Democratising science

Southern Africa is facing important decisions about genetically modified organisms, but how will nonscientists understand their choices if the media don't inform them, asks ***Pascal Mwale****.*


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In Africa, biotechnology raises hopes, fears and suspicion in both individuals and diverse groups of people because it has enormous implications for the continent.

Africa's involvement in the global biotechnology movement has led to a shift in location, from the periphery to the centre of the global technology movement, making some people nurse the hope that Africa might cease to be an underdog.

Unlike other kinds of science and technology, biotechnology allows Africa to leap-frog; the operating knowledge is not contained only within the Euro-American cluster. African scientists, for example, are investigating various aspects of the 80 000 cells that will collectively define the genetic "characteristics and proclivities" of every person on the globe.

This repositioning of Africa in the global biotechnology movement and on the world market has enormous implications for the development of the continent, potentially leading to significant changes in global power politics and important shifts in international economic and trade relations.

In Southern Africa, South Africa plays a leading role in biotechnology. South Africa is at the centre of the controversy surrounding genetically modified (GM) cropping, stem cell research and cloning, among others, providing a regional platform for public debates that originated outside Africa.

South Africa, as the regional leader of biotechnological innovations, also becomes the crucible for testing new models of international agricultural economics as well as the initial market for multinational companies' ventures into biotechnology in Southern Africa.

South Africa was the first Southern African country to conduct experiments on GM cropping in 1997 where crops, such as GM cotton, have been grown commercially. The South African government gave its approval for commercial activities on GM maize cropping in 1998. The South African National Biosafety Strategy was published in 2001.

Futhi, a much improved South African dairy cow, was the first higher mammal to be cloned on the African continent in 2003. South Africa is currently engaged in cutting edge research on human migration patterns based on tracking of mitochondrial deoxyribonucleic acid (DNA).

In spite of all these life-changing decisions and activities at the level of macro policy and within science communities, Southern African societies – just like their counterparts in the developed world in the post-Human Genome Project era – are yet to fully discover science.

After the dismantling of both dictatorial and racist regimes in Southern Africa, a crucial need arose in new democracies of the region for the democratisation of science. Democracy makes it imperative for whole societies in the region to understand and actively participate in developments in science and technology. For example, the Mandela government in 1994 made the democratisation of science and technology a priority in post-apartheid South Africa (Joubert, 2001: 316). This need necessitates increasing scholarly attention to "the problem of science communication" arising at the intersection between science and democracy in the region.

Public understanding of science

One significant dimension of the problem is how nonscientists can be said to *understand*, and effectively *talk*, or even debate, about developments in science and technology. Various models that assumed scientific literacy have hitherto been tried and discarded because they were misleading. A barrage of criticisms leveled at the "deficit model", the "rational choice model" and the "contextualist model" lead to doubts about these hitherto major models of science communication. In the developed world, such as the US, American laypeople equally exhibit little knowledge and awareness of latest developments in biotechnology and its products.

I think one preliminary task in studies on how nonscientists understand and talk about science would be to look at what goes on behind the scenes, as it were, of science news making. Minimally, such a task would actually involve looking at the relationships between key social actors in science communication such as the laypeople, science news writers, scientists, and, to some extent, public science spokespersons of, say, state-run science institutions, the food and health industry, and multinational biotech companies.

It is the presence of the laypeople that makes these relationships complex, and hence interesting for study. Thus, the question of the democratisation of science is challenging because it is fundamentally about the participation of nonscientists in science and technology. A plethora of somewhat dubious assumptions about the nature and scope of the scientific knowledge of nonscientists and their attitudes towards science are part of the problematic of "public understanding of science". But, we really begin to appreciate the complexity of these relationships when we also bring into the picture the media and scientists, traditionally, two categories of professionals in a paradoxical relationship marked mostly with uneasiness, distrust, and suspicion.

Laypeople and science communication

Laypeople are key social actors in science communication for at least three reasons. First, laypeople are the major consumers of products of science and technology. They ought to have a say in major decisions and activities of scientists and relevant government agencies. Second, scientists need the goodwill of laypeople in order to get public support and secure funding from the public sector for their research. Third, recent surveys have shown that social perceptions of laypeople and those of the media are in approximate alignment with science news stories. In other words, laypeople play an important role in determining which science news stories make it to print or air. On the whole, laypeople, the media, and scientists and government affect each other reciprocally in the making of science news.

But, laypeople's participation in science and science communication is beset by a number of factors, three of which are the most worrisome: ignorance, language barriers, and resource-poverty.

1. In 2004, an HSRC client survey of a representative sample of 7 000 adults showed that about 80% of South African laypeople did not know, or had no knowledge of, biotechnology. An average of 73% did not know if genetic modifications were either positive or negative (*HSRC Review*, 2005, p2). The vast majority of laypeople does not have any science education background. General illiteracy and innumeracy are not uncommon disadvantages of laypeople in Southern Africa, and Africa at large. These disadvantages contribute largely to the laypeople's general lack of interest in things scientific.
2. The language of scientists is alien to most laypeople as well as to journalists. A sociocultural-linguistically diverse country like South Africa, with its 11 official languages, presents a formidable challenge for translators of scientific findings, usually from Latinist English.
3. Apart from these cognitive and linguistic challenges, there are socio-structural obstacles. The majority of laypeople live in poor, remote rural communities that are marked with poor information and communication technologies (ICTs).

Scientists and science communication

Scientists are key social actors in science communication because they are the producers of science. Of direct relevance is the historical fact that it was mostly scientists who initiated science journalism in the United States in the 1920s, in order to advance "public scientific knowledge" and attract more funding for their research. Science journalism is a key component of science communication. Nevertheless, today the role of scientists in science communication is compromised by at least four factors.

1. Scientists are not trained to communicate with nonscientists. Scientists are generally seen as bad, ineffective science communicators "especially when the audience is a general public" (Weigold, 2001, p172).
2. Scientists do not realise, or accept, they have the *responsibility* to communicate their findings to a broader community than the scientific community. They see communication as someone else's responsibility. They are reluctant to talk with nonscientists, afraid of being misunderstood, misquoted or misrepresented. Scientists dread science news writers, fearing the latter might sensationalise and distort scientific findings, and then report them inaccurately. Generally, scientists are concerned that science news writers change scientific findings as they frame stories to make them interesting or entertaining for their usually nonscientist readers. Framing introduces substantial change in scientific findings, leading to bias and error in science stories.
3. Most developing world scientists face the additional challenge of conducting research and communicating in a second or third language.
4. Science institutions are not only resource-poor but also have weak infrastructure. This poses constraints on information-sharing. Moreover, science institutions have the tendency of being aloof and protectionist, sometimes preventing scientists from speaking with laypeople and science news writers. They tend to treat scientific findings as "a precious commodity" (Khanna, 2001: 54-5).

Science writers and science communication

Science news writers are key social actors in science communication for a variety of reasons, chief of which is that they make an effort to explain science

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to nonscientists. The media are an important source of scientific knowledge and information for nonscientists worldwide. In South Africa, the 2004 HSRC client survey showed that the media comes second to the university as "the most trusted institution to provide reliable information on biotechnology"(*HSRC Review*, 2005: 2). And yet, most developing world media – Southern African media included – lack expertise, interest, commitment and experience in science news writing.

Most science news writers do not have any science education background (Khanna, 2001: 145). Few editors have a science education background. The media depict a general lack of interest in and commitment to science news, as evidenced in poor quality and inadequate coverage of scientific and health issues, and in the virtual absence of science desks in most news organisations. Science news is neither given top priority nor is it focused on nonscientists' concerns. For Marina Joubert, a science communication advocate and consultant with more than 15 years experience in the field, South Africa faces the additional challenge of "apartheid" media: at the one extreme being poor and unsophisticated, catering for large but poor, mainly rural and black audiences, and at the other extreme being rich, sophisticated, catering for a small but affluent, mainly urban and white readership. She says the yearly Science and Technology Journalism Awards have seen "few (and poor quality) entries from community radio, rural press, and black language media… Competition winners thus far come from a relatively small number of media outlets aimed at the country's limited First-World readership."

Conclusion

Thinking like this about the complex interplay of certain key social actors in science communication enables us to begin to see a clearer and broader picture of what is actually implied in the vogue "public understanding of science" – a problematic catchall for effective ways for nonscientists to make sense of and talk about scientific issues. Science communication involves multiple players who use diverse ways to contribute to science knowledge. Science communication is not the prerogative of any one particular group of science stakeholders. It also begins to signal to us what the challenges for science communicators might be in this region. ■

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