. “For projects to be sustainable and even successful, you can’t only think of one group. You can’t only build for one group.”
A software designer who advocates for gender representation in technology and is keen on deepening developer communities locally

“My impact as a developer is mostly around communities,” software developer Purity Birir explains. In her career, Purity has worked with emerging tech talent recruiter Andela, which connects Africa's emerging engineering and development talent with some of the world’s largest tech companies. She now works with the BBC as a software developer. Despite an impressive resume at a relatively young age, Purity’s focus is largely on contributing to her community of African female developers and changing the narrative around women in STEM, so that women like her can thrive.

In all aspects of her field, Purity is able to step back and see the larger picture. On a macro level, she considers the importance of what her success means to other young girls who may be interested in science. “If more people would see that women can actually be in careers like this, it would inspire others to do it.” This is a path that she sees herself following in the future, where her interests will guide her towards being a leader in her field and inspiring more young women like her into careers in science.

“A lot of people get into STEM, but so many don’t end up staying,” Purity says. “The numbers keep reducing. By the time you get to the top positions and heads of industries, [women] have chosen other careers.”

She cites Dr Chao Mbogo as a Kenyan woman in STEM who has done a lot to encourage other women to stay in the field. Her model of mentorship and support is one that Purity aspires to create in the future. Her positivity and genuine excitement for software development and her industry encourage others to feel similarly. She has revelled in connecting with new people and networking amongst like-minded women. During Purity’s time at Andela, she became the first Kenyan community leader of AnitaB.org, an international social enterprise that supports women in computing and that hosts the Grace Hopper Celebration, the world's largest meetup for women in technology. Her experience speaking at events and attending the Grace Hopper Celebration cemented her desire to create more opportunities for Kenyan women in tech to network with each other.

As Purity progresses in her career, she continues to reflect on the wider context of privilege and access. "Without [developer communities] a lot of people would not have access to information," she explains. “Information is limited by privilege. If you come from a privileged background, you are able to have access to the internet and you are able to get information. Through the developer communities, people are able to find out so much information.”

In October, as part of AnitaB.Org, Purity helped organise a seminar for African women in tech with over 100 participants. An achievement in itself, Purity has since vowed to step back from planning, making room for other female future tech leaders to have the same opportunity to grow.

She believes in the power of saying yes to opportunities. This philosophy has served her well in her academic journey and career. “One thing leads to another. In January I didn’t know that I would be working for the BBC as a journalist coder. But I find myself in such spaces because I always try to explore different opportunities.” Still in the nascent stages of her career, Purity’s future seems bright and wide open. One thing is sure though, she will continue to celebrate the achievements of women in her field and inspire those in the STEM pipeline to confidently step into their dreams.
That laptop was a prized possession that I cherished. I explored every inch of it, marveling at all I had been missing.

MAURINE CHEPKOECH

You can’t be what you can’t see.

STEPHANIE OKEYO
BREAKING BARRIERS
MEET STEPHANIE OKEYO

A microbiologist and founder of Under the Microscope, passionate about Science communication and women in Science

“Even in a glass of water, there are millions of microbes!” science advocate and Under The Microscope Founder Stephanie Okeyo exclaims excitedly. When it comes to science, nothing gets Stephanie more excited than breaking a concept down into easily digestible language. A calling she discovered while pursuing her Bachelor’s degree. It was while in university that Stephanie realised that the many exciting and important ideas being discussed in her classroom, weren’t reaching the general public. Additionally, when she watched educational science videos online, she found that there were few African scientists featured, or producing such videos. As such, Stephanie says, she felt a disconnect with the non-African content. Instead she yearned for someone who could create more relatable content.

This was the genesis of Under The Microscope, a science communication initiative that provides a platform to educate, innovate, mentor and network. It began as a platform that disseminated scientific ideas and information for the general public. “At the end of the day,” Stephanie explains, “research is for the people.” Now with programming like “Science 123,” where Under the Microscope takes on health issues that sometimes touch on taboo topics such as genital warts, important information can reach the public in the form of written blog posts or short animated videos. “Big Bite” is another program from Under the Microscope that breaks down one large scientific topic at a time. Because it is also important that women in various scientific fields, who are typically underrepresented, are appreciated and showcased, Stephanie created the “Women Rock” segment. Through this segment, Under the Microscope fosters a female scientific community where women and their work can be spotlighted, and networks of support and mentorship can arise.

“You can’t be what you can’t see,” Stephanie says firmly, and she is determined for younger African women to see more of themselves in the sciences.

Finally, Under The Microscope also creates a Climate Change Series, connecting scientific research to the public, and outlining the current parameters of the ongoing climate change crisis. But Stephanie has even bigger dreams for the platform. For instance, she feels that there is real potential to use the platform to change the narrative on Female Genital Mutilation for young girls in rural areas. “By educating girls, you educate the community. What if education was used as a rite of passage?” she wonders aloud. Under the Microscope has partnered with the energy management consultancy group Brands & Beyond and Amref Kenya to address this very question. This project focuses on STEM education and encourages girls in parts of rural Kenya to consider the practical possibilities within the sciences.

There is a sense that Stephanie has enormous capacity to tackle several different issues at once, and she seems to enjoy turning an idea over in her head until it makes sense to her. Right now, in fact, she is brimming with excitement over her most ambitious project yet. A collaboration with Inkspace Studios, a Kenyan multi-disciplinary studio and Dr Hamisi Babusa, a Kiswahili lecturer at Kenyatta University, has yielded a stop motion animated short film entitled “Bintimaji and the Ocean.” The short film tells the story of a young girl, Bintimaji, who loves the ocean and is devastated by the effects of pollution on her underwater friends from the sea. The next step, Stephanie informs us, is for Bintimaji to be turned into a feature film, becoming one of the few stop motion animation films from the continent.

As daunting a task as this is, Stephanie is determined to see it through. “I’m really excited about this project,” she says. “It will involve culture, science, multiple artists, and we hope to have it in many languages.” Accessibility and relatability, the same issues that first inflamed Stephanie’s passion and remain her core focus in every aspect of her career path.
BREAKING BARRIERS
MEET GRACE NZIVO

A civil engineer and STEM ambassador who wants to inspire young girls in rural Kenya to dream big

When civil engineer Grace Nzivo was a young girl living in her village of Kakindu in Embu County, she heard a story about a woman named Florence. Florence had left their village to become a civil engineer and had returned, bringing her community a working water supply system. At the time, Grace had never even heard of the discipline of engineering. Neither was it common to talk about the ways in which women were contributing to their communities in such integral ways. For these reasons, this story, for Grace who was already quite curious about the sciences, made her aspire to be like Florence; an engineer who could give back to her own community.

Nowadays, Grace works as a Project Coordinator at Steel Structures Kenya Ltd, the leading steel supplier in East Africa, where she manages structural steel projects from inception to completion. As much as she loves her job, she is even more excited by the possibility of a future in which there are more female engineers and women in Science, Technology, Engineering, and Maths (STEM) in general. Remembering how life-changing it was for her to hear Florence’s story as a young girl, Grace now runs a program that educates school girls around rural Kenya about opportunities in STEM.

STEM Wahandisi La Femme is a collaborative initiative whose mission is to empower young African girls to seek careers in STEM. Her leadership at the initiative earned her an African Union International Centre for Girls and Women Education in Africa (AU-CIEFFA) award as a STEM ambassador. The AU-CIEFFA advocates for instituting national legal frameworks that support women and girls in academia, ensuring that curricula are gender-responsive, and increasing girl retention in schools. The opportunity took her to Tunis, Tunisia where she joined a cohort of like-minded individuals from all around the continent in trainings centred on topics like how to foster relationships with potential collaborators, how to deal sensitively with disadvantaged women, and issues relating to STEM. The confidence and new communication skills that Grace gained from the experience have encouraged her on her path of STEM outreach for girls.

While the award was a positive consequence of her work, for Grace, the real satisfaction comes from realizing she has helped somebody completely change their viewpoint. Speaking to girls who range in age from as young as nine years-old to their late teens, the content and medium of STEM Wahindisi La Femme may vary, but the message remains the same: to teach the girls to imagine their lives more complexly. To consider that not only is it possible to do well in the sciences as a girl, but for it to also be a means in which they can create lasting impact in their communities. Grace has realised that sometimes the message is simply to impart on the girls a level of agency. That they can have some control over what happens next in their lives.

“For example, when we go to Narok [county], it can be like we are starting from scratch. Sometimes you are educating people to have a dream. Some don’t even have a dream.” The ability for young girls to dream and picture themselves as women succeeding and contributing in STEM is perhaps the single biggest motivator for Grace. But her motivation is more than just a feel-good issue. “I strongly believe in the power of STEM since more than 10 SDGs [Sustainable Development Goals] rely on having more STEM practitioners. Even Kenya’s Big Four agenda and Vision 2030, is highly dependent on STEM professionals.”

Encouraging women’s participation in STEM, then, is also about building our human capacity to problem solve towards the attainment of a more equitable and sustainable world.
BREAKING BARRIERS
MEET MAURINE CHEPKOECH

A cyber security researcher and mentor with international recognition as a woman in technology

When Telecommunications Engineer Maurine Chepkoech aced her KCSE exam, her high school, Kipsigis Girls in Kericho County, gifted her a laptop. Her life was never the same. “By the time I completed High school, I had barely interacted with computers,” she remembers. “That laptop was a prized possession that I cherished. I explored every inch of it, marveling at all I had been missing.” Maurine’s excitement did not go unnoticed by her father, who promptly enrolled her into a local computer studies school. In 2018, Maurine would go on to receive the Vice-Chancellor’s Award and graduate with First-Class Honours in Telecommunication and Information Engineering from Jomo Kenyatta University of Agriculture and Technology (JKUAT).

Maurine now works as a cybersecurity researcher at eKRAAL, Kenya’s first cybersecurity innovation hub which provides services, guidance and advice on cybersecurity training and education to industry, academia, and other levels of government. Her work has contributed significantly to research on mobile security and reverse engineering. But outside of her work, Maurine has also invested time and resources into mentorship. In 2016 she was a Safaricom Technovation Challenge mentor and worked with girls from Loreto Convent High School to develop technological solutions that could offer advice and marketing services to farmers. Then, with the Kids Go Tech program, she helped introduce young children to the marvels of technology, and since March 2019, she has been a mentor with KamiLimu, a mentorship programme headed by Dr. Chao Mbogo, Head Of the Computer Science Department at Kenya Methodist University. Her appointment as a mentor at KamiLimu is especially meaningful, as she herself was a mentee of the programme in 2018. This progression is indicative of Maurine’s drive and steady ambition, which she credits in part to her family’s unwavering support in giving her the motivation to succeed.

“Memories of the efforts my parents and siblings put into my education are the driving forces behind every aspect of my career. They are the reason behind every single moment I have talked myself out of giving up on anything.” It is this quality of support that Maurine hopes to pay forward when it comes to other young people hoping to get into the field of technology. Although she is only 24 years old, and a recent graduate, Maurine has already set up a mentorship programme of her own, Kuza, that is set to launch in January 2020 and will equip high schoolers in Kericho, her home county, with personal, professional, and Information and Communications Technology (ICT) skills to aid them in the transition to institutions of higher learning. Her ability to give back to the community where her love of computers was first birthed is no doubt rewarding, but it is also a foundational aspect of Maurine’s career.

When Maurine was the only Kenyan to be selected as a Google Women Tech-Makers scholar in 2018, she leveraged it into an even greater opportunity and secured support from Google for future community service initiatives. In 2020, she will work as a selected Mozilla Open Leader who will train and mentor participants on data security and digital footprints. She adds that there is also a chance for us to “foster security concepts, openness, and inclusion.” The Kenyans who she trains will be the next generation of cybersecurity experts in the country, she believes. While still young, Maurine’s career points to a path committed to helping other young people reach their highest potential.
Information is limited by privilege. If you come from a privileged background, you are able to have access to the internet and you are able to get information.

PURITY BIRIR

Being able to generate energy for yourself as a nation is freedom.

WANGARI MUCHIRI