

IZETTE GREYLING



## Judge research impact on a local scale

Metrics that give a global overview risk sidelining science in developing nations, argues Casparus J. Crous.

The latest global list of the world's most highly cited scientists was released in June and is likely to act as a focal point for promotion and funding decisions. Creators of such metrics — in this case the company Thomson Reuters — argue that they take no responsibility for how their data are used. But the reality here in South Africa, as in many other countries, is that they feed into official judgements of performance and discussions of how to allocate resources.

To me, an early-career African scientist, the latest list makes disturbing reading ([highlycited.com](http://highlycited.com)). Searching across all entries, only 11 African scientists made it onto the list — just 0.3% of the total. Of these, only six have primary addresses in Africa. The list is dominated by the United States (more than half of all scientists featured), followed by a handful of European nations, as well as China and Japan. Most developing countries have similarly bleak showings, except Saudi Arabia, which has more scientists on the list — mostly from a single university — than any other nation except the United States and the United Kingdom.

If this is a true reflection of the world's leading minds, what does it mean for an aspiring scientist in Africa? It might be subjective, but if you have an interest in furthering your career, how could this easily accessible and well-published list influence you? It tells an enquiring young scholar little about current research growth or potential in Africa.

The value of role models for stimulating young people to follow a certain career is well known. When I reflect on my choice to venture into biology, I recall reading about the first human heart transplant, by Christiaan Barnard in South Africa in 1967. I was intrigued by this 'magic'. It wholly challenged my perception of life as I knew it; how on Earth was this possible? Today, considering the highly-cited list, I was confronted with a new question: is there any value in continuing an academic career in Africa when all the science of 'impact' is done elsewhere?

Arguably, there has never been a better time to be a budding scientist. With advances in technology, and the great increase and connectivity of available knowledge, I am part of a generation with unrivalled tools for investigating some of the world's most complex questions. Moreover, with various factors driving international collaboration, geographical and disciplinary boundaries no longer stand in the way of attacking evermore complicated questions. Fundamentally, young scientists should all strive to learn from the best researchers, in countries offering the highest scientific impact. The global scientific impact metric provides an attractive map with which to orient such an endeavour.

Excellence should be recognized and rewarded, especially when research funds are under pressure and critical voices call for greater accountability. Yet the very nature of global

excellence metrics makes rewarding excellence trickier in developing nations. How do we reward the careers of the best curious minds at lesser-known universities, who study issues of high regional importance that might have limited global consideration at that time?

With Africa steadily progressing in its science capacity, the anchoring of research excellence to such lists could render African-based academia a less attractive or less rewarding career choice, ultimately impeding the overall investment of science in the region.

I ask that Thomson Reuters and others take a more sophisticated approach that uses spatially explicit modelling (also known as individual- or agent-based modelling). Such models include extra dimensions — age and geography, for example — to highlight the best local outputs and people, and to account for their realized or *in situ* research impact.

Impact data need to be partitioned and not pooled globally. This would stop important scientists from developing regions falling through the cracks. In community-ecology analyses, we often standardize species-composition data to reduce the weight of the dominating species. This is important for observing the influence that the less-abundant species have on community patterns across the landscape. Impact assessment should do this too.

Locally sensitive lists would paint a less dismal picture of African research. This is more work for metrics institutions, but I feel that it is not unreasonable. (Some resources, such as the *Times Higher Education* World University Rankings, powered by Thomson Reuters, include structured sensitive metrics as regular features.)

I hope that a world that values the unravelling of a complex question, no matter how localized, has not disappeared. Is this not how the art of science originated, and what still draws curious scholars? I hope that there is still room to appreciate and respect local knowledge at a grand scale, on which global numbers do not exclusively dominate decision-making by funders, promotions by administrators, and the movement of young scientists. Otherwise it would be akin to judging happiness around the world on the basis of data on national gross domestic product.

If influential players in global science continue to propagate such crude centralized models, there would seem to be little hope for the development of a more equally distributed global science system, which in turn would drive a more equal and sustainable future. Such a system can be achieved only if we find ways to solve the problems in the regions we live in — independent of scale. ■

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