

Democratization of Science and Biotechnological Development: Public Debate on GM Maize in South Africa

Abstract

The Mandela¹ government that came into power in 1994 made the democratization of science and technology a priority in post-apartheid South Africa (Joubert 2001: 316). Attendant ideas of Science Communication and Public Understanding of Biotechnology² have hitherto become currency in South Africa's public sector drive towards the democratization of science. Democratization of science and technology implies that the people as non-experts are an integral part of all deliberations on policy, regulation and control of science and technology, for example, in debates or controversies on issues arising from biotechnology. Democratization of science and technology is about the sociopolitical control of science and technology by wider society. Science and technology must be controlled by wider society because evil-minded groups of people can ill-use it to inflict harm on other groups of people. Moreover, certain unscrupulous and corrupt business entities can collude with the state and/or powerful and influential sociopolitical figures in societies to exploit and abuse indigenous scientific resources as well as endogenous modes of specialized scientific knowledge. On the latter, for example, they can evoke intellectual property rights (IPR) to patent resources that are not theirs historically. Thus, the ideal-type of democracy makes it imperative for the people of South Africa and of other societies in Africa to understand and actively participate in developments in science and technology.³ This need necessitates increasing scholarly attention to be given to questions of science communication and public understanding of science, arising at the intersection between science, society and politics in South and southern Africa. Some of the major drivers of the processes of the democratization of science are social movements, which are elements of civil society (Ballard, Habib and Valodia 2006). Social movements do fill and are apt to fill an important gap in science

¹ At his Inaugural Address to a Joint Sitting of Parliament on May 24, 1996, the first democratically-elected President of South Africa, Nelson R. Mandela said, 'My government's commitment to create a people-centered society of liberty binds us to the pursuit of the goals of freedom from want, freedom from hunger, freedom from deprivation... These freedoms are fundamental to the guarantee of human dignity. They will therefore constitute part of the centerpiece of what the government will seek to achieve...' (Preface to the *White Paper on Science and Technology*. Department of Arts, Culture, Science and Technology. September 4, 1996).

² Biotechnology involves the use of living things to perform certain tasks and make useful products. Genetic modifications (GM) technology and reproductive cloning are examples of biotechnology.

³ According to Huijer (2003), one of the underlying assumptions of democracy—especially deliberative democracy—is that a democratic society provides 'options for people—citizens, politicians and other nonscientists—to become actively involved in and anticipate new directions in the life sciences.' Non-experts need to be involved "in setting priorities and funding patterns 'related to national and regional science projects. Therefore, democratization of science entails, giving nonscientists 'opportunities to reflect, anticipate, and negotiate on new directions in science and technology' (Huijer, 2003: 479).

communication and public understanding of biotechnology in South and southern Africa. Scientists are accused generally of being poor communicators of science and technology, preferring to work in isolation, behind closed doors, in laboratories (Latour 1987). Science communities are notoriously insular (Weingart *et al* 2000). News media practitioners are accused of misrepresenting-- by distorting, oversimplifying, or sensationalizing-- science in public domains and of passively resisting science communication (Joubert 2001: 324-5). Yet there is a lack of scholarly attention to the role of social movements in the democratization of science in Africa as a whole. Practically, the democratization of science is partial, ad hoc, and biased in South and southern Africa.⁴ Therefore, overall, it is unclear what the nature and role of interventions of social movements are in the democratisation of science in Africa.

Introduction

Aim of paper

This paper selects as a case the South African debate on GM maize. First, the paper looks at the background to the processes of the democratization of science in South Africa. Second, the paper puts the idea of ‘civil society’ in the crucible, that is, South Africa, examining specifically the nature, role, scope and limits of ‘social movements’ in science communication in South Africa. Biowatch SA’s intervention into GM regulation in South Africa is selected as a specific instance of the case study. The overall aim of the paper is to help improve our understanding about the dynamics of public debate on biotechnology in South Africa by looking at the case of public debate on GM maize. Rather than attempt to arrive at neat and tight conclusions about the democratisation of science as well as the attendant ideas of science communication and public understanding of science, the paper will further complicate these ideas with the hope of suggesting critical insights into the interaction between science, society and politics. The paper argues that inasmuch as the intervention of social movements might be the drivers of the democratisation of science—as they help fill a gap filled neither by scientists nor news media practitioners-- the conceptual morass in which the idea of civil society is swamped renders it extremely difficult for thinkers to readily appreciate its political potency and agency in Africa vis-à-vis biotechnological development. Civil society, as an idea, is ill-defined.⁵ The regrettable result is science miscommunication and public misunderstanding of biotechnology in South and southern Africa. To remedy science miscommunication and public misunderstanding of biotechnology, the paper recommends more issue-specific and multi-stakeholder studies around biotechnology at both country and regional level.

The Democratization of Science, Science Communication and Public Understanding of Biotechnology in South and southern Africa

⁴ The precise conceptual or definitional characterization of this process is hard to pin down. However, practically, it is generally seen as a potentially politically-liberating albeit somewhat socially-overdetermined process in totalitarian states, including African states because they were autocratic despotisms or racist regimes in Africa’s bygone era of post-independence states.

⁵ Moreover, although it is the least significant concern for this paper, civil society organisations are uncoordinated in their goals and interventions in Africa, leading to duplication and wastage of their otherwise worthwhile interventionist efforts.

Southern African societies –just like their counterparts in the developed world in the post-Human Genome Project era—are yet to discover science fully. This is in spite of all the life-changing decisions and activities at the level of macro policy- and decision-making within science communities and the state. After the dismantling of both dictatorial and racist regimes in southern Africa—totalitarian regimes which excluded the vast majority of the people from both politics and science—a crucial and urgent need arose in the emerging democratic regimes of the region for the democratization of science. The ideal-type of democracy makes it imperative for people of South Africa and whole societies in the region to understand and actively participate in developments in science and technology.⁶ The process of the consolidation of democracy has ignored, and failed dismally to recognise, the central place and crucial role of ‘the people’, that is, non-experts, in science and technology communication in the region. There is need for ‘the democratization of science’ in the region, and in Africa at large.

There is a general consensus among theorists of democracy that the further development of the postcolonial African state will not be achieved without our being cognizant of and respecting the centrality of involving ‘the people’ in both policy- and decision-making as well as in actual developmental tasks. Catchall phrases like ‘participatory parity’ (Fraser 1993), ‘the bottom-up approach’ (Obadare 2004), ‘public understanding of science/biotechnology’, among others, attest to this realisation on the part of theorists of democracy of the centrality of ‘the people’ in development. These phrases point to the need for broad-based, or community-wide, participation in developmental planning and implementation.

Perhaps due to the over-determination of the ideal-type of democracy, on the one hand, and the rapid pace of advances in science and technology, for example, biotechnology, on the other hand, the democratic imperative of participatory parity, or the all-inclusiveness of voices, in biotechnological policy-and decision-making has been low and poor,⁷ if not non-existent.⁸

At the continental level, biotechnology raises both hopes and fears in individuals and diverse groups of people in Africa because it has enormous implications for Africa’s development. As Fukuyama (2002) argues, in biotechnology both the good and the bad are ‘closely interconnected’, and hence the need for tight political controls over

⁶ According to Huijer (2003), one of the underlying assumptions of democracy—especially deliberative democracy—is that a democratic society provides ‘options for people—citizens, politicians and other non-experts—to become actively involved in and anticipate new directions in the life sciences.’ Non-experts need to be involved ‘in setting priorities and funding patterns related to national and regional science projects. Therefore, democratization of science entails, giving non-experts ‘opportunities to reflect, anticipate, and negotiate on new directions in science and technology’ (Huijer 2003: 479). The background idea to deliberative democracy is that of the public sphere for deliberations as envisioned by Habermas (1962, translated into English in 1989).

⁷ See, for example, *HSRC Review* 2005: 2, July, for South Africa’s low level and poor quality of ‘public understanding’ of biotechnology.

⁸ See, for example, Mwale (2005a; 2006) for Zambia’s near-zero level and very poor quality of public understanding of biotechnology. See also Chinsembu and Kambikambi (2001).

biotechnological development, use, or research (Fukuyama 2002:181-2). Africa's involvement in the global biotechnology movement could lead to a shift in Africa's location, from the periphery to the centre of the global technology movement. Unlike other kinds of science and technology, biotechnology allows Africa to leapfrog; the operating knowledge is not contained only within the Euro-American cluster. African scientists, for example, are investigating various aspects of 80, 000 cells that will collectively define 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. Biotechnology could positively change the position of Africa on the world market.⁹

South Africa's Public Sector Drive towards the Democratizations of Science

South Africa provides a relevant and an interesting context for beginning to study the problematic idea of the democratisation of science as well as the attendant ideas of science communication and public understanding of science. In southern Africa, South Africa plays a leading role in biotechnology. 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. GM crops, such as GM cotton, have been grown commercially in South Africa since 1997. The South African government gave its approval for commercial activities on GM maize cropping in 1998. A year later, in 1999 parliament passed the GMO Act.¹⁰ 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 2003.¹¹ South Africa is currently engaged in innovative research on human migration patterns based on tracking of mitochondrial deoxyribonucleic acid (DNA).¹²

Impressive as these policy and practical strides the country has taken into the new biotechnology might look, the issues which biotechnology raises are knotty and sticky, and have led to profound and persistent disagreements in South Africa's public domains since the commercialisation of GM crops in 1998. Since then, South Africa has found herself at the centre of intense and deep controversies surrounding GM cropping, stem cell research, cloning, antiretrovirals (arvs), among others, providing a regional platform for public debates on conflictual scientific issues that originated outside Africa. South

⁹ *Genomics and Society* 2004.

¹⁰ The South African parliament amended the GMO Act (1999) in January 2006. See *SA GMO Amendment Bill (2006)*.

¹¹ Poster on Public Understanding of Biotechnology, 2005, *South African Agency for Science and Technology Advancement (SAASTA)*.

¹² *Genomics and Society* 2004.

Africa is, inescapably, the epicentre of public debate on GM technology. For Van der Walt, because of its leading position in science and technology in southern Africa, South Africa ‘has become the primary biotechnological battleground in Africa’ (Van der Walt 2000: 35).

As far as science and technology are concerned, post-apartheid South Africa has a big public sector drive. Science and technology are integral to human development in the new South Africa—no matter how development is characterized. According to the South African government’s *White Paper on Science and Technology* (September 4, 1996), South Africa will use science and technology to provide basic services, infrastructure and effective health for all South Africans and to become economically competitive on a global scale.

Since 1994, the state has made a number of landmark decisions and crucial initiatives to put the people at the centre of deliberations on policy, regulation and control of science and technology. For example, four years into the new dispensation, South Africa declared 1998 the Year of Science and Technology in South Africa (YEAST 1998). The aim of YEAST 1998 was to make South Africans more aware of how Science and Technology affected them in their everyday life. At present, South Africa is the only government in southern Africa that has a *Science Communication* unit and a *Public Understanding of Biotechnology* program. The South African Agency for Science and Technology Advancement (SASTA) houses both the unit and the program. SASTA is a business unit of the National Research Foundation (NRF). The *Science Communication* unit of SASTA aims to develop and implement new science communication initiatives in response to national challenges and needs ‘in line with international trends in the field of science communication.’¹³ As a concept, science communication is multi-stakeholder, bringing within its purview such players as scientists, news media practitioners, statespersons and politicians, and social movements—in short, it involves both expert and non-expert publics. The *Public Understanding of Biotechnology* program of SASTA aims to ‘promote a clear understanding of the potential of biotechnology and to ensure broad public awareness, dialogue and debate on its current and potential future applications, including Genetic Modification (GM).’¹⁴ The *Public Understanding of Biotechnology* program is committed to incorporating the views of non-expert publics into discussions and debates on developments in biotechnology, especially in genetic modifications technology and its most notable products like GM maize. Additionally, South Africa initiated the Southern African Science Communication Network (SASCON), which is also housed by SASTA. As a regional networking unit, SASCON ‘believes that the way southern Africans understand, communicate and use science and technology significantly affects their economic, social and environmental wellbeing.’¹⁵ Thus, it aims to provide a forum for scientific knowledge and information exchange, to improve non-expert publics’ understandings of science, and to improve news media’s engagement with science.

¹³ See <http://www.saasta.ac.za/scicom/index.shtml>. Retrieved in June 2007.

¹⁴ See <http://www.pub.ac.za/about/index.html>. Retrieved in June 2007.

¹⁵ See <http://www.saasta.ac.za/sascon/index.shtml>. Retrieved in June 2007.

Thus, Mandela's vision to democratize science and technology explains South Africa's commitment to promoting science communication and public understanding of biotechnology. Overall, South Africa's drive towards the democratization of science and technology has (universalizable) justification. Non-experts are key social actors in science communication for at least three reasons. First, non-experts 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 non-experts 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 non-experts and those of the media are in approximate alignment with science news stories. In other words, non-experts play an important role in determining what science news stories make it to print or air (see, for example, Trumbo et al 1998: 240; McInerney et al 2004: 347; Tanner 2004: 353, 360).

One significant dimension of the problematic of the democratization of science is how non-experts can be said to understand, discuss and debate the latest developments in science and technology such as biotechnology and its most notable products. The question of the democratization of science is challenging because it is fundamentally about the participation of non-experts in science and technology.¹⁶

Therefore, whereas the overall goal of the paper is to help improve our understanding about the dynamics of public debate on biotechnology in South Africa by looking at the case of public debate on GM maize, the paper actually isolates for illustratory and elucidatory purposes the particular case of Biowatch SA, a local social movement registered as an environmental non-governmental organisation and it was formed in 1997.

Social Movements and the Democratization of Science

Quite evidently then, the question that is still lingering is how to get non-expert publics or 'the people' to discuss and debate biotechnology in particular or science and technology in general. In spite of a big public sector drive, there is a gap filled by neither the scientists nor the media in science communication and public understanding of biotechnology in South Africa. This in spite of the fact that both scientists and news media practitioners claim to have social legitimacy because they uphold 'the public value' and work for 'the public interest'. Social movements try to fill the gap left by scientists and the news media. They evoke public value and public interest to try to legitimate their intervention in society. Social movements are important in public scientific controversy and public debate on biotechnology because-- in spite of their well-

¹⁶ A number of factors, three of which are the most worrisome, beset non-experts' participation in science communication: ignorance, language barrier, and resource-poverty. On non-experts' *ignorant* of science, in 2004, an HSRC client survey of a representative sample of 7,000 adults showed that about 80 percent of South African non-experts 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: 2). In South Africa, the above-cited 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).

known or traditional role as activists and lobbyists in the sociopolitical as well as ethical and cultural realms of society-- they play a significant educational role as scientific information providers. Using appropriate mediating and dissemination instruments especially the print news media, social movements articulate the basic science underlying the key scientific issues arising in the debate, thereby providing crucial detail about the basic science. They also fuel, or accentuate, public critique –that puts the evidence, legitimacy and credibility of the experiments and findings to question-- by proffering the counter-science or the alternative scientific or quasi-scientific evidence. Thus, social movements can help us begin to appreciate not only the fate of science in public domains but also the extent to which science is vulnerable when it is exposed to public critical examination, outside its professional field of production, for example, the laboratory or the scientific community.

Non-experts stand to benefit significantly from social movements' role as educators, information providers, and articulators of science in public debate on science. In South and southern Africa, and in the case of the experimental science of genetic modifications technology and its most notable products, social movements –if seen as activists and lobbyists-- contribute greatly to the intensification of the controversy over experimental science in that they bolster and augment their arguments or reasoned opinions with non-scientific discourses such as human *rights*, democratic *governance*, *colonialism* and imperialism, postcolonial or post-independence *development*, and *globalization* discourses, among other non-scientific discourses. It can be suggested that by exploring social movements' public engagement in debate on controversial biotechnological products such as GM maize, it is possible to begin to notice clearly the problematic intersection between science, politics and society. An exploration of how one social movement intervened in GM regulation in South Africa is one of the most feasible ways of beginning to look closely at the problematic idea of the democratization of science.

Biowatch SA Takes the State and the Biotech Corporate Industry to Court

South Africa did not itself experience food shortages in the 2001/2002 season. The southern African GM debates that was triggered by widespread acute hunger in the southern region forms the background to the court case in which Biowatch SA took the State and multinational GM seed company Monsanto and its allies and licensees to court on the behalf of 'the people' in what it called a 'public interest' case. Briefly UN WFP offered GM maize, procured from the US, to hunger-stricken countries. The US-produced GM maize met with resistance in the region, which led to Zambia's total rejection of the GM maize grain and conditional acceptance by the majority of countries in the region. Biowatch SA sued both the state and the biotech industry in the Pretoria High Court in what turned out to be a rather protracted, emotive court trial, from 2004 to 2005. Biowatch SA accused them of withholding information from 'the people' on the risks and dangers of GM technology. It wanted the 'veil of secrecy' on information on GMOs to be removed. In its submissions to the high court, Biowatch SA argued that since July 2000, the Department of Agriculture had consistently denied it access to information on GM field trial licenses or permits. In spite of that, Biowatch SA argued, South African law on GMOs –the GMO Act (1999)--specified that no modified crops could be released

unless there had been a ‘suitable and sufficient assessment of the risks’ to human health and the environment. ‘The people,’ who Biowatch SA claimed it represented, were entitled-or had a right of-- access to information which affected their environment, and so the high court should have assessed for itself whether or not the information was ‘genuinely confidential’.

The state [Department of Agriculture, the Executive Council for GMOs, and the Registrar for Genetic Resources] and the biotech industry [Monsanto and Stoneville Pedigree Seed Co.] counter-argued that some of the information Biowatch SA was seeking was ‘confidential’ and could not be disclosed to it.¹⁷ On March 3, 2005, the high court ruled in favor of Biowatch SA. In the ruling, the high court judge ordered the state to give Biowatch SA the information it had been requesting--but to which it had been denied access-- for four years.¹⁸ On the next day, March 4, 2005, the Department of Agriculture reportedly began to prepare the information for Biowatch SA, in compliance with the high court order.¹⁹

Notably, soon after the high court drama the state instituted a study on the implications of GM maize imports on South Africa’s export trade. The state put on hold GM maize imports into South Africa, implying that in the course of the studies, no GM maize imports were allowed into South Africa. The study began in March 2005 and was scheduled to be completed early 2006. The Department of Trade and Industry launched a study to assess the implications of GM maize imports on South Africa’s export trade. This state-run study was in response to society-wide concerns—as expressed by certain ‘social movements’ in various public forums—that GM maize imports would depress local maize prices and hinder robust exports to markets abroad where consumers rejected GM products. The department also launched two supplementary studies; the first, to assess the implications of GM products within the SADC region, where most countries had rejected GM products; the second, to assess the trade implications for South Africa as an exporter of GM products.²⁰

Social Movements and Civil Society in General

Biowatch SA is a nongovernmental organization involved largely in environmental activism in South Africa. It is a ‘social movement’ (Greenstein 2005). The high court case described above raises important questions, chief of which is about the sources of authority and power of ‘social movements’ and ‘civil society’ as a whole. ‘Social movements’ are generally conceived of as instantiations or elements of ‘civil society’.²¹

¹⁷ *The Mercury* 2004 May 5.

¹⁸ *The Mail & Guardian* 2005 March 9.

¹⁹ *Cape Argus* 2005 March 5.

²⁰ *The City Press* 2005 October 28.

²¹ The view that ‘social movements’ are a subset of ‘civil society’ commands wide consensus in contemporary social critical theory. For example, Greenstein (2005) perceives post-Apartheid South Africa’s ‘new social movements’ as ‘elements of civil society’. He likens them to Fraser’s ‘subaltern publics’, i.e. ‘arenas for debate and contestation’. He is interested in how ‘the new social movements... create in the discussion of alternative policies, modes of organization, and

Arguably, the idea of civil society has western roots. The question of the origin, or provenance, of 'civil society' has been a subject of extensive debate, especially about the meaning, applicability, and use of the idea of civil society in non-western contexts like Africa (See, for example, Bratton 1989; Callaghy 1994; Camaroff and Camaroff 1999; Chandhoke 2001; Deakin 2001; Ferguson 1980; Gellner 1990; Howell and Pearce 2001; Hutchful 1998; Kavraji and Khilnani 2001). Not wishing to be drawn into the rather frustrating and sterile 'ancestry of civil society' debate, some African thinkers have even gone to the extent of proposing an 'alternative genealogy of civil society' for Africa (Obadare 2004).

The Idea of Civil Society in Africa

Social movements, such as nongovernmental organizations (NGOs), are not a new phenomenon in Africa. Nyang'oro (cited in Bashaw 2001) observes that nongovernmental organizations 'have been actors on the development stage for several decades,' prior to global financiers like the World Bank, or global governmental organizations such as the United Nations, or any other official relief agency. Academic experts and higher education institutions 'discovered' NGOs and gave them international attention only in the mid-1980s (Nyang'oro in Bishaw 2001: 251). For several years, NGOs have occupied a central place in people's economic and social life in Africa. NGOs' interventionist work in emergency food, refugee shelter and rehabilitation and in community development is acknowledged universally. Their intervention in Ethiopia's 1985/6 food crisis is inerasably memorable. Other than charity and relief, on the political plane, NGOs have successfully mobilized the people towards resistance against totalitarian rule, resulting in positive political change, for example, the United Democratic Front (UDF) in South Africa, Public Affairs Committee (PAC) in Malawi, and numerous others outside Africa such as in South America.

However, social movements in Africa are constrained and limited in important ways. The constraints are both structural-political (external to NGOs) and strategic (internal to NGOs). African states, argues Bashaw, 'are not much inclined to give enough room to enable NGOs to operate and function smoothly. This is certainly the case in Africa' (Bashaw 2001: 252). This is true for oppositional civic organizations. For most African states, NGOs are a thorn in the flesh. A case in point is Malawi where constitutional

social and political visions' (Greenstein, 2005, p.5). Hawthorn (2001) describes 'civil society as the great variety of social movements... whose purposes and direction are not controlled by the institutions of the state' (Hawthorn 2001: 276). Khilnani (2001) is worried that an exclusive focus on 'social movements' which exist outside 'high politics' and the party system, as the crucial agent for the creation of a civil society and 'democratization', yields an overly partial perspective. Khilnani complains that the exclusive focus on 'social movements ... avoids questions about the abilities of social movements to secure both stable and durable institutional form and to embody self-limiting properties: if they are to govern, what governs?' But he does not commit himself to proposing an alternative to 'social movements', i.e. as the crucial agents in the emergence of civil society in the South (Khilnani 2001: .31). Tester (1992) looks at 'civil society as a label applicable to 'all those social relationships which involve the voluntary association and participation of individuals acting in their private capacities' (Tester 1992: 8).

constraints are without doubt intended to contain and frustrate the political programs and activities of NGOs. Malawi's NGO Act (2001) prevents NGOs from having, or appearing to have, 'objectives that are political in nature' or to indulge in 'partisan politics'. Khembo (2004) argues that this wording is vague, and it has led to arbitrariness in the interpretation of the act itself. Khembo feels pity for NGOs operating in Malawi because in practice, 'lack of clarity [in the NGO Act] has meant that... the church, civil society organizations ... have invariably been accused of peddling "partisan politics"' (p.84), leaving NGOs in a very precarious position in which the NGO Board may at any moment cancel registration of a suspect NGO at will. For Khembo, it is accepted fact that 'civil society, especially the NGO community, is not entirely immune from calculated legal suffocation' (Khembo 2004: 86). The Malawian legislators seem to feel at ease with charitable NGOs—a purely economic civil society—but uneasy with NGOs that position themselves as oppositional civic organizations—a political civil society. Not doubt, when Biowatch SA contested the South African state power by using the judicial machinery it positioned itself in an oppositional manner, and hence its self-evidential political nature.

Bashaw, however, cautions against our falling for a myth: the mere fact that NGOs do interventionist work does not imply that 'the people' can then trust them, 'simply because they are different from the state...We cannot love NGOs just because they are nongovernmental' (Bashaw 2001:253). Strategically, it is argued that most NGOs are ill planned: their plans are short-term and often geared to alleviating immediate consequences of poverty. NGOs do not plan in the long-term, and so they 'give little attention to matters concerning development theory' (Cherret et al in Bashaw 2001:253). If they are assessed on the long-term basis, most NGOs do not seem to impact positively on poverty in Africa. Most people previously helped by NGOs remain trapped in the vicious cycle of abject poverty (UNDP 1993 in UNO 1995 in Bashaw 2001: 253). Yet, unlike states, NGOs are not directly accountable to 'the people' for issues of poverty let alone development in any state. No citizenry or population group can blame an NGO for not delivering public utilities like water and electricity or for not providing in time basic property like houses or land for houseless or landless majorities.

Thus, in spite of Keane (1998, 2003)'s efforts to revive our interest in 'the old idea', 'civil society' remains saddled with serious conceptual and empirical difficulties. As a subset of 'civil society', the idea of 'social movements' suffers from similar problems as 'civil society' does. Conceptual obscurantism, or definitional imprecision or fuzziness, leads to confusion as to what 'social movements' are—or ought be, as an ideal-type--and what their potency and agency could be in sociopolitical reality, for example, in Africa's postcolonial states.

Political Control of Biotechnology in Africa: The People, Civil Society, and the State

The idea of 'social movements' raises an important question around the issue of the political control of biotechnology. The question is two-fold, involving both representation and accountability. Representation: because 'social movements' claim to represent 'the people'-- whether 'the people' are perceived as consumers, or as end-users of biotech products in their programs and activities, while they simultaneously contest similar

claims by the state and political party groupings to represent 'the people'. They claim to uphold 'public value' and to work to promote the 'public interest' or 'the general interest'. Accountability: because 'social movements' tend to position and express themselves as though sociopolitical accountability is categorical, and not hypothetical—i.e. an unconditional, and not a conditional (or *prima facie*) obligation. They believe that the state's accountability to 'the people' is categorical. Thus, the question is: from what source of authority (or mandate or legitimacy) can a 'social movement' claim to represent 'the people'?

The question is important because the issue of the political *control* of biotechnology does not directly suggest that social movements will get to decide whether or not we will control this new technology. Fukuyama, for example, is unequivocal about the collective identity of those who will get to decide about the political control of biotechnology, just as he is clear about the source of their authority (or mandate or legitimacy) in society. For him, decision- and policy-makers will be a 'democratically constituted political community, acting chiefly through their elected representatives, that is sovereign in these matters and has the authority to control the pace and scope of technological development...[i.e.] institutions that can capture the will of the people' (Fukuyama 2002: 186).

Thus, when it comes to legislators --in parliamentary sovereignties-- there is little or no doubt about the source of their political authority to represent 'the people' in decision- and policy-making on matters biotechnological. It is standard liberal democratic political thinking that legislators govern or lead by the general consent of 'the people' as voter-citizens. However, when it comes to 'social movements', as instantiations of 'civil society', it is not immediately clear what the source of their authority is.

Erstwhile theorization about the idea of 'civil society', from which the idea of 'social movements' is derived, is not helpful either. For example, theorists of 'civil society' here in the South are far from clear about the political potency and agency of the idea of civil society, thereby frustrating others to the extent of debunking the idea altogether. Mbembe (2001), for instance, thinks 'civil society' is yet to emerge in postcolonial Africa. For Mbembe, 'civil society' will emerge only when 'places and spaces where ideas of autonomy, representation, and pluralism can publicly crystallize, and where juridical subjects enjoying rights and capable of freeing themselves from the arbitrariness of both state and primary group (kin, tribe, etc) can come into being' (Mbembe 2001:39). Therefore, Mbembe envisions postcolonial 'civil society' in the form of autonomous--self-legislating and self-governing—associations and institutions of society that 'will articulate, autonomously and publicly, an idea of the general interest' (Mbembe 2001: 39). At present, all we seem to have on the ground is a multiplicity of disparate 'normative, economic, military and governmental spheres' that reflect a 'heteronomous and fragmented conception of the political community', instead of 'a consolidation of a constitutional state and right-bearing citizens in civil society' (Mbembe 2001: 39).

Other postcolonialist theorists, namely, Khilnani (2001) and Chatterjee (2001) cast more doubts over the political potency and agency of the idea of civil society. Khilnani thinks

that in the South ‘civil society is best thought of as a complicating term, one that embodies a range of historical idioms intended to establish a legitimate political order’ (Khilnani 2001: 13). Contemporary scholarship is not in agreement about-- and is yet to locate--the proper location of the sources of ‘civil society’. Is it in the economic, or the expressive, or the cultural? In other words, does ‘civil society’ reside in the economy, or ‘in society independent of the economic domain’ (i.e. interest-based associations ‘where ideas are publicly exchanged’), or in ‘a set of cultural acquisitions’? (Khilnani 2001: 13-14).

Hitherto, for Khilnani, the idea of civil society has not been deployed to ideal-typically refer to a substantive, determinate category in postcolonial states, whether it has been conceptualized as an idea distinct from, or opposed to, the state, or as a set of politicized, or depoliticized, or apolitical, associations that complement the state in governance functions, or normatively as ‘moral and political’ collective ‘human capacities’, or as an amalgam of ‘commercial societies’ (Khilnani 2001: 24-25). In spite of its ‘promise’ for sociopolitical change in the South, theorists of ‘civil society’ are conscious of the experimental if not elusive nature of the idea itself. Ultimately, Khilnani doubts the adequacy and even significance of the idea of civil society because ‘in the task of developing viable and durable democratic politics in the South, the idea of civil society is hardly a self-sufficing one, let alone a fundamental “key”’ (Khilnani 2001: 32). Chatterjee debunks the idea of civil society altogether and opts for another idea which he christens as ‘political society’. For Chatterjee, ‘civil society’, for example in postcolonial India, fails dismally to reach out to and represent wider society and the diversity of interests:

An important consideration in thinking about the relation between civil society and the state in the modern history of countries such as India is the fact that whereas the legal-bureaucratic apparatus of the state has been able...to reach as the target of many of its activities virtually all of the population that inhabits its territory, the domain of civil social institutions... is still restricted to a fairly small section of ‘citizens’. The hiatus is extremely significant because it is the mark of non-western modernity as an always incomplete project of ‘modernization’ and of the role of enlightened elite engaged in a pedagogical mission in relation to the rest of society (Chatterjee 2001: 172).

Chatterjee seems to be relegating civil society organizations to elitist, western-style special-interest associations that could hardly justify their claim to serving ‘the general interest’. He claims that his idea of ‘political society’ will be more inclusive and more empowering in postcolonial states:

But then how are we to conceptualize the rest of society that lies outside the domain of modern society? The most common approach has been to use a traditional/modern dichotomy. One difficulty with this is the trap, not all easy to avoid, of de-historicizing and essentializing ‘tradition’. I think a notion of political society lying between civil society and the state could help us see some of these historical possibilities. By political

society, I mean a domain of institutions and activities where several mediations are carried out' (Chatterjee 2001: 172-3).²²

Political societies may resort to strategic maneuvers, resistance and appropriation akin to those of political parties, but they are distinctively 'population groups'—and not bodies of citizens-- whose demands on the state are based on 'the violation of the law'. They demand state welfare as a matter of right. The welfare functions, which political societies demand of the state, are seen as collective rights, rather than as individual citizenship rights. The degree to which political societies are recognized by the state and nongovernmental organizations depends on the pressure they are able to exert on state and non-state agencies (Chatterjee 2001: 177). In essence, political society stands for a community that comes into being spontaneously, for example, 'through the illegal occupation of a particular land or the collective illegal consumption of a public utility' such as 'associations of squatters, encroachers on public property, ticketless travelers on public transport, habitual defaulters of civic taxes, unauthorized users of electricity, water, or other public utility, and other such violators of civic regulations' (Chatterjee 2001: 177).

Chatterjee's substitute idea is forceful but not convincing. Chatterjee assumes there is a dichotomy between 'population' and 'citizenship'. Nevertheless, his assumption is questionable. His idea of 'political society' draws its conceptual force from the pragmatic idea of 'population,' which is divested of its moral-legal demands, which are usually normatively imposed on political individuality --or 'citizenship' --in postcolonial states. The fact that violators of the law enjoy and benefit from collective rights does not necessarily imply that the state and non-state agencies will easily recognize their associations.

The pressure they are able exert on the state and non-state agencies is more about provision of property or access to public utilities than about the official recognition of their associations, which, in any case, violate or sidestep the law. Thus, although political societies often get what they demand as a collectivity, their 'illegal' deeds are bound to render them marginalized if not excluded from mainstream political programs and activities. The possibility of marginalization or exclusion renders them weak and vulnerable 'subaltern publics'. Therefore, the notion of citizenship, which is infused with moral-legal imperatives, is still crucial to our conception of individual or collective rights in a polity. On this, says Hawthorn (2001):

²² Political society is only feasible where the definitive concept is that of *population*, because though 'differentiated', it is 'classifiable, describable, and enumerable'—unlike *citizenship*. Chatterjee says he is indebted to Michel Foucault (*History of Sexuality*. Hammondsworth: Viking, 1985) for rudiments of the idea of 'political society'. For Chatterjee, Foucault 'has been more perceptive than other social philosophers of recent times in noticing the crucial importance of the new concept of population for the emergence of modern governmental technologies... Perhaps we should also note the contribution here of colonial anthropology and colonial administrative theories' (Chatterjee 2001: 173).

For states in the South...whose capacities are now constrained...associations concerned with civil rights can press issues of constitutional kind, those concerned with political rights for improvements in political procedures. And both are likely to be able more effectively to do so if there are opportunities for discussion and debate, opportunities that these associations, with others, might be able to do something to improve. But *it is unrealistic to suppose that the associations can act greatly to extend the scope of powers of public policies to improve the well-being of the majority of the population. To be clear about the concept of 'civil society' is first to be clear about what citizenship can be, about what the state can do, about a point of politics itself* (Hawthorn 2001: 286; my emphasis).

Hawthorn is hereby highlighting the interrelatedness of concepts of population, citizenship, politics and the state. Thus, even if the state deployed the concept of population for macro policy purposes or centralized planning-- in the form of demographic statistics—it would not lose sight of the political nature—or citizenship status—of the population.

Conclusion

The problematic idea of the democratization of science is multi-issue in scope and is a multi-stakeholder effort. The idea is important because it provides the basis for thinking more deeply about biotechnological development in South and southern Africa. Science communication and public understanding of biotechnology do not make sense outside the framework of the democratization of science. Hitherto, scholarly attention has focused only on the role of scientists and news media in making science more and more accessible to wider society, especially to non-expert publics. Scientists are accused generally of being poor communicators of their own trade, preferring to work in isolation behind closed doors, in laboratories. News media practitioners are accused generally of misrepresenting science in public domains. Social movements, as elements of civil society, raise a hope of filling the gap left by both scientists and news media practitioners. Looking at Biowatch SA's intervention in GM regulation in South Africa a couple of years ago, one could see that there is room for such hope. At least for starters, one could see that the processes of the democratization of science are not the prerogative of one group of stakeholders such as the state, scientists, or news media practitioners. Yet the idea of civil society is swamped in confusion at present. Thus, there are reasonable doubts about its political potency and agency to help democratize the new science and technology [biotechnology] — i.e. to bring biotechnology to 'the people'. Moreover, the idea's pretensions to introducing and sustaining any desired sociopolitical change in southern Africa need to be interrogated further.

There is little or no doubt though that social movements have, at least at the empirical level, made their presence felt in South and southern Africa, in Africa at large, as well as at the global level. A social movement such as Biowatch SA would definitely be one to reckon with in South Africa. Once more, Biowatch SA managed to draw the attention of the high court, sued the state and the biotech corporate industry, and eventually won its 'public interest' case. However, in spite of such anecdotal evidence of their integration into wider society, social movements still occupy a theoretically obscure and politically

contested space in Africa. The meaning of the idea of civil society together with its attendant ideas such as social movements and NGOs is not only conceptually fuzzy but also relentlessly contested by traditional sources of power and authority such as state agencies, political parties and trade unions, which have enjoyed and still enjoy moderately tidy and neat conceptualizations. Since the meaning of the idea of civil society is unclear, rendering theorization obscure, clear and tidy conclusions about the democratization – that is, the sociopolitical control – of science and technology in the region, or the continent at large, are not easy to reach.

In spite of the fuzziness of the idea of civil society, some would be hesitant to leave all policy, regulation and control on biotechnology in the hands of ‘parliamentary sovereignties’ (Fukuyama 2002) or “strong publics” (Fraser 1993). These traditional sources of power and authority can help democratize science and technology. African states might be resource-poor, inefficient in terms of service delivery, generally corrupt, and the least accountable to ‘the people’, but they are largely strong states.²³ South Africa’s big drive towards the democratization of science is testimonial to, or at least indicative of, a strong state. Although the emergence of ‘strong’,²⁴ states does not preclude the growth of a strong civil society, oppositional civil organizations in Africa are politically constrained and limited in important ways. Biowatch’s legal victory against the state and the biotech corporate industry raises Mbembeian and Keanian quasi-utopian visions of a future African deliberative democratic public sphere, an abstract ‘becoming’, with a bit of luck to be realized when ‘the people’ are mobilized by civil society organizations-- rather than solely by political parties and trade unions—to participate in societal deliberations on matters biotechnological, in particular, and, scientific and technological, in general.

What Mbembe (2001) and Keane (1998; 2003) omit to mention is the lineage and provenance of most associational and economic social movements operating in the postcolony. Admittedly, social activists operate from and in “weak publics” (Fraser, 1993) in that they are not an integral part of the formal hegemony for decision- and policy-making at the level of the nation-state. Even when they pose as pressure groups and help effect a socio-political ‘paradigm shift’, as was the case with Public Affairs

²³ For Migdal (1988), apart from having ‘strongmen’ [powerful leaders], strong states are also characterized by ‘strong state agencies’ which exercise ‘social control’ on the population because they have ‘channels to the population to induce mobilization through a viable mix of rewards, sanctions and symbols’ (Migdal 1988: 210). In an ANC-majority-led government, it would be unusual for the South African state not to be considered ‘strong’.

²⁴ The binary ‘strong/weak’ in the categorization of states is without doubt only a speculative – and not a practical—idea. In practical reality, most states would lie somewhere midway, along the continuum strong-to-weak. Recently, an empirical study used what was called the Minorities at Risk Database to impose this characterization on sub-Saharan African states. This study gives us one of the latest attempts at empirical definitions of a ‘strong’ or ‘weak’ state. Analysts Atiku-Abubakar and Shaw-Taylor used ‘inter-communal conflict’ to measure and describe the attributes of a sub-Saharan African ‘weak state’ as one ‘having a prevalence of structural inequality, the components of which are economic differentiation, cultural (or social) inequality and political inequality’ (Atiku-Abubakar and Shaw-Taylor 2003: 168). This empirical definition is far from clear let alone precise as to what constitutes ‘weaknesses’ in a state.

Committee (PAC) in Malawi early 1990s, they remain enfeebled social change agents, in the Fraserian sense. Political parties and legislatures are the “strong publics” (Fraser, 1993). To be autonomous is to be self-legislating and self-governing; a claim many a social activist might not make without stuttering, or equivocating. They tend to pander to western socio-political consciousness. Most of them rely on economic support from similar groupings in the métropole (Quist-Adade and van Wyk, 2007).

For good or ill, the elites and the officials speak for the “people” in the debate on GM technology in particular and biotechnology in general. For example, small-scale farmers make infrequent appearances in such debates. Small-scale farmers occasionally speak for themselves. Most often, farmers unions speak for the small-scale farmers. The farmers unions re-present the small-scale farmers as the helpless victims of agricultural biotechnology. Consumer rights lobby groups also speak for “the people” as consumers. The lobbyists re-present consumers as vulnerable to the deception and manipulation of GM food manufacturers. For the lobbyists, the consumers lack knowledge and information about GMFs to make informed choices. The lobbyists step in to protect the consumers from bodily harm resulting from the consumption of GMFs. Social activists believe they are, and position themselves accordingly as, protectors and promoters of “the public interest,” the needs and aspirations of “the people.” It is in the very nature of the public sphere in democracy to have “the people” represented in public deliberation. Political expediency and logistics dictate that a few represent the many.

In the regional GM debates, journalists take it as axiomatic that the socio-politically-and/or professionally-privileged voices draw on commonsensical views about reality. For the journalists, it is also axiomatic that what is commonsensical must be true and hence objective and universalisable. When the media play agent of public opinion – that is relay-mediate the diversity of opinions – in debate, they have inherent bias to the voices of ‘elite-officials’. They also believe that they appeal to commonsense and prevailing “regimes of truth,” one of which is that ‘science is saviour’. Journalists’ belief in access to knowledge, commonsense, and truth is tantamount to their believing they have access to reality itself. This renders “public opinion”²⁵ a rather unstable and amorphous notion. ‘Unstable’ because its attribution is ambiguous and constantly changing. In popular democracy, for example, “public opinion” can be the collective opinion of voter-citizens, consumers of goods, clients of public services, beneficiaries of state welfare or NGOs’ charity, members of hegemonic institutions like political parties or religious denominations, members of minority groupings, readers or viewers of media, mainstream producers and/or suppliers of trendy products, and so on. ‘Amorphous’ because it applies to “the people” only *in extenso*.²⁶

²⁵ As well as the “public interest” and “public conscience” (Ettema and Glasser, 1998).

²⁶ There is nothing fundamentally wrong in “the people” being represented in public deliberation in the public sphere of democracy. An inbuilt contradiction in democracy is that in spite of its principle of equality, in practice democracy works through representation—that is, some voices must represent other voices. The principle of equality is just an ideal. Theorists argue about the fairness and modalities of such representation, and hence the various formulae in electoral systems. Democracy runs on the voices or opinions of majorities, almost drowning the voices of minorities. The majorities, however, need not be part of the decision- and policy-making just

The poor people, for example, are not heard in these debates. The poor people form the socio-demographic majority in popular democracy. The southern African GM debates shows a contradiction in popular democracy in the sense that the socio-demographic majority are excluded from, or marginalized in, debate. It looks as though the contradiction that is central to the idea of popular democracy is thrown into sharp relief. The exclusion, or marginalisation, of the socio-demographic and poor majority can be attributed partly to the journalism practice of newsgathering in which voices of the “elite-officials” are privileged as news sources and partly to the exclusionary potential of the public spheres in the region. The media are a proxy to “the people.” Journalists play agent of public opinion. This media agency is taken as axiomatic in democratic politics. However, there is a broader perspective to public opinion, which operates as a basis for media agency. For example, Habermas conceives public opinion as “democratic publicity”²⁷ (Habermas, 1989, p. 244), implying a set of opinions of a “critically-debating public” (Habermas, 1989, p. 238). Once more, the latter form of “public opinion” requires the media to do more than just provide space for public deliberation. It requires them to “mediatise.”

Finally, the paper recommends more issue-specific and multi-stakeholder studies in things biotechnological at both country and regional level. Regardless of whether the idea of civil society is original or derivative, in-depth research on the idea is required in order to further clarify its conceptual-epistemological status or meaning and its conditions of applicability and use in South and southern Africa. Generally, future research in science communication and public understanding of biotechnology in South and southern Africa might further illumine the complexities of ‘the democratization of science’ in South and southern Africa and Africa as a whole.

because they have representatives. (See, for example, Mill, 1972). The media and social activists add to such representation because the history of democratic politics has set more than enough precedents for poor representation, the ‘self-poverty alleviation’ of the representatives being one common flipside, and hence the persistent distrust of representatives. (See, for example, Peters, 1993)

²⁷ In contrast to non-public opinions aimed at popular “acclamation” (Habermas, 1989, p.238). On “democratic publicity,” Habermas adumbrates, “A concept of public opinion that is historically meaningful, that normatively meets the requirements of the constitution of a social-welfare state, and that is theoretically clear and empirically identifiable can be grounded only in the structural transformation of the public sphere itself and in the dimension of its development. The conflict between the forms of publicity, which today characterises the political public sphere, has to be taken seriously as the gauge of a process of democratisation within an industrial society constituted as a social-welfare state. Non-public opinions are at work in great numbers, and ‘the’ public opinion is indeed a fiction. Nevertheless, in a comparative sense the concept of public opinion is to be retained because the constitutional reality of the social-welfare state must be conceived as a process in the course of which a public sphere that functions effectively in the political realm is realised, that is to say, as a process in which the exercise of social power and political domination is effectively subjected to the mandate of democratic publicity.” (Habermas, 1989, p.244)

References

- Atiku-Abubakar, J.J. and Shaw-Taylor, Y., 2003, 'An empirical profile of weak states in sub-Saharan Africa,' *Africa Development*, Vol. XXVIII, Nos. 3&4, 168-85
- Ballard, R., Habib, A., and Valodia, I., eds., 2006, *Voices of Protest: Social Movements in Post-Apartheid South Africa*. Scottsville, South Africa: University of KwaZulu-Natal Press
- Bashaw, Z.N., 2001, 'NGO-Government Relations: Conflict and co-operation in development management for rehabilitation of demobilized soldiers: The case of Eastern Tigray, Ethiopia,' *Africa Development*, Vol. XXVI, Nos. 1&2, 251-94.
- Bratton, M., 1989, 'Civil society and associational life in Africa,' *World Politics*, 41(3): 407-30.
- Callaghy, T.M., 1994, 'Civil Society, Democracy, and the State in Africa: A Dissenting Opinion about Resurgent Societies,' in Haberson, J., Rothchild, D., and Chazan, N., eds., *Civil society and the State in Africa*, London: Lynne Rienner, pp. 231-54.
- Buck, J.A., Dent, E.B. and Umpleby, S.A., 2000, 'Commentary: Communicating Science,' *Science Communication*, 22(1): 73-87
- Camaroff, J.L. and Camaroff, J., eds., *Civil Society and the Political Imagination in Africa: Critical Perspectives*, Chicago: The University of Chicago Press.
- Chandhoke, N., 2001, 'The "civil" and the "political" in Civil Society,' *Democratization*, Vol.8, No.2 (summer), 1-24.
- Chatterjee, P., 2001, 'On civil and political society in postcolonial states' in Kaviraj, S. and Khilnani, S., eds., *Civil society: history and possibilities*, Cambridge: Cambridge University Press, pp.165-78.
- Chinsembu, T. and Kambikambi, T., 2001, 'Farmers' perceptions and expectations of genetic engineering in Zambia,' *Biotechnology and Development Monitor*, No. 47, 13-15.
- Cook, G., Robbins, P.T., Pieri, E., 2006, "'Words of mass destruction": British newspaper coverage of the genetically modified debate, expert and non-expert reactions,' *Public Understanding of Science* 15(1): 5-29.
- Corbett, J.B., and Durfee, J.L., 2004, 'Testing Public (Un)certainly of science: media representations of global warming,' *Science Communication* 26(2): 129-51.
- Deakin, N., 2001, *In Search of Civil Society*, Basingstoke: Palgrave.
- Ettema, J. and Glasser, T. 1998, *Custodians of Conscience: Investigative Journalism and Public Virtue*. New York: Columbia University Press.
- Ferguson, A., 1980, *An Essay on the History of Civil Society*, with a new introduction by Schneider, L., New Brunswick: Transaction Books.
- Fraser, N., 1993, 'Rethinking the Public Sphere: A Contribution to the Critique of Actually Existing Democracy' in Calhoun, C., ed., *Habermas and the Public Sphere*. Cambridge, MIT: Polity Press, pp.109-42.
- Fukuyama, F., 2003, *Our posthuman future: consequences of the biotechnology revolution*, London: Profile Books.
- Gellner, S., 1995, 'Civil society and its future,' in Hall, J.A., ed., *Civil Society: Theory, History, Comparison*, Cambridge, MIT: Polity Press.
- Greenstein, R., 2005, *Social movements and public intellectual life*. Johannesburg: University of the Witwatersrand (unpublished).

- Gutteling, J., Hanssen, L, van der Veer, N., Seydel, E., 2006, 'Trust in governance and the acceptance of genetically modified in the Netherlands,' *Public Understanding of Science* 15(1): 103-12.
- Habermas, J., 1989, *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society*. Cambridge: MIT Press.
- Hawthorn, G., 2001, 'The promise of 'civil society' in the South' in Kaviraj, S. and Khilnani, S., eds., *Civil society: history and possibilities*. Cambridge: Cambridge University Press, pp.269-86.
- Hijmans, E., Pleitjter, A., and Wester, F., 2003, "Covering Scientific Research in Dutch Newspapers". *Science Communication* 25(2): 153-76.
- Horst, M., 2005, 'Cloning sensations: mass mediated articulation of social responses to controversial biotechnology,' *Public Understanding of Science* 14(2): 185-200.
- Howell, J. and Pearce, J., 2001, *Civil society and Development: A Critical Exploration*, London: Lynne Rienner.
- HSRC Review, 2005, 'Bio what? Public has scant knowledge of biotechnology,' *HSRC Review*, 3(2):2, July.
- Huijter, M., 2003, 'Reconsidering democracy: History of the Human Genome Project,' *Science Communication*, 24(4):479-502.
- Hutchful, E., 1998, 'The Civil Society Debate in Africa,' *International Journal* 51(1): 54-77
- Joubert, M., 2001, 'Report: Priorities and challenges for science communication in South Africa,' *Science Communication*, 22(3): 316-33.
- Keane, J., 1998, *Civil society: old images, new visions*, Cambridge, MIT: Polity Press.
- Keane, J., 2003, *Global Civil Society?* Cambridge: Cambridge University Press.
- Khanna, J., 2001, 'Science Communication in developing countries: experience from WHO workshops,' *Science Communication* 23(1): 50-6.
- Khembo, N.S., 2004, 'The Multiparty promise betrayed: the failure of neo-liberalism in Malawi,' *Africa Development*, Vol. XXIX, No.2, 80-105.
- Khilnani, S., 2001, 'The development of civil society' in Kaviraj, S. and Khilnani, S., eds., *Civil society: history and possibilities*, Cambridge: Cambridge University Press, pp.11-32.
- Larson, B.M.H., Nerlich, B., Wallis, P., 2005, 'Metaphors and Biorisks: the war on infectious diseases and invasive species,' *Science Communication* 26(3): 243-68.
- Latour, B., 1987, *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA.: Harvard University Press.
- Logan, R.A., Park, J, and Shin, J., 2004, 'Elite sources, context, and news topics: how two Korean newspapers covered a public health crisis,' *Science Communication* 25(4): 364-98.
- McInerney, C., Bird, N. and Nucci, M., 2004, 'The flow of scientific knowledge from Lab to the Lay public: The Case of Genetically modified food,' *Science communication*, 26(1): 44-74.
- Mandela, N.R., 1994 cited in Preface to *White Paper on Science and Technology*. September 4, 1996. Department of Arts, Culture, Science and Technology. Republic of South Africa. Pretoria.
- Manzini, S., 2003, 'Effective communication of science in a culturally diverse society,' *Science communication*, 25(2): 191-7.

- Mbembe, A., 2001, *On the Postcolony*, Berkeley: University of California Press.
- Migdal, J.S., 1988, *Strong societies and weak states*, Princeton, N.J.: Princeton University Press.
- Migdal, J.S., 2001, *State in Society*, Cambridge: Cambridge University Press.
- Mountcastle-Shah, E., Tambor, E., Bernhardt, B.A. et al., 2003, 'Assessing mass media reporting of disease-related genetic discoveries,' *Science Communication* 24(2): 458-78.
- Mwale, P.N., 2006, 'Societal deliberation on genetically modified maize in southern Africa: the debateness and publicness of the Zambian national consultation on genetically modified maize food in 2002,' *Public Understanding of Science* 15(2): 89-102.
- Mwale, P.N., 2005a, 'Public Debates and Societal Deliberations: The Case of the Zambian National Consultation on GM Maize Food Aid in 2002.' Paper presented at the *Science and Democracy Conference 3*, Institute of Philosophy, Napoli, Italy, October 20-22. See <http://www.dipmat.unipg.it/~mamone/sci-dem/introduction.htm>
- Mwale, P.N., 2005b, GM Maize Food Aid in Zimbabwe (2001-2004), Johannesburg: University of the Witwatersrand (unpublished).
- Obadare, E., 2004, 'The alternative genealogy of civil society and its implications for Africa: Notes for further research,' *Africa Development*, Vol. XXIX, No.4, 1-18.
- Pelletier, D., 2005, 'Food safety and Consumer Choice Policy' In Owamo, S.W. and von Grebmer., K., eds., *Biotechnology, Agriculture, and Food Security in Southern Africa*, Washington DC and Harare: IFPRI and FANRPAN, pp.113-56.
- Peters, J.D., 1993, "Distrust of representation: Habermas on the public sphere". *Media, Culture and Society*. 15: 541-571.
- Quist-Adade, C. and van Wyk, A., 2007, "The Role of NGOs in Canada and the USA in the Transformation of the Socio-Cultural Structures in Africa." *Africa Development*. Vol. XXXII (2): 66-96.
- Roche, J.P. and Muskavitch, M.A.T., 2003, 'Limited precision in Print and media communication of west Nile virus risks,' *Science Communication*, 24(3): 353-65.
- Shoemaker, P.J. and Reese S.D., 1996, *Mediating the Message: Theories of Influences on Mass Media Content*, London: Longman.
- Smith, J., 2004, *Seeds of Deception*, London: Green Books.
- Tanner, A.H., 2004, 'Agenda building, source selection, and health news at local television stations: a nationwide survey of local television health reporters,' *Science Communication* 25(4): 350-63.
- Tester, K., 1992, *Civil Society*, London and New York: Routledge.
- Trumbo, C.W., Dunwoody, S. and Griffin, R.J., 1998, 'Journalists, Cognition and the Presentation of an epidemiological study,' *Science Communication*, 19(3): 238-65.
- Van Der Walt, W.J., 2000, 'South Africa and the Global Biotechnology Battle,' *BIOY2K Combined Millennium Meeting: Programme and Abstracts*, Grahamstown: Rhodes University, Jan 23-28, pp.34-5.
- Walters, L.M. and Walters, T.N., 2006, 'It loses something in the translation: syntax and survival of key words in science and nonscience press releases,' *Science Communication* 18(2): 165-80.
- Weigold, M.F., 2001, 'Communicating science: a review of the literature,' *Science communication*, 23(2):164-93.

Weingart, P., Engels, A, and Pansegrau, P., 2000, 'Risks of Communication: discourses on climate change in science, politics, and the media,' *Public Understanding of Science* 9: 263-83.

Posted: May 7, 2008
Scienza e Democrazia/Science and Democracy
www.dipmat.unipg.it/~mamone/sci-dem