

Future of women in science depends on investment in tech, innovation

By [Dr Eunice Ubomba-Jaswa](#)

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When the South Africa Water Research Commission (WRC) opened its doors nearly fifty years ago in 1971, it was because of a serious water shortage that threatened the economy, livelihoods and the overall health and well-being of the population. Water became a keen focus for research scientists and, through the WRC, has resulted in a large repository of research reports that help us navigate the consistent challenges we face with water supply, water quality, sanitation and environmental conservation.



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However, fifty years ago research scientists were mainly men, our picture of “women in science” was “women as subjects” - the tired mother fetching water from a far-away river or caring for sick relatives due to water-borne illness. Fast-track to 2020 and while many of the problems that prompted the creation of the WRC exist – we still want to ensure water supply for future needs and we still strive for good water quality – our picture of women in science has shifted considerably to women being researchers, data gatherers, asking the questions, analysing, experimenting, advising and solving.

The fifth International Day of Women and Girls in Science on 11 February 2020 celebrates this changing image. This year's theme, 'Investment in equality in science, technology and innovation in the digitalisation era for inclusive green growth' (with special focus on agriculture, technology and digital economy) also cautions us to scale up investment in the appropriate capacity development of women in science so that they meet the demands of the fourth industrial revolution. We must also realise that women excelling in science and accelerating gender equality are not only critical for economic and social development, but they are also imperative if we are to achieve the United Nations Sustainable Development Goals (SDGs) by 2030; this nexus between science and sustainable development is especially apparent in the water sector.

Water and subsequently sanitation are fundamental to sustainable development. Our health depends on access to safe water and adequate sanitation. We need water for agriculture, to produce energy and for industrial activities such as manufacturing. All these uses also produce wastewater which must be managed in such a way that it does not cause harm to human health or damage the environment through pollution. Water is also central to keeping our natural habitats stable, which in turn contributes to a reliable supply of quality freshwater. Water is therefore inextricably linked to social and

economic development, rising inequality, conflict and political instability, disease outbreak, migration, natural disasters and climate change. Research scientists in the water sector must therefore employ digital technology and innovative thinking to solve these challenges and in so doing start to create new career paths and new images of scientific work.



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Women must be at the foreground of new images of research and science

If we think of women in science in relation to water quality, our general image is of a woman in a lab with test tubes or petri dishes, but that is a fading image of water quality testing. The WRC's vast research repository has provided us with insights into the new careers that will be required in the South African water sector in the near future. We now know that a woman sitting with earth observation data using satellite technology will likely be the one to determine whether water quality is deteriorating in an area. A water microbiologist for instance will no longer need to go into the field to take a sample and then bring it back to the lab and test it. Sustainable water supply in agriculture is no longer about setting up rainwater harvest tanks – it is now about metering, using remote sensing, and using big data to inform smart agricultural practices and smart irrigation. Those are the new images we need to draw in our minds and more importantly women scientists must be equipped with these new skills. These new careers involve information and communication technologies, computer engineering, artificial intelligence, internet of things, remote sensing and robotics – all fields that are predominantly driven by men currently. We need to give guidance now – not later – to women and girls in science who are still studying to ensure that they have the required skills for future careers in science.

Blurred lines in science make a clear case for integrated careers

The WRC research repository also points to the deepening integration of scientific fields in the water sector and this is further reflected in the SDGs where almost all the 17 goals have indicators relating to water access, supply and quality. This means that the opportunities to enter water sector careers have also expanded considerably. Whether at the start of their careers or at mid-career level, women must realise that there are a lot of offerings in water and should seize the opportunity to participate in these sectors. The water sector is no longer a constrained field – it is possible for women to begin their careers in other areas for example geography and then transition into water. With the overlay of the democratic nature of digital skills such as coding, programming and data visualisation, more than ever before, women can use the highly multi-disciplinary nature of the water sector to transition into scientific careers from a range of entry points including from the social sciences which are typically dominated by women.

Moreover, the water sector offers the opportunity for women to come in at different career levels. For example, a mid-level engineer can transition into a role in natural systems without sacrificing their current career advancement. So educational opportunities such as short courses, training programmes, workshops are avenues for women to tap into and expand their knowledge in order to move into new opportunities. The integrated nature of the water sector also means that women who are already in scientific fields but may feel stagnant can also see opportunities to pivot or escalate their careers by branching into emerging or highly specialised areas such as climate smart agriculture or biomimicry in wastewater treatment.



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The image of science is becoming more developmental

While the critical challenges related to water have not changed much, the premise and starting point of scientific research has taken on a very distinct developmental nature to meet the demands and requirements of sustainable economic growth. A decade or so ago many water scientists were not thinking about a circular economy (an economic system aimed at eliminating waste and the continual use of resources) or how their research could lead to minimising waste, for example, looking at a wastewater treatment plant as an energy recovery centre. We are now even questioning the whole idea of waste and rather moving towards the elimination of the concept of waste. Many more scientists are finding solutions that will enable us to transition to a green economy (considering the economy as a key component of the ecosystem), potentially with significant benefits, including efficiently producing clean energy, creating new green industries and therefore new green jobs particularly for women and youth; boosting agricultural production and food security and mitigating the effects of climate change. Women scientists must be part of this transition - making sure that new ways of thinking include women's perspectives and consider gender equality, inclusivity, and diversity in its entirety.

Decades of research later, water is still an exciting sector albeit one full of challenges – the challenges make it exciting and provide opportunities for women and girls in science to provide those solutions and change what the situation looks like. Let us who have the hindsight of research findings ensure that the adequate investment is made so that women and girls in science have the appropriate knowledge and tools to position themselves up for the careers of the future – to be prepared for jobs that are driven by technology and innovation, and to make sure they do not get left behind again.

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