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GENETICS AND NEW BIOTECHNOLOGIES IN SOUTH AFRICA AND AFRICA: EXPLORATIONS BY AN AFRICAN FEMINIST ETHICIST

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INTRODUCTION

Reflections on genetics and biotechnologies in Africa in the 21st century and in the context of economic globalisation are demonstrative of deep concerns on matters of life and death for humanity and for the earth. They create the basis for the broader theological, ethical and socio-political analysis of genetics, biotechnologies and their implications for the church and society in Africa and in the world. They also expose the issues of agency and power in relation to these technologies as well as exposing the contradictions, benefits, weaknesses and the dilemmas that the intersections between science, life, governance politics, economics and ecology pose on our understanding of the integrity of life, of humanity and the web of life. They require of the churches to be wise, to discern and grapple and as well, be conversant with these concerns in order to creatively participate in the pursuit for justice, where these technologies are not utilized for the purposes of the wellbeing of humanity and the web of life.

My task in this paper is to outline in a non- exhaustive manner the South African context of genetics and biotechnologies. The idea is to map out the details relating to the structures, methods and applications of genetics and biotechnologies specifically to South Africa and Africa and to relate these to the regional and global discussions on these concerns. The second is to sketch some of the perspectives and views of the churches and ecumenical organisations in South Africa and Africa on Genetics and Biotechnologies in this century.

The churches in South Africa and Africa in general, live out their ministry in different contexts (socio-economically, geographically, environmentally, linguistically, etc). Accordingly, they do not have a homogenous outlook on the subject of genetics and biotechnologies and their applications and implications for Africa. The churches, ecumenical organisations and or Christian theology and ethics do not always provide clear-cut answers to the biotechnology and genetic questions. Their engagement with these disciplines and life changing sciences are however, fundamental in illumining and clarifying the ethical concerns and or dilemmas they pose. They are also fundamental as they could enable members of the general public to identify some theological and ethical criteria that could guide biotechnology and genetics research, their implementation, as well as evaluating the consequences, and in understanding the implications of their uses through the articulation of practical, reasonable and

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realistic understanding of what it means for humanity, the earth and the web-of-life to live with integrity, and fully as attested to by Christian theology and ethics.

The churches do not only need to understand the consequences and effects of biotechnologies and genetics, but must proactively attempt to understand them at the level of intentions, the processes they employ, their impacts and their ethical implications, particularly in relations to ecological, socio-political and economic systems, as well as cultures and spiritualise of Africans and peoples of the world. This ought to be informed by the understanding that technologies are not neutral or value free disciplines. The WCC has noted that biotechnologies have become instrument of power, locked in complex systemic networks of power, often tied up with active agents such as multinational or transnational companies, affluent individuals, countries, universities and private entities, and with processes aimed at profit maximization as opposed to the common good of all humanity, the earth and the web of life.

> The advent of biotechnology calls the churches to re-examine the fundamental Christian understandings of the relationship between God, humanity, and the created world. That task has just begun. In the process, the fresh resources of biblical witness, and the declaration of the churches' ancient creeds, all beginning with faith 'in God as the Creator, and Maker of heaven and earth, of all things visible and invisible, must be reaffirmed, to give a foundation for addressing these challenges.[1]

Our attempt to deliberate on the ethics of biotechnologies and the new genetics must enable us to understand not only the ramification of the possible futures opened by scientific research, but to require us to seek to understand the intentions behind these technologies, their applications, and to how and why things are done in a particular way. Often times, ethicists and theologians tend to respond to biotechnologies and genetics after technologies have already been implemented thus leaving the public and the scientific community without taking into consideration attendant ethical issues.

Proactive engagement with genetics and biotechnologies and the directions of research, implementation and commercialisation or the lack thereof, is generally more helpful than overreacting after they have been implemented. This thus requires that theologians and ethicists must seek inter- or multidisciplinary discussions in order to dialogue with the sciences, but also to seek clarity from those scientist involved in biotechnology and genetic research. This may be helpful with widening public debate on genetics and biotechnologies within the South African and or African society.

Ethics ought to ask some of the following questions:

- What are the personal and social impacts of biotechnologies and genetics in South Africa and Africa?
- What are the prospective consequences of biotechnologies on our values, virtues and relationships, as well of our understanding of what it means to be human and live with other creation and within the web of life?
- Do applications of biotechnologies or genetics protect or endanger individual and rights and do they endanger ecological integrity and wellbeing?

- How are the risks, benefits and burdens of these technologies spread and who and what is adversely affected?
- Do these technologies advance the common good or not?

Ethics also ought to move beyond the descriptive level where it explains what the technologies are or are about to include questions of how they ought to be and how we should set criteria helpful in understanding them.

THE ENVIRONMENT OF GENETICS AND BIOTECHNOLOGIES IN SOUTH AFRICA

South Africa has in the last decade attempted to consolidate and expand its research and implementation capabilities on genetics, biotechnologies and nano-sciences including nanotechnology. It has also sought to establish a cohort of research institutions, protocols and laws on biotechnologies and Genetics. This has been evident in a number of specific programmes, projects and work that the government, and in particular the ministry of Science and Technology has embarked upon, namely,

- The National Biotechnology Strategy which was approved by the Cabinet in 2001(The strategy among others, aimed at stimulating the development of biotechnology skills, capacities and tools in the country);
- The institution of regional biotechnology innovation centres known as BRICs which are considered as the implementation centres of the national biotechnology strategy. These include centres such as the EGoli Bio in Gauteng, Cape Biotech in Western Cape, and Eco Bio (sometimes LEFELab) which covers Port Elisabeth, Kwazulu Natal and Mpumalanga;
- The establishment of a National Innovation Centre for Plant Biotechnology (known as PlantBio) was created in 2004;
- The development and institution of a National Bioinformatics Network located in a number of South African universities including among others, the University of Cape Town;
- The establishment of one of the largest biotechnology Labs in South Africa and Africa known as the International Centre for Genetic Engineering and Biotechnology (ICGEB)[2] whose primary aims include among others, the strengthening innovative research in life sciences for the benefit of African countries and countries of the South, and as well operates on broad disciplines or fields such as biomedicine, bio-pharmaceuticals, bio pesticide production, crop improvement, and environmental protection and remediation. The Lab has relationships with private and public sector entities, including departments of health. Private sector players are expected to pay licence fees to manufacture products developed by the centre.

These developments demonstrate that, whilst the position of Africa is small with regards to Genetic and Biotechnologies, South Africa has positioned itself as the hub of genetics and biotechnologies in Africa. Although there seems to be a lot of optimism about the potential benefits of genetics and biotechnologies by the South African government, the private sector and some universities, there are also a number of experts, social movements and including the churches, particularly the South African Council of Churches and the South African Catholic Bishops Conference who have stated some caution, called for meaningful public discernment, debate and transparency in biotechnologies and genetics. It is the purpose of this essay thus, to outline some of the broad issues related to genetics and biotechnologies, to the ethical

issues, dilemmas and or contradictions posed by these disciplines and phenomena, as well as weighing the possible benefits, disadvantages and or contradictions with regards to accepting these technologies. It is also our intention to outline some ethical criteria relevant for South Africa and Africa, informed by Christian theology and ethics, and African cultures and philosophies with regards to life.

GENETICS, BIOTECHNOLOGIES AND SOUTH AFRICA

Biotechnologies and Genetics confront Africans as a range of processes and contested projects. They challenge us to distinguish between the different forms. They also require us to understand the interplay between their differing forms and or applications. While biotechnologies and genetic technologies are claimed to contain universal dynamic, their possible impacts ought to be interrogated in order to understand who benefits or will benefit from them and who will lose out, what positive or negative impacts they will raise and whether these are even or not?

Biotechnologies and genetics are the result of genetic manipulation, which permits the production, alteration and transference of genes between living beings, breaking the natural barrier between non-species crosses, creating and alternating and transferring genetic material between vegetables, animals, bacteria, viruses and human beings."[3]
They can, in the main, be understood to entail at least four areas.

- The first is what is normally referred to as the first generation biotechnology which simply describes the use of natural biological organism to generate products, for example, using yeast to make beer or bread.
- The second involves the production of specific products, employing pure cell or tissue cultures from specifically selected organisms, through random cross breeding or similar techniques, for their superior production or expression capabilities without introduction of foreign DNA.
- The third type involves the introduction of selected foreign (from across species barrier DNA by means of recombinant DNA technology) and the manipulation of the genetic make up of organisms, with the aim of making them genetically modified organisms, and to produce small molecules, compounds, or proteins for example, xenotransplantation.
- The fourth refers to biotechnology support services. These include support systems that facilitate their commercialisation, the legal frameworks which are relevant for their implementation, equipment, research and infrastructural services that enable their research and applications.

There a number of specific activities, applications and processes that can be subsumed under the terms biotechnologies and genetics. These are

- Processes such as, **fermentation**, bio-reactors, bio-processing, bio-transformation, bio-pulping, bio bleaching, bio-desulphurisation, bio-remediation, bio-filtration, phyto-remediation, biological gas cleaning, bio-augmentation, bio-indicators process control, classical or traditional breeding, and extraction, purification/ separation;
- **genetics**, which broadly covers research fields such as genomics, bio-informatics, gene-probes/ DNA markers, DNA sequencing/ synthesis/amplification, recombinant DNA technologies, and Peptides/ protein sequencing/synthesis, lipid/ Protein engineering, carbohydrate engineering,

proteomics, enzymology, hormones and growth factors, call receptors/ pharmaco-genomics signalling/pheromes, antibodies, structural biology, and molecular modelling;

- cell and tissue culture and engineering covering cell /tissue culture, tissue engineering, hybridisation, cellular fusion, vaccines/immune stimulants, and embryo manipulation;
- sub cellular organisms, covering fields such as viral vectors and gene therapy;

- multidisciplinary research including molecular high throughput screening, drug delivery, rational drug design, diagnostics, biochips, combinatorial chemistry, biomaterials, processing of blood products and substitutes, natural products chemistry, microbiology/virology/ microbial ecology, biosensors, transgenic, and molecular synthesis;
- Nano-sciences, particularly nanotechnology which undertakes to be a novel and groundbreaking global science platform that studies the nexus between the manufactured nano-scale world and living systems, including radical and or innovative applications such as intelligent targeted drug delivery.
- **"**Genomics which go well beyond human genetics in that it concerns all living organisms.

The new technologies manipulate life for therapeutic and environmental properties. They span from basic research to clinical and industrial application of DNA –based technologies, to the culture and reproduction of plants and animals and include the study of pharmaceutical proprieties. They place all living organisms under the scrutiny of research, and thus examine the differences and or similarities between and amongst species. They also allow for the study of transgenic 'pharming' which is not only intended at producing plants only, but also animals that carry vaccines and that have the therapeutic properties. They also facilitate the development of tissues as well as their transfer from different species to another. For instance, xenotransplants are organisms transferable from humans to plants and vice-versa. Biotechnologies and genetics promise increased productively, the development of organisms which are resistant to adverse events as well as the development of neutraceticals.

The applications of the new technologies on human life raise questions such as:

- "Are humans just another form of living matter in this new biotic universe?"
- What are the implications for the humanity of future generations?
- Will the creation and interventions on biotechnologies on humanity through the Human Genome Project and subsequent studies on genetics affect our sense or concept of self, of humanity in relations, and of life?

Ethics and theology will thus need to reflect on an understanding of the varied questions raised by these technologies including their transgenerational effects and concerns; and beyond the domestic and international scale.

Some of the ethical questions biotechnologies raise Africa include among others (and not exhaustively, the following:

- Questions of bioprospecting,

There are numerous examples of biotheft and used under the guise of biotechnology, for instance, "the German Company Bayer, acquired a strain of bacteria from Lake

Ruiru in Kenya, from which it was developed a drug that helps diabetes sufferers. The patented Drug is usually sold under the name of Precose or Glucobay and has generated at leas $380m in Sales. And yet Kenya has received nothing in return. Bayer spokeswoman, Christina Sehnert Confirmed that the product had been developed from the Kenyan Bacteria but said the drug was a product of biotechnology. She said, you are not using the original. What has been patented is the biotech product."[4] As Andrew Buncombe notes, we need not just celebrated the development of genetics and Biotechnologies, but be cautious of some of the life-denying and exploitative elements of these technologies when applied without care, concern and or justice when he says, "Dozens of Western Multinationals have made millions of pounds in profits from exploiting African Bio-resources taken from some of the poorest nations on earth, with not a penny offered in return." [5]

- The use of antecedent knowledge systems to biotechnologies and The commercialization and applications of these technologies;

Claims of intellectual property ownership rights by big corporate pharmaceutical or biotechnology companies to local varieties after they have modified the landraces or seeds which consequently displaces farmers and communities from food production

- The question of the distributions of the benefits and risks they entail in South Africa, Africa and in the world, the third is the implications of their commercialisation, particularly in instances where precursors or antecedent products and or knowledge are drawn from Africa, or from poor communities with or without their consent, the fourth is the issues related the legal framework which govern them and their implications for human life, human rights, ecological integrity and values of justice.
- The relationship of genetics and biotechnologies to human health, particularly the alleged possible provocation of increases in allergies, antibiotic resistance and an increase in the indices of toxic substances in foods;
- The concern about the environment relations to the possible risk of genetic erosion, irreversibly affecting biodiversity through contamination of the germ plasma of local seeds. The increase in the use of monocultures and the consequent loss of biodiversity and the rich variety and the quality of seeds.
- The threats to food sovereignty and security of Africans due to the loss of biodiversity and of specifically of control of the seeds and living organisms by the patenting;
- The risk of total dependency ensuing from the destruction and finally the disappearance of the small and even medium scale production of seeds if they are subsumed under the domain of a small group of the giant and powerful transnational corporations;
- The exploitation of the poor and or vulnerable from poor countries in biotechnology and genetic research:

Lisa Carhil rightly notes that

> Even before transnational biotech companies can seek international markets among the affluent, they need research population, now frequently drawn from among the world's poor. Research conducted across borders often target local, relatively isolated populations whose homogeneous genetic pool provides a useful way to study disease, and whose lack of power renders donors less able to negotiate

> compensation or share in benefits or profits. Moreover, research in other lands permits sponsors to evade human subjects' protections that may obtain in their home countries. Such research is increasing common, and cannot be diagnosed as an aberration that does not reflect on the ethics of biotech commercialisation."[6]

The ethics of research on Aids in Africa, especially the clinical trials of antiretroviral drugs, have elicited the possible abuses of biotechnology and genetic research on the poor. They have shown how rich and or countries which have commercial interests on the products and processes based on biotechnologies can act without compassion even in spite of the life threatening levels of the poor. For instance, South Africa has been in Conflict with the US and European pharmaceuticals companies over access to low cost Aids drugs"[7] Where commercial benefits, and in particular, intellectual property rights are pitted against human dignity, the web of life ought to guide the application of patent law so that it "respects the fundamental principles of safeguarding the dignity and integrity of people. It should or ought to exclude the human body from patenting, including germ line cells, embryos, and gene sequences, albeit only as found inside the human body, and not as isolated for the purposes of product of innovation."[8]

Additional concerns about the biotechnologies, genetics and their association with IPR include among others the following:

- Their impact and effect on agricultural R&D as a public good and the kind of farming systems and farmers research supports
- The balance between the incentive to produce biological innovations and the responsibility for their environmental and other consequences;
- The structure and direction of seed production
- Effects on market structures and access to food consumers in rural and urban areas
- Control over genetic resources and pressure for intensive farming practices
- The ethics of the extension of IPRs to life forms; and
- The health of the farming population

THE CHURCHES AND BIOTECHNOLOGIES AND GENETIC ISSUES IN AFRICA

The positions of the churches on genetics and biotechnologies are diverse and sometimes contradictory. The Christian faith affirms "God loves presence in nature. Creation – the whole community of being, animated by divine spirit- is the context of reality. All of the earth community matters, and has intrinsic value to the one who continues to create, sustain ad redeem the whole."[9] Theological awareness about ecology, "knows that ecosystems- and similarly social systems- are inherently interconnected communities, with reverberations in all entities related therein."[10] As it has rightly been observed by Carol Johnston, in situations where biotechnologies violated relations and undermine human and the web of life, "when relations are conceived as inherent…justice is a matter of the quality of relationships… characterised by freedom, participation, solidarity… all entities have a right to be respected appropriate to their degree of intrinsic value and to their importance to the possibility of the value in others."[11] The church has been cautious about

biotechnologies. As early as the 1930's, (1937) theologians such as Reinhold Neibuhr cautioned against naïve and mistaken confidence in science and technology, without taking into account to the destructive as well as the creative potential of human power and freedom. For instance, he said, "science can sharpen the fans of ferocity as much as it can alleviate human pain."[12]

The church observes that technologies- whether in the form Genetics, biotechnologies or nanotechnologies, or others, are ambiguous. The reason is that – the history of technology us filled with instances of unintended and unpredictable and undesired consequences. The technologies among other things encompass "nuclear bombs, explosives used to blow/kill others, to burn fossil fuels, which some times have bad effects such as poisoning of water, etc. On the contrary, they also produce vaccines for illnesses such as diabetes. The church notes that, "the use of science and technology can lead to accomplishment of human needs yet technologies on the other hand have displayed the power to unleash evil. It is thus the church understands that all people are given gifts and talents to participate creatively in life, and thus be co-creators with God. This however, challenges us as to what are the limits our boundaries, if any, does this position of being co-creators? What are the perimeters of work in biotechnologies and genetics such that they do not violate life? As co-creators we are not to produce evil in the form of suffering/ exploration, inequality, truthlessness and reckless exploitation in the quest for wealth, power, and glory.

The churches in South Africa, particularly the SACC has critiqued the simplistic approaches that some scientists or proponents of biotechnologies and genetics promote. For instance, the church has observed that some technologies treat Life and reduce it to a matter of technology. They have also noted that these technologies are not collective projects based on "universally held assumptions about what it means to be alive and to die."[13] In many cultures, even the idea of genetic engineering, and the presently most important biotechnological method are considered extreme and their practice seen as violent attack on life. For others, "genetic engineering is certainly not based on respect for the miracle of life and the integrity of organisms, whether that be a micro organism, a plant, an animal, a human being or an entire bio-habitat"[14] Some have claimed their distrust of biotechnologies and genetics on the grounds that they are deeply intertwined with modern capitalism, which views everything as a commodity, or as a potential commodity and sometimes promotes exploitative, extractive and abusive approach to life where the utility of products, processes are only tied to monetary value.

The churches have also noted that the inextricable link between biotechnologies and genetics with hyper-capitalist ventures reinforce deterministic approach to science which does not aim at the common good and the respect of the integrity of the web of life, but promotes technologies and science whose priorities are more for the generation and maximisation of profits for those who are the benefactors and beneficiaries of such sciences and technology. For instance, the WCC says, much of these technologies or sciences are generally "geared towards production of marketable and profitable commodities, science is consequently reduced to a production technique including research and development. It becomes at the same time a political tool in the hands of commercial interests."[15]

An important point that the WCC has also made in its studies is that "while biotechnology is promoted as science that offers the true epistemology of biology and biochemistry, it recognises wholeness and complexity only as agglomeration of reducible parts of components. Organisms, including humans, are not fully recognised as having any inherent integrity- Nor are clans, cultures and societies."[16]

In assessing the effects of these technologies and their alliance with hyper capitalism, and thus the quest for profits and for strengthening private rights, then, a key question is whether these technologies support the social and economic welfare of the Africans, especially the poor and whether they meet the developmental goals to which most states, including South Africa ought to pursue? Whilst proponents of these technologies often hail them as promising and having potential to address the present ills, it is important for the churches and Christian theologies/ ethics to ask, if the empirical record concerning the economic/ social, ecological, international relations and social effects of biotechnologies and genetics so far, and their alliance with intellectual property protection in general and in agriculture has not brought about wellbeing for many in the world and particularly in Africa, what hope should we have that these promises will be real for Africa? How do we trust these promises when HIV and Aids, and other life-threatening diseases such as Malaria, dengue fever and others are still not the focal point of these technologies? How might we believe in the benefits that are touted which do not necessarily impact positively the lives of the poor and marginalized?

THE SACC AND GENETICS AND BIOTECHNOLOGIES:

The South African council of churches (SACC) has been involved in attempts to understand, study and reflect deeply on biotechnologies and genetics and their implications for South Africa. The SACC has expressed its concern about the manner in which complex issues on genetics and biotechnologies; specifically on genetically modified organisms (GMO's) in South Africa are treated by proponents of genetics and biotechnologies. It has noted that these have been treated by some legislators, in a purely technical manner, "delinking science from ethics, values, economic and political ideology and our African communal spirituality about life and food." [17]

The link between genetics and biotechnologies to neo-liberal economic globalisation, with its inherent unequal power relations, has also been an area of concern for the SACC, particularly for a country such as South Africa, in which inequality between peoples is greatly acknowledged and is also based on the legacies of apartheid, a system of dehumanisation and injustice. The SACC has raised concern that the radical implementation of biotechnologies and genetics without adequate discernment as well as the application of principles of caution, care and the conservation of diversity, particularly evident in the quick release of GMO's into agricultural life in south Africa is troublesome. They have thus suggested that more detailed studies should be held and along with social and ecological justices group such as the Ecumenical Environmental Justice Network, Biowatch South Africa and many others, for a 5 year moratorium and a detailed studying of the risks and benefits before their quick implementations.

The SACC has also questioned the insufficient representation of relevant sciences including ethics to advise government, and the apparent non-independence of the

advisors to the government and government institutions in the development and implementation of biotechnologies, Genetics particularly, GMO policy; the lack of, or nominal public awareness and or debate on biotechnologies, Genetics, and or GMO's, including our own (SACC) lack of participation in GMO policy developments. It has (SACC) further questioned the overriding profit motive and supremacy of the market over these technologies, as opposed to the concerns on human and environmental safety and health, and food supply; the erosion of the sovereignty of national states, democracy and transparency in policy processes of international agreements and the conventions related to biotechnologies, genetics and even trade concerns which make contextual domestic concerns the subject of trade concerns and not of justice, integrity, respect for the web-of-life, communal rights and et cetera.

As well, the SACC has questioned the linkages of these technologies to the commoditisation of life, and monopolisation of knowledge through the patenting of genes and living organisations as well as indigenous science productions and practices.[18] The council has noted that bio patenting and the benefits of biotechnologies and genetics reflects the priorities of the north and of industrialised societies. They tend to favour the few large companies that can afford to protect their interests, to exclude the needs of the poor and impose sets of values that are counter cultural to the values of the collective.

Not only has the SACC critiqued biotechnologies, the legal framework in which biotechnologies and genetics are implemented but has stated that it has inspired to take a position informed by the following principles: the dignity of the human person; the common good; solidarity, subsidiarity; integrity of creation; socio-economic and environmental justices which are core to the Christian faith.

The SACC finds imperative to embark on a compressive understanding of the issues related to biotechnology, genetics and GMO's which have local, national, regional and international implications.

SOME ETHICAL CRITERIA RELEVANT FOR SA AN BIOTECHNOLOGIES

At least five questions should be asked / criteria should undergird the evaluation of the genetics and biotechnologies in Africa:

- What benefits and what harms can be predicted for biotech innovations in both the research and applications phases, and which courses of actions will result in the best consequences overall?
- Who are the ethically relevant stakeholders, and what rights do they have? Asking questions on the dignity of life, including that of human beings, animals and plants.
- What are the options for accessing innovative products and processes for the most vulnerable?
- How will future generations be affected? We need to consider transgenerational consequences of these technologies.

In relation to these questions, on the other hand, we cannot ignore or leave aside the ethical requirements such as beneficence, social justice, ecological justice and the precautionary principle. In principle, beneficence implies our duty to avoid or resist

evil or harm done to others. In the case of the massive introduction of new technologies that imply potential risks to health, the principle needs to be fully guaranteed by means of clear and trustworthy information.

The principle of social justice, in case of massive technological innovations of a high social impact, leads us to question who will benefit and who will be harmed. Now, in the concrete case of the GMO's it is clear that a small group of large corporations will be the greatest beneficiary, with grave damage for the family farmer. The principle of ecological justice imposes the duty to preserve the environment for present and future generations. Justice is an integrative concept which indicates the interdependence and connectedness of all the just relations and institutions that make up the common good. It calls for the listening and being attentive to the plight of the poor, and vulnerable to biotechnology abuses. It also calls for the transformation of unjust structures, including legal structures which continue to exacerbate and continue injustices resulting from the ruthless applications and as well the commercialisation of genetics and biotechnologies. It is also the mobilisation against injustices in the economy and ecology that genetics and biotechnologies have on people and the earth.

The precautionary principle also requires that before liberating any product for human consumption, that strict norms of bio security be adopted. It is not an issue of obstructing science or scientific inquiry, or of provoking paranoid fears in the face of something new. On the contrary, science and enquiry need to have their space defended and oriented for the common good. Technological applications that imply potential risks on a large scale need to be decided upon, approved, denied or perfected on the basis of democratic decisions and under public control and participation"[19]

Other ethicists, suggests that because of the complex nature of biotechnologies and genetics, it is important to develop and formulate new concepts of rights which take seriously an intercultural framework for dealing with issues of equality, ecological justice and fundamental human rights. This is particularly urgent in the light of the fact that juridical processes associated to these technologies tend to use as a dominant legal framework, property rights and intellectual property rights framework. Property rights in particular, are conceptualized as bundles of rights which govern relationships between peoples with respect to tangible and intangible resources, including among others, knowledge. These rights (property and intellectual property rights) often include among others, the rights to use, include, exclude, sell, licence, transfer, purchase etc. Embedded in property and intellectual property rights are the ideas that all resources are capable of being owned by someone, or should be owned , owners of property ought to have the incentive to insure the costs required to use their property efficiently and that property can be exchanged to a more productive use through voluntary market or non-market exchange. These notions of property however, do not necessary address those cultures or communities where property is not the basis of life or is not central to relations between and amongst peoples, or where the individual is not an isolated self disinterested in the common good but competing for her or his own self interest.

CONCLUSION

The fact that both economic globalisation and genomics are rapidly changing life, offers a window of opportunity for theologians and religious activists to have an impact on the ethical global governance of biotechnology. At present time, some of the alleged benefits of genetics research and biotechnologies are more probable than real, while some are already existent, for example, genetic therapy for some illnesses. These however, are largely determined by market demand and their access is reliant upon the ability to pay. The churches thus have

> to extend and deepen the connection of theological bioethics to social activism by linking religion and theology to coalitions working for distributive justice on multiple levels, from community organising to national legislation to transnational advocacy networks. …including the social movements in order to be in solidarity and to accompany the struggles of, and to empower and be empowered by disenfranchised groups or peoples. By linking with the ecumenical traditions of the social movements, the anti-apartheid struggles, gender justice and full dignity of human, and more contemporary struggles of economic, social and ecological justice, the church will make visible, its call and pursuit for justice in the world and in genetics and biotechnologies.[20]

As churches, we must never make a simplistic equation between the work of science and the domain of such principalities and powers. Yet, we also recognize that science does not function in an isolated vacuum, but rather, is subject to wider perceptions and influences, which express loyalty to certain networks of power. The theological and ethical reflections on biotechnologies in Africa ought to continue to draw on already existing work done on local social justice level. They also ought to draw from the local, regional and global social justice struggles for political, economic wellbeing and against the threats to ecological justice.

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[1] (From WCC report on Genetics and biotechnologies)

[2] The two existing ICGEB are in New Delhi and Trieste, Italy and the latter is the headquarters.

[3] Brazilian Catholic Bishops statement on GE May 6th 2003

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