Pambazuka News
PAN-AFRICAN VOICES FOR FREEDOM AND JUSTICE

New technologies and the threat to sovereignty in Africa

Pambazuka News,
Fahamu, 2nd floor, 51 Cornmarket Street,
Oxford OX1 3HA,UK
Tel +44 (0)1865 727006
Fax +44 (0)1865 727909
www.pambazuka.org

ETC Group Headquarters,
431 Gilmour St, 2nd Floor, Ottawa,
ON Canada K2P 0R5
Tel: 1(613) 241-2267
Fax: 1(613) 241-2506
etc@etcgroup.org

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The award-winning and influential electronic weekly newsletter providing a platform for progressive Pan-African perspectives on politics, development and global affairs. With more than 2,500 contributors across the continent and a readership of more than 660,000, Pambazuka News has become the indispensable source of authentic voices of Africa's social analysts and activists.

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New technologies and the threat to sovereignty in Africa

Firoze Manji and Molly Kane

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cc NASA

Produced in collaboration with the ETC Group, this special issue presents
a range of articles discussing the staggering developments in bio- and nanotechnology and the alarming implications for the African continent and the global South at large. Firoze Manji and Molly Kane outline the sheer scale of this 'technological tsunami', the immense challenges for Africa's self-determination and the action by activists to challenge the corporate assault on bio-sovereignty.

Africa faces today the threat of a new form of conquest, a conquest that is being made possible through astonishing technological revolutions in biology, quantum physics, chemistry and engineering.

Today, all living matter can be modified through genetic engineering; new life forms created and released into the environment through synthetic biology; the properties of common elements and compounds dramatically modified through nanotechnologies (technologies working at the scale of atoms and molecules) and nanomanufacture (creating, for example, semiconductors at molecular level, and even non-nuclear nanobombs); and there is a even a convergence between nanotechnologies, information technologies and cognitive science that potentially enables the development of cerebral implants for monitoring or even controlling our brains.

Reading about such developments is like reading science fiction. The difference is that this is real; it is happening now. These technologies are being developed in a world that is grossly unequal, under conditions where accumulation and profiteering rule, enabling the rich to get richer by any means, while the majority are pauperised. They have developed under conditions created over the last 30 years that have allowed corporations to monopolise atomic-level manufacturing – whether of living or inanimate matter – and legitimise wide-scale corporate biopiracy, with Africa, a continent of extraordinary biodiversity, being a significant victim. Plants that have long been used in Africa are being patented by corporations in the North. But perhaps most significant of all for the continent is the fact that corporate eyes are looking greedily at the profits to be made from the hundreds of billions of tonnes of undifferentiated plant matter that can be used as the alternative source of carbon to fossil fuels, enabling the manufacture of transport fuels, electricity, chemicals and plastics, fertilisers and all those products that ensure the comfortable lifestyles of the North, under the guise of supporting the 'green economy'.

As we celebrate 50 years of independence in a number of countries across Africa, we cannot but mourn, at the same time, the gradual erosion of self-determination and sovereignty that has been the consequence of 30 years of structural adjustment programmes, PRSPs (poverty reduction strategy papers) and neoliberal economic policies. Today, we have less influence on economic and social policy than the IMF (International Monetary Fund), World Bank and international aid agencies. But the neoliberal economic policies have created precisely the 'enabling environment' for corporations to take full advantage of the new technological revolutions and to flourish through exploitation of Africa's natural resources – both living and inanimate.

The new technologies, or more precisely corporate control of the new technologies, represents a potential and growing threat to the continent. A continent that has already faced a turbulent history of colonial conquest and economic conquest under neoliberalism now faces a technologically mediated conquest by the oligopolies.

It is a characteristic of technological revolutions that the full scale of the social, economic and political implications of their use is rarely appreciated until, like the rising tide of a tsunami, it sweeps away everything in its path. The full consequences of what has been dubbed the 'technological tsunami'[1] needs to be publicly discussed and strategies developed to counter these trends.

These trends are being challenged around the world – in local communities, national movements and in global meetings of the United Nations such at the Convention on Biological Diversity and the Committee on Food Security of the FAO (Food and Agriculture Organisation). Citizens are joining together to expose the dangers of governments giving free reign to corporations to use new technologies to solve problems that at root require social and political solutions.

In many parts of the world, people like the Coalition for the Protection of Africa's Genetic Resources (COPAGEN) in West Africa are organising to protect the commons, their homes and their futures against irreparable harm.

This special issue of Pambazuka News, jointly produced with the ETC Group [2] seeks to arm those engaged in the battle for a fairer world to engage in the debates, discussions and dialogues that can prevent the impending conquest of the continent, its people and its natural resources.

Pat Mooney summarises the principal trends that are leading to the 'geopirating' of the commons; Kathy Jo Wetter explains what nanotechnology is all about; Oduor Ong'wen looks at biopiracy and intellectual property rights; and Gareth Jones and Mariam Mayet examine the development of synthetic biology with particular reference to the production of the anti-malarial drug, Artemisinin. Jim Thomas takes on the hype surrounding the 'green economy' and explains the role of the 'biomassters'. Khadija Sharife provides detailed case studies on corporate profiteering in forestry in Tanzania as well as how biotechnologies are leading to dispossessions in Kenya. Pat Mooney looks critically at the UN REDD programme (Reducing Emissions from Deforestation and Forest Degradation) and how it serves corporate interests. Blessing Karumbidza shows how climate change adaptation and mitigation-oriented programmes in Africa has opened up new forms of resource imperialism. Anne Maina recounts a personal story of Kathulumbi Seed Bank Community Development Committee in Kenya. Diana Bronson looks at the implications for Africa of geoengineering, highlighting the actions taken by the campaign 'Hands off Mother Earth'. Resistance is building up not just in Africa, but across the global South. Silvia Ribeiro speaks about the 35,000 people who responded to Bolivia's call for the World People's Conference on Climate Change and the Rights of Mother Earth (PWCC) in Cochabamba in April 2010.

- *Firoze Manji is editor in chief of Pambazuka News, http://www.pambazuka.org/en*
- *Molly Kane is deputy director of the ETC Group, http://www.etcgroup.org/en/about/staff/molly_kane*

NOTES

[1] ETC Group for the South Centre (November 2005), http://www.etcgroup.org/upload/publication/45/01/southcentre.commodities.pdf

[2] ABOUT ETC GROUP: http://www.etcgroup.org. ETC Group is an international civil society organisation. *See p 71 for further details.*

The big squeeze: Geopirating the remaining commons

Pat Mooney

http://pambazuka.org/en/category/features/67507

cc Kaibara

As the UN General Assembly prepares for the June 2012 environmental summit in Rio de Janeiro, the global response to the current set of crises around 'food, fuel, finance and Fahrenheit' are giving rise to even greater commoditisation of our lives, writes Pat Mooney. In the face of new 'shock doctrines' around agricultural erosion, ecosystem collapse, cultural extinctions and gender 'disappeareds', Mooney discusses the supposed therapies and ultimate pay-offs.

The UN General Assembly is preparing for a head of state summit on environmental issues in Brazil in June 2012. Dubbed 'Rio +20' to privilege the 1992 Rio Earth Summit, some critics are already calling the high-profile event 'Rio -20', in just the latest in a succession of global 'happenings' that began with the Stockholm Conference on the Human Environment in 1972, trundled on to Rio de Janeiro in 1992 and then bumbled into Johannesburg in 2002. Retrospectively, the most famous event in Stockholm in 1972 was a botched bank robbery in which a few employees were kidnapped. Once released, some of the employees appeared to have fallen in love with their captors in a psychiatric phenomenon now known as the 'Stockholm syndrome'. Looking back over 40 years of UN environmental jamborees however, the real victim of the Stockholm syndrome was the UN itself, and the coterie of civil society organisations kidnapped by the charisma of summitry.

The Rio Earth Summit of 1992 adopted 'Agenda 21', including a series of treaties and agreements intended to conserve and restore biodiversity, halt desertification, stop deforestation and safeguard us from climate change. When leaders meet in Rio in 2012 they will be told that the deserts have expanded, biodiversity is collapsing, only a scientifically baseless redefinition of 'forest' by some governments allows them to pretend that deforestation is slowing and the climate change biz is booming on offsets and credits.

The new summit will announce a 'green economy' offering a technological 'fix' for all our environmental and economic woes.

In the midst of crises and chaos, gullible governments and panicked publics grasp at 'magic bullet' solutions. But magic has its price – surrendering power, property and/or principles. It is a classic political strategy, most recently described by Naomi Klein in 'The Shock Doctrine'. When the calamity subsides, the magic is gone – and so is social sovereignty. Our current set of crises – food, fuel, finance and Fahrenheit – are setting us up for a classic coup over those parts of our world – and our lives – that have yet to be commodified. This coup is already well underway and it is projected to culminate in some kind of new global consensus Rio +20 summit.

Here's an overview of how this massive new shock doctrine is supposed to play out…

SHOCK #1 – AGRICULTURAL EROSION

When we need it most, we are losing most of our living diversity. 75 per cent of agricultural biodiversity is already extinct. We are losing 2 per cent of crop and 5 per cent of livestock diversity every year. Today's extraordinarily high food prices may weave and wobble but they may never again dip to late 20th century levels. The demand for land to grow agrofuels,

commodity speculation, consumer pressure, water shortages and (most of all) climate chaos ensure that food supplies will remain erratic and expensive.

Industrial agriculture has already made long-term food security a scarce commodity. From 40 livestock species and 7,000 crop species, industry only works with five livestock species and 150 crops (heavily emphasising just 12 crops). Meanwhile, farmers are spending US$90 billion a year on synthetic fertilisers trying, in vain, to make up for the more than 24 billion tonnes of topsoil destroyed by factory farming every year. Below ground, the same farms are sucking up 25 per cent more water than threatened aquifers can replace. From more than 35,200 marine species, industrial fisheries focus on 336 species. 75 per cent of the global fish stocks are either fully exploited or substantially depleted.

Agriculture is also losing its pollinators: North American grassland bird populations have dropped by one-third since Rachel Carson, in 1962, warned us of a silent spring, and 40 per cent of global bird species are in decline. At the 2012 summit, governments shouldn't celebrate Rio +20 but rather lament Carson -50.

SHOCK #2 – ECOSYSTEM COLLAPSE

There is no such thing as marginal land. Salt marshes in the United States account for 20 per cent of all US carbon up-take. Global carbon up-take from coastal habitats is roughly equal to Japan's annual GHG (greenhouse gas) emissions. So-called under-utilised forests and savannas play a massive role in protecting us from global warming. Two-thirds of the world's ecosystems are in danger of collapse.

SHOCK #3 – CULTURAL EXTINCTIONS

The world's indigenous peoples (just 6 per cent of humanity) nurture the more than 50 per cent of wild plant and animal life in forests and savannas and are often the sole protectors of surviving crop, livestock and aquatic species used for food. They also secure the medicines that safeguard the health of 80 per cent of people in the global South.

Yet 90 per cent of the world's 7,000 remaining languages may become extinct by the end of this century. Humanity is losing at least one language every fortnight.

SHOCK #4 – GENDER 'DISAPPEAREDS'

Women are the guardians of most of this knowledge. But patriarchy prioritises male literacy, meaning that women's wisdom, embedded in local languages – carrying their precise understanding of specific plants, soils, animals and ecosystems – disappears, denigrated and untranslated.

We're not just losing the message; we're losing the messenger – the women themselves. Female infanticide is pandemic. In 1990, Amartya Sen estimated the loss at 100 million lives. In China, the gender imbalance was 108 boys to 100 girls for the generation born in the late 1980s; today's generation is 124 to 100. Similar ratios are showing up in India and elsewhere around the world. The diversity we most need to protect is that of indigenous and peasant women. Because of this loss, the so-called 'baby boomer' generation is the first generation in history to lose more knowledge than it has gained.

THERAPY #1 – GEOPIRACY

Industry (and their governments) argue that to feed and fuel ourselves in the decades ahead, we must move from a 'fossil carbon' to a 'living carbon' economy. The oft-heard and most alarming statistic is that only 23.8 per cent of the world's annual terrestrial biomass is being appropriated today – meaning that 76.2 per cent of our land-based biomass remains to be commodified. Rumours of the impending 'carbohydrate economy' have been with us for some time, but new crises and technologies now make its arrival opportune. As one Cargill spokesperson puts it: '[A]ny chemical made from the carbon in oil could be made from the carbon found in plants.' At stake are some (or all) of the raw materials for the US$8.5 trillion food/fodder/fibre industries, the US$2 trillion chemical products industry, portions of the US$825 billion pharmaceutical industry and, of course, the estimated US$5 trillion energy industry.

The goal is no longer to produce food or fuel but to create and control as much biomass as possible. Corporate structures are being reconfigured. Major energy companies are jostling

for dominance with conventional chemical and agribusiness/biotech companies. Exxon Mobil and BP have recently each invested US$600 million in new biomass strategies. Shell and Chevron are also investing in biomass technologies, while BASF and Monsanto have partnered in a joint US$2.5 billion venture to challenge the energy industry. Unilever and Kraft are looking to algae biomass for their future raw materials. The gene giants have become our new biomassters.

THERAPY #2 – GEOENGINEERING

The second magic fix is to control the thermostat to dilute or delay climate change. Lacking the political will to adopt tough policies, northern governments are eager to embrace geoengineering to sidestep drastic changes in consumption and lifestyle. Geoengineering schemes include an astounding range of experiments to transform the biology of large ocean surfaces, restructure clouds and block solar rays through stratospheric barriers. As absurd as this sounds (and the scientists advocating this concede that the risks are extreme and success uncertain), the UK Parliament and the US Congress have recently held hearings sympathetic to all of the proposed strategies.

Arguing that the world's governments will not achieve a new multilateral agreement to effectively address climate change, geoengineers are calling for a new 'coalition of the willing' wherein a handful of governments and industries will use technology to prevent the worst aspects of global warming. They argue that the proof of principle is that we have already geoengineered the planet into this crisis. The governments and industries who got us into this mess, who have denied or delayed action on climate change for decades, who refuse to take substantive action even now and who lack the courage to tell their citizens to take the bus, have neither the intelligence or integrity to be entrusted with control of the world's thermostat.

THERAPY #3 – NANOMANUFACTURE

Industrial manufacture is moving down to the nanoscale (one nanometre = one billionth of a metre) – the scale of atoms – everything from rocks to rice. When everything in nature is seen as composites of atoms and molecules, the technologies that make iPads could be considered to be the same as the technologies that create life.

Since 2000, governments have spent US$50 billion on nano-scale technology research. Most of the Nobel laureates in physics and chemistry over the past 15 years have been working at the nano-scale. When the Royal Society in the UK conducted its analysis of nanotechnology in 2004, industry reported that there are more scientists in the vicinity of Beijing working on nanotechnology than there are in all of Western Europe – at one-twentieth the cost of Western European scientists. Close to 50 countries now have national nanotechnology initiatives and the race is on to see which countries will not be left behind.

Nanotech's spin doctors claim that the global market for the (approximately) 2,000 products incorporating nano-scale materials (note: not the sole value of nanotechnology itself) is around US$400 billion. This, the spin doctors say, will jump to US$2.6 trillion by 2014. At this point (while not forgetting the industry's enormous capacity for hype), nanotechnology could account for as much as 15 per cent of global manufacturing and have the combined market value of the telecommunications and informatics industries and 10 times the market clout of biotech – and still be in its infancy. More money has gone into research in nanotechnology than was spent collectively on the Manhattan and Apollo projects. With so much already spent, governments are still not thinking about health, the environment or livelihoods. Although nano materials are already in foods, pesticides, cosmetics, sunscreens and textiles at a scale that can enter our skin or organs undetected by immune systems, there are virtually no safety regulations anywhere in the world. The huge attractiveness of nanotech for industry is that it multiplies the uses of the Periodic Table and hugely changes raw material requirements. The value of presumed national treasures could rise or fall precipitously with changes in nanotechnology.

THERAPY #4 – SYNTHETIC BIOLOGY

To get 'beyond petroleum' industry says, we must build unique biomass. For synthetic biologists, life is Lego. DNA's double helix is just a kind of chemical circuitry that can be

assembled with off-the-shelf parts.[1] These engineers (many are not trained as biologists) are attempting to build artificial self-replicating organisms that can do almost anything.

Not only can 'synbio' build DNA, it can also teach the cell's machinery to read DNA differently.[2] Scientists at Cambridge University have cajoled cells to read DNA's four-letter nucleotides in larger sets or codons.[3] Instead of just 20 amino acids from which to build different proteins, this more literate DNA can theoretically have 276 amino acids to mix and match, with the potential to construct proteins that don't exist in the natural world – the building blocks for unbelievably different life forms. Scientists have already constructed five- and six-base double helixes.

A few months ago, J. Craig Venter captured world headlines by announcing that his private-sector scientists have managed to build 'Synthia' – the first-ever synthetic, self-reproducing microorganism. Many scientists regard Synthia as the most significant scientific accomplishment since the splitting of the atom.

Meanwhile, iBoL (the international Barcode of Life) consortium is mapping the genome of every known species, placing the electronic map on the internet and depositing a sample in the USA. Once mapped, it will be possible for researchers – armed with Craig Venter's self-replicating technology – to download a genetic blueprint, tweak it at will and construct new life forms. Some argue that gene banks, zoos and botanical gardens – and conservation programmes – are redundant. It is theoretically possible to create (and patent) more unnatural biodiversity in a test tube than there is natural biodiversity in the Amazon.

PAYOFF #1 – MASSIVELY DESTRUCTIVE INDIVIDUALS

For industry, the alluring side effect of the new techno-fixes is that almost anyone, using almost anything, can be massively destructive. The state's inevitable reaction is to seek massive control over everybody.

Are the tools of destruction so readily available? Carbon nanotubes are only airfreighted in minute quantities because they tend to explode in larger packets. Aluminium oxide, routinely used by dentists, also explodes in nanoparticle form. (The US Air Force is experimenting with aluminium oxide to ignite bombs.) Gold nanoparticles, between seven and twenty-one atoms, can be used as catalysts. So what? According to one of the most watched videos on the internet, if you drop Mentos Mints into a two-litre bottle of Diet Coke, it too will explode. But out of all of these potentially explosive materials – aluminium oxide, carbon nanotubes, gold, Mentos Mints and Coke – only Coke can't go through airport security. Quantum effects offer the potential to change all of the characteristics of all nature's elements when particles are reduced to the nanoscale. This changes almost everything. Russia has already exploded the first nano-bomb – flattening buildings – the world's most powerful non-nuclear weapon.

PAYOFF #2 – MASS MONITORING

The new nanoscale technologies create – and require – social monitoring. And the cost and labour of monitoring can be borne by consumers. The most obvious example is Facebook, with 400 million plus members. Whatever doesn't make it into Facebook or MySpace can probably be found on one of the two blogs per second being launched on the internet. Privacy is no longer a 'social norm'. Meanwhile, YouTube is uploading 10 hours of personal video every minute. This year, according to some analysts, there will be as many functioning cell phones on the planet as there are people. Most of them come with cameras and a disturbing number use GPS (global positioning system) to advertise their location. And they tweet their purchases, politics and paranoia to friend and foe indiscriminately. Computer algorithms are not only sorting out who is buying what, but mining the massive data cloud to identify emerging trends and tensions that might become threats and revolutions.

PAYOFF #3 – MASS MARKETS

New work in genomics and neurosciences create new profit opportunities as well as new control strategies. The public goal is to cure disease but the private opportunity is to enhance human performance while increasing control. An estimated one in 10 people have some mental or physical abnormality that someone else thinks needs fixing. Add to this the one in six couples that experience difficulty conceiving, and then add to that those parents wanting

to select the sex of their next child and the market for performance enhancement is almost limitless. Private clinics now claim they can test embryos for 150 different genetic disorders. But we just can't seem to get a handle on poverty, pollution or patriarchy!

Enhancement, of course, will be pricey … and perpetual. Implanted cognitive chips will allow families to pay for upgrades for their children. (Failure to upgrade could leave a version 2.0 child to duke it out with a 2.3 sibling parented by 1.0 losers!) Enhancement will come with an introduced Terminator sequence that will render the parents sterile until they renew their licence for the next generation. Those who refuse – or can't afford – to be enhanced will become outcasts. If someone has a cognitive chip in their brain, who has the remote control?

PAYOFF #4 – MASSNATIONAL CORPORATISM

Collusion between elites in industry and governments is hardly new. But the high-risks involved in shock therapy require extraordinary levels of industry/government coordination. Governments want the techno-fixes (and plausible denial); industry wants its investments secured, its liabilities controlled and unfettered monopoly over natural resources.

With the new techno-fixes, size matters. The value of global annual corporate mergers in 1975 was approximately US$20 billion. Before the recent financial crisis, global mergers soared to almost US$4.5 trillion. Industry may well opt more for alliances or consortia in the years ahead in order to avoid unwelcome scrutiny.

Intellectual property and other forms of technological monopoly are already forcing new alliances. In recent years, patents have been granted that subsume one-third of the Periodic Table; two-thirds of industrial manufacture; and almost all agricultural species. US patent 5,874,029 covers methods for particle nano-isation. The invention can be used in the pharmaceutical, food, chemical, electronics, catalyst, polymer, pesticide, explosives and coating industries – just about the whole economy. US patent 5,897,945 claims nano-rods containing any of 33 elements – over one-third of the working parts of the Periodic Table. Meanwhile, six agribusinesses have applied for – or obtained – mass-genome plant patents extended to the plant's commodity use.

Will this global shock doctrine really work? Many of the therapies and payoffs will fail. However, technological failures can still breed windfall profits. As governments gather in Rio to mark 20 years of failure of leadership and action, we must remember that the only antidote to our 50-year march toward silent spring is another 50-year struggle by an anything-but-silent civil society.

- *Pat Mooney is executive director of ETC Group, http://www.etcgroup.org/en/about/staff/pat_mooney*
- *This article is based on earlier version published by Canadian Dimension, http://canadiandimension.com*

NOTES

[1] DNA – A self-assembling, cellular molecule that contains the genetic instructions for the development and function of living things. DNA is made up of simple units called nucleotides that are held together by a 'backbone' made of sugar and phosphate groups. DNA's structure is a double helix.

[2] Synthetic biology (also known as synbio, synthetic genomics, constructive biology or systems biology) – The design and construction of new biological parts, devices and systems that do not exist in the natural world and also the redesign of existing biological systems to perform specific tasks. Advances in nanoscale technologies – manipulation of matter at the level of atoms and molecules – are contributing to advances in synthetic biology.

[3] Codon – A series of three chemical bases linked together in a specific order. During protein synthesis, it is the order of the codon that determines which amino acid will be added to the protein under construction within the cell. Each codon carries the code for a specific amino acid.

Big continent and tiny technology: Nanotechnology and Africa

Kathy Jo Wetter

http://pambazuka.org/en/category/features/67525

Cc AJCL

Despite supposedly self-evident claims to its ability to solve social and health problems in Africa, developments in nanotechnology should be met with serious critical reflection, writes Kathy Jo Wetter. In a discussion of what nanotechnology is and the risks associated with it, Wetter underlines that the technology offers new opportunities of monopoly control 'over both animate and inanimate matter', while government regulations worldwide remain completely inadequate to address its unique risks.

The August 2010 issue of NANO Magazine, highlighting nanoscale research expected to have a positive impact on the developing world, included articles focused on energy generation, disease prevention and water purification. The articles reflect a now-familiar pattern: a presentation of the horrific scope of the current problem (e.g., unclean water responsible for 6,000 deaths every day) followed by a report on promising nanotech research that would seem to address the problem (e.g., electrostatically charged nanoscale particles that remove contaminants from water). Readers are expected to connect the dots along the way to the logical and inevitable conclusion: Who would say 'no' to nano?

Indeed, the 19 member countries of the Common Market for Eastern and Southern Africa (COMESA) closed their recent summit, 'Harnessing science and technology for development', by urging the promotion and utilisation of nanotechnology and science, 'given its application in various key areas such as medical treatment'.[1] That wasn't the first time experts have committed to pursue nanotechnology as a way to solve the global South's most pressing problems of course. Back in 2005, the UN Millennium Project's Task Force on Science, Technology and Innovation had already identified nanotechnology as an important tool for addressing poverty and achieving the Millennium Development Goals.

Early in 2010, however, participants at a regional awareness-raising workshop on issues related to nanotechnologies in Côte d'Ivoire were insisting that countries have the right to accept or reject the import and use of manufactured nanomaterials to minimise their risks.[2] They also urged that attention be paid to the critical role of precaution and to nanotechnology's ethical and social risks, in addition to benefits, especially in developing countries and countries with economies in transition. Here was a group of experts in Africa questioning the received wisdom of nanotechnology's central role in solving the problems of the developing world, even going so far as to suggest that in some cases it may make sense to 'say no to nano'.

WHAT IS NANOTECHNOLOGY AND WHAT ARE ITS RISKS?

Nanotechnology is a suite of techniques used to manipulate matter on the scale of atoms and molecules. Nanotechnology speaks solely to scale: Nano refers to a measurement, not an object. A nanometre (nm) equals one-billionth of a metre. Ten atoms of hydrogen lined up side-by-side equal one nanometre. A DNA molecule is about 2.5nm wide (which makes DNA a nanoscale material). A red blood cell is enormous in comparison: about 5,000nm in diameter. Everything on the nanoscale is invisible to the unaided eye and even to all but the most powerful microscopes. Only in the last quarter of a century has it been possible to intentionally modify matter at the nanoscale.

Key to understanding the potential of nanotech is that, at the nanoscale, a material's properties can change dramatically; the changes are called 'quantum effects'. With only a

reduction in size (to around 300nm or smaller in at least one dimension) and no change in substance, materials can exhibit new characteristics – such as electrical conductivity, increased bioavailability, elasticity, greater strength or reactivity – properties that the very same substances may not exhibit at larger scales. For example, carbon in the form of graphite (like pencil 'lead') is soft and malleable; at the nanoscale carbon can be stronger than steel and is six times lighter; nanoscale copper is elastic at room temperature, able to stretch to 50 times its original length without breaking.

Researchers are exploiting nanoscale property changes to create new materials and modify existing ones. Governments around the world have already invested more than US$50 billion on nano-science and nanotechnology research. One market analyst firm expects the private sector to invest a staggering US$41 billion just this year. Companies now manufacture engineered nanoparticles that are used in thousands of commercial products, including textiles, paints, cosmetics and even foods.

Because nanoscale manipulations are now possible and, because the basic components of both living and non-living matter exist on the nanoscale (e.g., atoms, molecules and DNA), it is now possible to converge technologies to an unprecedented degree. Technological convergence, enabled by nanotechnology and its tools, can involve biology, biotechnology and synthetic biology, physics, material sciences, chemistry, cognitive sciences, informatics, geoengineering, electronics and robotics, among others. At the nanoscale there is no qualitative difference between living and non-living matter. (ETC Group uses the term BANG to describe technological convergence: bits, atoms, neurons and genes – the stuff that can come together when various technologies converge.)

MARKET IMPACTS

The most direct impact of new designer materials created using nanotechnology is multiple raw-material options for industrial manufacturers, which could mean major disruptions to traditional commodity markets. It is too early to predict with certainty which commodities or workers will be affected and how quickly. However, if a new nano-engineered material outperforms a conventional material and can be produced at a comparable cost, it is likely to replace the conventional commodity. History shows that there will be a push to replace commodities such as cotton and strategic minerals – both heavily sourced in Africa and critical export earners – with cheaper raw materials that can be sourced or manufactured by new processes closer to home. Worker-displacement brought on by commodity-obsolescence will hurt the poorest and most vulnerable, particularly those workers who don't have the economic flexibility to respond to sudden demands for new skills or different raw materials.

(In the face of perennially low and volatile prices for primary export commodities, and the persistent poverty experienced by many workers who produce commodities, few would argue in favour of preserving the status quo. Preservation of the status quo is not the issue. The immediate and most pressing issue is that nanotechnologies are likely to bring huge socio-economic disruptions for which society is not prepared.)

The beneficiaries of sudden shifts in market demand will be those in a position to see the changes coming, while the 'losers' will be the producers of primary commodities who are unaware of the imminent changes and/or those who could not make rapid adjustments in the face of new demands.

SOUTH AFRICA

South Africa has had its eye on nanotech for the better part of the last decade for this very reason, paying particular attention to the impact new nanomaterials could have on minerals markets. In 2005, the country's then-Minister of Science and Technology Mosibudi Mangena warned, 'With the increased investment in nanotechnology research and innovation, most traditional materials … will … be replaced by cheaper, functionally rich and stronger [materials]. It is important to assure that our natural resources do not become redundant, especially because our economy is still very much dependent on them.'[3] The government launched its National Nanotechnology Strategy the same year, funding research & development (R&D) through the Department of Science and Technology, whose overall budget for 2009–10 neared US$600 million. South Africa is also a player in a cooperative nanotech R&D programme under the India-Brazil-South Africa Dialogue Forum (IBSA).

Nanotech is one area of science collaboration, led by India, funded by a US$3 million trilateral research pool.

HEALTH AND ENVIRONMENTAL IMPACTS

The qualities that make nanomaterials so attractive to industry across a wide range of fields, particularly pharmaceuticals – their mobility and small size, on the same scale as biological processes, and their unusual properties – turn out to be the same qualities that may make them harmful to the environment and to human health. Human cells are generally larger than nanoscale – on the order of 10-20 microns in diameter (10,000-20,000 nm) – which means that nanoscale materials and devices can easily enter most cells, often without triggering any kind of immune response. While there is great uncertainty about the toxicity of nanoparticles, hundreds of published studies now exist that show manufactured nanoparticles, currently in widespread commercial use (including zinc, zinc oxide, silver and titanium dioxide) can be toxic. Some nanoparticles can cross the placenta, posing significant risks to developing embryos. Workers who experience routine occupational exposure to nanoparticles will likely be most at risk.

Back in 2002, ETC Group called for a moratorium on the commercialisation of new nano products until they could be shown to be safe, to protect workers as well as consumers. In 2007, a broad coalition of civil society, public interest, environmental and labour organisations from across the globe worked out a set of Principles for the Oversight of Nanotechnologies and Nanomaterials grounded in the Precautionary Principle.[4] With the exception of the occasional reporting requirement, no government regulations yet exist that address the unique risks posed by nanoscale materials, and the commercialisation of nanotech products continues unhindered.

While no one knows how many workers are exposed to manufactured nanomaterials currently, the number of workers involved in nanotech is predicted to reach as high as 10 million worldwide within five years. Given the uncertainties regarding exposure and health effects, the international trade union IUF (Uniting Food, Farm and Hotel Workers World-Wide) has called for a moratorium on commercial uses of nanotechnology in food and agriculture. The Côte d'Ivoire conference participants made the sane recommendation that workers be involved in developing occupational health and safety programmes and measures in relation to manufactured nanomaterials, and countries were encouraged to set up and enforce legal provisions to ensure safe practices with regard to production, use, transport and disposal of nanoparticles and nanomaterials.

WHO'S IN CONTROL?

Nanotechnology provides new opportunities for sweeping monopoly control over both animate and inanimate matter. In essence, patenting at the nanoscale could mean monopolising the basic building blocks that make life possible. Whereas biotechnology patents make claims on biological products and processes, nanotechnology patents may literally stake claim to chemical elements, as well as the compounds and the devices that incorporate them. With nanoscale technologies, the issue is not just patents on life – but on all of nature – opening up new avenues for biopiracy (see Oduor Ong'wen's contribution on p. 14). Control and ownership of nanotechnology is a vital issue for all governments because a single nanoscale innovation can be relevant for widely divergent applications across many industry sectors.

Many who envision nanotech bringing benefits to Africa ignore the realities of technology transfer and intellectual property. Intellectual property is being driven by the North and promotes the interests of dominant economic groups, both North and South. A 2006 study reported that Africa accounts for just 0.4 per cent of all patents granted throughout the world, while the United States and Europe together account for 81.8 per cent.[5]

More than 12,000 patents in the field of nanotechnology have been awarded, granted over three decades (1976–2006) by the three offices responsible for most of the world's nanotech patenting – the US Patent & Trademark Office (USPTO), the European Patent Office and the Japan Patent Office.[6] As of March 2010, close to 6,000 nanotech patents had been granted by the USPTO and a further 5,184 applications were waiting in the queue. Multinational corporations, universities and nanotech start-ups (primarily in the OECD countries) have

secured 'foundational patents' on nanotech tools, materials and processes – that is, seminal inventions upon which later innovations are built – and nanotech 'patent thickets' are already causing concern in the US and Europe.

Meanwhile, African governments are under pressure to enact tougher intellectual property laws that recognise the rights of patent owners. In June, the US government, reportedly spending millions of dollars campaigning for an Anti-Counterfeits Trade Agreement (ACTA), hosted a three-day regional workshop in Kampala, where the East African Community was encouraged to take the lead – in the interest of public safety! – in developing enforcement procedures and regional standards.[7]

Researchers in the global South are likely to find that participation in the proprietary 'nanotech revolution' is highly restricted by patent tollbooths, obliging them to pay royalties and licensing fees to gain access – which is not to suggest that nanotech, unencumbered by patents, will provide solutions for the South's most pressing needs. On the contrary, a technological fix can never bring about equity.

Ultimately, however, nanotech will profoundly affect Africa's economy, regardless of its level of direct participation or its handling of intellectual property. It is crucial that commodity-dependent developing countries in Africa gain a fuller understanding of the direction and impacts of nanotechnology-induced technological transformations, and participate in determining how converging technologies could affect their futures. Innovative approaches are needed to monitor and assess the introduction of new technologies. Early-warning and early-listening strategies must be developed to keep pace with technological change. The recommendations put forward by the participants in the regional workshop in Côte d'Ivoire are a strong start. ETC Group has called for the creation of a broadly inclusive International Convention for the Evaluation of New Technologies (ICENT) at the United Nations.

- *Kathy Jo Wetter has worked in ETC Group's Carrboro, NC office as a researcher and as the Assistant to the Research Director. http://www.etcgroup.org/en/about/staff/kathy_jo_wetter*

NOTES

[1] Anon. 'Africa: Nineteen countries pledge to promote science,' University World News, Issue 139, 12 September 2010, http://www.universityworldnews.com/article.php?story=20100911201707964, with link to Summit Communiqué.

[2] Resolution on nanotechnologies and manufactured nanomaterials by participants in the African regional meeting on implementation of the Strategic Approach to International Chemicals Management, Abidjan, Côte D'Ivoire, 25 – 29 January 2010. The event was one in a series of regional awareness raising workshops, and was organized by the UN Institute for Training and Research (UNITAR) and the OECD.

[3] Opening Address by Mr. Mosibudi Mangena, Minister of Science and Technology at a Project Autek Progress Report Function, Cape Town International Convention Centre, 8 February 2005.

[4] The Principles are available online at http://www.nanoaction.org/nanoaction/page.cfm?id=223

[5] Sikoyo, G., Nyukuri, E., Wakhungu, J. (2006) Intellectual Property Protection in Africa: Status of Laws, Research and Policy Analysis in Ghana, Kenya, Nigeria, South Africa and Uganda. Ecopolicy Series. ACTS Press

[6] Hsinchun, C. et al., 'Trends in nanotechnology patents,' Nature Nanotechnology, Vol. 3, March 2008, pp. 123-125.

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Biopiracy, the intellectual property regime and livelihoods in Africa

Oduor Ong'wen

http://pambazuka.org/en/category/features/67523

African countries suffer the most from the rapid trend towards the privatisation of African plants, writes Oduor Ong'wen. Even though the patented plant materials often originate in Africa, once they are patented by multinational corporations it becomes virtually impossible to access them for the public good.

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Thousands of patents on African plants have been filed. These include brazzeine, a protein 500 times sweeter than sugar from a plant in Gabon; teff, the grain used in Ethiopia's flat 'injera' bread; and thaumatin, a natural sweetener from a plant in West Africa. The African soap berry, the Kunde Zulu cowpea and genetic material from the west African cocoa plant also make the list.

Increasingly, African countries are going to court over patents on their indigenous plants. The most celebrated case to date involves the Hoodia cactus from the Kalahari Desert. For centuries, the San people of southern Africa ate pieces of the cactus to stave off hunger and thirst. Analysing the cactus, the Council for Scientific and Industrial Research (CSIR) in South Africa found the molecule that curbs appetite and sold the rights to develop an anti-obesity drug to pharmaceutical company Pfizer. It could be worth billions.

The commercial development of naturally occurring biological materials, such as plant substances or genetic cell lines, by a technologically advanced country or transnational corporation without fair compensation to the peoples or nations of the developing world is one of the most serious cases of the externalisation of resources. The appropriation and patenting of nanotechnologies by corporations has more often than not worked against the best interests of humanity, especially in the less developed world.

BIOTECHNOLOGY AND INTELLECTUAL PROPERTY RIGHTS

Intellectual Property Rights (IPRs), as the term suggests, are meant to be rights to ideas and information, which are used in new inventions or processes. These rights enable the holder to exclude imitators from marketing such inventions or processes for a specified period of time. In exchange, the holder is required to disclose the formula or idea behind the product or process. Long before our time, Aristotle gave thought to ways of rewarding inventors. Although the origins of patents and other IPRs are not well known, in England the first patents can be traced back to the 15th century. Since then patent law has gone through several iterations, reflecting a continuous process of co-evolution with technology and society.

Globalization is leading to harmonised IPR regimes around the world, even in the face of stark contrasts in wealth between the highly developed and the least developed nations. The effect of IPRs is therefore to create a monopoly over commercial exploitation of an idea or information for a limited period.

While IPRs such as copyrights, patents, and trademarks are centuries old, the extension of IPRs to living beings and knowledge or technologies related to them is relatively recent. In 1930, the US Plant Patent Act was passed, which gave IPRs to asexually reproduced plant varieties. Several other countries subsequently extended such or other forms of protection to plant varieties, until in 1961 an International Convention for the Protection of New Varieties of Plants was signed. Most signatories were industrialised countries, who had also formed a Union for the Protection of New Varieties of Plants (UPOV). This treaty came into force in 1968.

Plant varieties or breeders' rights (PVRs/PBRs) give the right-holder limited regulatory powers over the marketing of 'their' varieties. Till recently, most countries allowed farmers and other breeders to be exempted from the provisions of such rights, as long as they did not indulge in branded commercial transactions of the varieties. Now, however, after an amendment in 1991, UPOV itself has tightened the monopolistic nature of PVRs/PBRs, and some countries have substantially removed the exemptions to farmers and breeders.

In addition, in many countries, patents with full monopolistic restrictions are now applicable to plant varieties, micro-organisms, and genetically modified animals. In 1972, the US Supreme Court ruled that microbiologist Ananda Chakrabarty's patent claim for a genetically engineered bacterial strain, was permissible. This legitimised the view that anything made by humans and not found in nature was patentable. Genetically altered animals, such as the infamous 'onco-mouse' of Harvard University (bred for cancer research), were also soon given patents.

Finally, several patent claims have been made, and some granted, on human genetic material, including on material that has hardly been altered from its natural state. Until very recently, these trends were restricted to isolated countries, which could not impose them on others. However, with the signing of the Trade Related Aspects of Intellectual Property Rights (TRIPs) agreement, this has changed. TRIPs requires that all signatory countries accept:

- Patenting of micro-organisms and 'microbiological processes'.
- Some 'effective' form of IPRs on plant varieties, either patents or some new version.

The agreement allows countries to exclude animals and plants per se from patentability. However, the provisions above have serious enough implications, for no longer are countries allowed to exclude patenting of life forms altogether (micro-organisms are be open for patenting).

BIOTECHNOLOGY, PATENTS AND BIODIVERSITY

Biodiversity underpins the economic, social, and cultural lives of billions of people globally, particularly indigenous communities. Needless to say, the preservation of biodiversity in the face of a variety of well-documented encroachments is more than an aesthetic or strictly environmental concern. Biodiversity also has a commercial attraction. Agriculture, pharmaceuticals, forestry, fisheries, and tourism, among others, are all major economic areas that are heavily dependent upon biodiversity, attracting the keen attention of industry researchers and investors. There is no gainsaying the fact that the management of biological resources has a profound effect, for better or worse, on biodiversity and the related ecological services that sustain life. Habitat destruction as a result of competing human needs has resulted in the loss of numerous species of flora and fauna, some known and others unknown. However, the recent unprecedented commercial interest can also play a role in preserving biodiversity. It can also irreparably destroy it.

The pertinent issues are embodied in both the Convention on Biodiversity (CBD), which seeks to conserve biodiversity and protect community rights, and the World Trade Organisation's (WTO) TRIPS agreement, which emphasises private property rights over community rights. There are substantive conflicts between the goals of TRIPS and those of the CBD, reflecting the lack of international consensus on these difficult questions of rights and equity.

In 2002 Hoodia Gordonii rewrote a global history of the exploitation of indigenous peoples. For thousands of years, the San people of Namibia have eaten the Hoodia cactus - called 'Xhoba' in local dialect - to stave off hunger and thirst on long hunting trips. Besides alleviating hunger and thirst, Xhoba also provides a state of alertness but without the jittery feeling produced by the current Western diet remedy of caffeine. Thus it is an ideal choice for long hunts where prey is tracked over hundreds of miles.

In mid 1990s, South African scientists at the Council for Scientific and Industrial Research (CSIR) began studying the properties of Xhoba. Lab animals fed the flesh of the cactus lost weight, but otherwise suffered no ill effects. It was during these tests that CSIR researchers discovered the plant contained a previously unknown molecule, which has since been christened P57. CSIR, which patented the compound in 1997, sold the license to Phytopharm

plc, which in 1998 subleased it and the marketing rights to US pharmaceutical giant Pfizer Corporation for US$32 million plus royalties from future sales. CSIR has been accused of selling something they did not own, although it claims to have the best interests of the San at heart. The San sued CSIR and will now get up to eight per cent of profits from a diet drug derived from the Hoodia, a plant they know well.

In the mid 1980s, Australian researchers led by Dr. John Frisch identified the need for the introduction of tropically adapted breeds that were unrelated to Brahman, and that would complement that breed's attributes. They turned to Africa. After careful evaluation, the most suitable candidates were found to be the Boran from Kenya and the Tuli from Zimbabwe. The most important factors in their favour were productivity, high fertility and adaptability to hotter regions. Both breeds have long histories as beef producers in a harsh environment and this fact, along with their extreme genetic differences from previously introduced breeds, lent weight to the project.

The Tuli has many prized attributes, including high fertility, superior beef quality and docile temperament. It also has proven resistance to environmental stresses. It is native to Zimbabwe and Zambia. In 1987, a joint venture between the Commonwealth Scientific and Industrial Research Organisation (CSIRO) – an Australian government agency – and the Boran and Tuli Producers Consortium, a consortium of Australian producers, surreptitiously collected Tuli and Boran embryos from Zimbabwe and Zambia respectively. The embryos were quietly taken to Cocos Island in August 1988 where they were implanted into surrogate cows. In March 1990, live calves parading as 'Aussies' - landed in Australia. Since then the Tuli has largely been used as a crossbreed in Australia's beef industry, estimated to be valued at US$6.47 billion.[1]

Increased earnings for the Australian livestock industry attributable to the introduction of the Tuli could be estimated at A$2 billion annually.[2] The Australian consortium is also selling the embryos on the Australian and world markets. In May of 1994, the second Boran and Tuli pure-bred embryo sale was held in Australia. The Tuli embryos were so much in demand that a new world-record price of $5,500 was set.

But Australia is not just selling the crossbreds. RAFI, a Canadian NGO, reveals that in 1994 during a sale of pure-bred two to three year old Tuli bulls offered for sale in Australia, the Consortium also revealed that: 'Semen and embryo sales have exceeded expectations with heavy demand from the Americas.' This is a pointer to the fact that the Australians are selling pure-bred embryos from Zimbabwe to countries in the Americas and appropriating all the proceeds.

In 2003, the Kenyan Government was locked in a less publicised altercation with one Jonathan Leakey over exports of products of a tree known as 'mweri' in the Gikuyu language. Mweri, otherwise known as the African Plum or Pygeum ('Prunus Africana' in the scientific world), is a multipurpose tree. The dark brown bark of the tree is used for treating many diseases, among them genito-urinary complications, allergies, inflammations, kidney disease, malaria, stomach ache and fever. It has also been used in the treatment of benign prostatic hyperplasia (BPH) and 'old man's disease'.

Despite its well known indigenous origins, Mweri bark extract is patented by a French entrepreneur Dr. Jacques Debat. About 300 tons of the bark extract is exported every year. In Kenya, the price of mweri bark is US$2 per kilogramme, while capsules containing the bark extract are marketed in Europe for about US$8 for a 15-capsule packet. A kilo of bark, on conservative estimates, produces 100 such packets. Thus, the French pay Kenyans US$2 to earn US$800. Moreover, were Kenya to develop capacity to manufacture drugs from this bark, it would be required to pay hefty royalties to Jacques Debat, the patent holder.

Both the Nairobi-based World Agroforestry Centre (ICRAF) and Washington-based Future Harvest estimate that the world market for Prunus products currently stands at US$220 million annually. At least four European companies have interests in the tree. The product is 'bought' for a song in Africa and sold exorbitantly as the final product.

NANOTECH AND AGRI-BIODIVERSITY

Since the dawn of agriculture more than 10 millennia ago, humans have nurtured plants and animals to provide their main sources of food. Through diligent selection of the traits, tastes and

textures to make good food, their endeavours have resulted in countless diversity of genetic resources, varieties, breeds and sub-species of the relatively few plants and animals humans use for food and agriculture - agricultural biodiversity.[3] Agricultural biodiversity also includes the diversity of species that support production such as soil biota, pollinators and predators.

These diverse varieties, breeds and systems underpin food security and provide insurance against future threats, adversity and ecological changes. Agricultural biodiversity is therefore the first link in the food chain, developed and safeguarded by indigenous peoples, and women and men farmers, forest dwellers, livestock keepers and fisherfolk throughout the world. It has developed as a result of the free-flow of genetic resources between food producers.

This agricultural biodiversity is now under threat - thanks to human advancement in science and technology. Animal breeds, plant varieties and the genetic resources they contain are being eroded at an alarming rate. It is estimated that more than 90 per cent of crop varieties have been lost from farmers' fields in the past century and livestock breeds are disappearing at the rate of five per cent per year. Soil biodiversity, including microbial diversity, and the diversity of pollinators and predators are also in grave danger.

Urgent actions are needed to reverse these trends. There is also an urgently felt need to initiate and promote actions to protect the genetic resources stored in ex situ public gene banks, which are often poorly maintained. Threats to these resources, both in situ and ex situ, also include pollution by genetically modified material and the increasing use of IPRs to claim sole ownership over varieties, breeds and genes, which thereby restricts access for farmers and other food producers. This loss of diversity is accelerating the slide of food insecurity that today sends close to two billion people to bed hungry.

Africa's most important and capable innovators are her small-scale farmers. In the Sahel, for example, farmers produce two to 10 times more animal protein per square kilometre than commercial farmers in Australia and the USA.[4]The innovation of African farmers is particularly important when it comes to plant breeding. It is estimated that African farmers depend on seeds cultivated within their own communities for as much as 90 per cent of their seed needs. Most of these seed breeders are women, as they produce 70 per cent of the food for use in the region. They meticulously select those seeds that respond to various soil types and growing conditions and that carry particular traits such as stability, disease resistance, drought tolerance, palatability, and storage quality.

Formal sector breeders, from the private and public sectors, remain relatively insignificant. In the Machakos area of Kenya, for example, commercial seed accounts for less than two per cent of the cowpea and pigeonpea seed used by the average farmer while neighbours and local markets supply more than 17 per cent.[5] In the southern African region, on-farm seed multiplication and farmer-saved seed constitutes 95 - 100 per cent of the seed used for sorghum, millet, food legumes, roots and tuber crops. In Zambia, 95 per cent of the millet crop is grown from farmers' seed. Even with a commercial crop like maize, small farmers are typically the main suppliers of seed. In Malawi, despite years of effort by the state seed company and private seed companies, hybrid maize covers no more than 30 per cent of the smallholder area. Small farmers constitute by far the largest sector of seed breeders in Africa and they have cultivated the abundant diversity that sustains the continent's food security.[6]

INNOVATION BY CORPORATE BREEDERS

Private sector breeding is mainly driven by biotechnology. Plant biotechnology took root in the 1980s with the first commercial releases of transgenic crops. Along with commercialisation came an increase in IPR protection. However, issues have been raised with regard to this development. Some are related to cultural values such as ancestral farmers' rights, traditional knowledge or food sovereignty, while others address such ethical issues as the patentability of life forms. What makes many people feel uncomfortable about IPR in agricultural biotech is that agriculture was perceived until now as 'the last stronghold of the free'. Farmers have had the freedom to replant their own seed and to sell it to other farmers since the dawn of agriculture.

With the exception of a few African-based seed companies, the private seed sector in Africa is dominated by a handful of transnational corporations (TNCs), as it is in the rest of the world. Just six TNCs control over 30 per cent of the global seed market. The same six

corporations control over 70 per cent of the global pesticide market and over 98 per cent of the global market for patented genetically modified crops. The driving vision behind this integration of seeds, pesticides, and biotechnology industries is to develop transgenic seeds that are programmed to grow according to specification. Companies have used genetic engineering to develop crops that do not reproduce in subsequent generations, crops with resistance to their proprietary herbicides, and crops that will not grow properly unless sprayed with a patented chemical concoction. Although the research and development costs are high, the companies believe that they can recover these expenditures through monopoly rights and royalties.

Until recently, the transnational seed industry had little interest in Africa. Outside South Africa and Zimbabwe, the sub-Saharan seed market is worth only US$200 million – a paltry amount for these big companies. But with the advent of genetic engineering, these companies are beginning to take a more active interest in the African seed market. Industry analysts estimate that the introduction of genetically modified crops can increase the value of seed markets by 50 per cent, making even the relatively small African market quite valuable.

The multinational seed industry's expansion into Africa has come with intense pressure for developing IPRs. While the industry portrays itself as a benevolent source of technologies essential to African food security, such technologies come at a great cost. As part of their plans to expand markets in Africa, the seed TNCs have made it clear that they expect monopoly rights over their seeds. Peter Pickering, the manager of Pioneer South Africa, sums up the view of the multinational seed industry in Africa: 'We will not operate in any country that does not have IPRs.'[7]

ENTER BIOMEDICINE

In the medical sphere, nanotechnology has had a tremendous contribution to the manufacture of drugs that have been used to treat diseases and conditions whose cure has eluded medical practitioners. However, as with other bio-industrial innovations this benefit to humanity has not been equitably shared. Below are some highlights.

While many diabetic patients globally can thank a microbe from Kenya's Lake Ruiru for a drug that improves their lives, the Kenyan state or people have nothing to show for it. Type II diabetics frequently take acarbose, a drug commercialised by trade names Precose (in the US and Canada) and Glucobay (in Europe and elsewhere). In 2001, a group of scientists from the German pharmaceutical giant, Bayer, and German academics published an article in the Journal of Bacteriology, that a bacteria strain named SE 50 was being used to manufacture the diabetic drug, acarbose.[8] Acarbose is an 'alpha glucosidase inhibitor', meaning that it works by regulating absorption of glucose into the bloodstream, thereby preventing potentially dangerous spikes of glucose. In the article, they described manufacture of acarbose and related compounds.

Acarbose is widely sold by Bayer. In 2004, Bayer sales of acarbose totaled US$379 million.[9] How is it made? In 1995, five years after Glucobay was commercialised in Europe and one year before it was released in North America, Bayer filed for patent on a new way to manufacture the product. The patent application, which was subsequently issued in Europe, the US, and Australia, revealed that an Actinoplanes sp. bacteria strain called SE 50 had unique genes that enable the biosynthesis of acarbose in fermentors.[10] The strain comes from Kenya's Lake Ruiru.

Kenya is greatly challenged in meeting her obligations to provide healthcare to her 39-million people. In the 2010/2011 financial year, Kenya's medical services ministry was allocated only US$7.33 per person. However, there is no evidence of a benefit-sharing agreement between Bayer and the Kenyan people related to this extremely valuable microbe.

In the early 1970s, a Streptomyces sample, which a Canadian Medical Research Expedition collected at Easter Island (Rapa Nui) yielded an immunosuppressive drug called rapamycin, which is used in medicine to prevent the rejection of organ transplants. The discovery of rapamycin sparked a search for other Streptomyces that produce similar compounds.

SmithKline Beecham (now Glaxo SmithKline) has claimed ownership of a compound from a Streptomyces strain that, according to its patent, 'was isolated from a termite hill at Abuke,

Gambia'. [11] The strain produces a rapamycin-related compound called 29-desmethylrapamycin and, according to the patent, it is useful both as an anti-fungal and as an immunosuppressant. It is unclear what research and development has been conducted by Glaxo on 29-desmethylrapamycin. The 2001 patent application indicates recent interest in the candidate drug. Generally, rapamycin and related compounds remain a subject of considerable scientific interest. However, there is no documented information about any benefit sharing arrangements between SmithKline Beecham and Gambia or between Glaxo and Gambia.

Impotency drugs have become a major hit for pharmaceuticals lately. In 2004, global sales of Viagra and other prescription treatments for erectile dysfunction (ED) topped US$2.5 billion. But according to the New York Times, sales have dipped in recent years. One of the main reasons why, according to the Times, is consumer doubt about drug companies. It says that 'many patients [are] angry about drug prices and worried that companies are playing down side-effects…'.[12]

Enter Canada's Option Biotech. The company, based in Montreal, has patented the seeds of Aframomum stipulatum, obtained from the Congo, for use in an anti-impotency drug it calls 'Biovigora'. [13] Option Biotech has extensively tried to exploit the side effect suspicions about Viagra reported by the New York Times, claiming that, 'Biovigora is not a chemical medication' and further noting that it 'was used centuries ago [and still is used] by certain African tribes without unfavourable side effects'. [sic] [14]

While Biovigora may never rival Viagra, Cialis and other ED drugs as a multi-billion dollar moneymaker, it is a patented Option Biotech property sold at more than 750 stores across Canada. A bottle of 24 capsules costs about US$30. Available information from Option Biotech does not show any benefit sharing agreement with the Congo or any other country where A. stipulatum is traditionally used.

CONCLUSION

Genetic technologies move knowledge from the public to the private domain. Therefore, increasing amounts of know-how, which would have been available freely for further innovation and product development, is either unavailable, if exclusive licenses were granted, or must be purchased. While research and development in all countries is affected by these changes, African countries suffer most, for four reasons. First, located in the periphery of research and development networks, their chance to obtain exclusive licenses first is very low. Second, TNCs have long entered the so-called 'knowledge economy' by creating huge patent portfolios for the sale and exchange of licenses and by creating knowledge monopolies and cross-licensing networks in which emerging industries in Africa can hardly participate. Third, while identifying and purchasing the necessary licenses is difficult and costly for any industry, African countries are particularly handicapped because they frequently have not the same informational and financial resources. Lastly, the increasing costs of patent filings and litigations required for new product developments pose a growing barrier to any research and development efforts in poor countries.

The appropriation of elements of this collective knowledge of societies into proprietary knowledge for the commercial profit of a few is one of the concerns of African communities. An urgent action is needed to protect these fragile knowledge systems through national policies and international understanding linked to IPR. The developed world wants to hear none of this.

- *Oduor Ong'wen is the Kenya country director for the Southern and Eastern African Trade Information and Negotiations Institute (SEATINI).*

NOTES

[1] ABARE, Australian Commodity Statistics, 2008

[2] Ibid.

[3] Agricultural Biodiversity comprises the diversity of genetic resources, varieties, breeds, sub-species and species of crops, livestock, forestry, fisheries and micro-organisms used for food, fodder, fibre, fuel and pharmaceuticals. Agricultural biodiversity results from the interaction between the environment, genetic resources and the land and water resources management systems and practices used by culturally diverse peoples, for food production.

[4] http://www.grain.org/briefings/?id=3#ref
[5] Ibid.
[6] Ibid.
[7] Ibid.
[8] J Bacteriol. 2001 August; 183(15): 4484–4492.
[9] Bayer 2004 Annual Report, http://www.bayer.com/annualreport_2004_id0109
[10] US Patent 5,753,501, EP0730029 (B1), and AU706116 (B2).
[11] US Patent 6,358.969, issued 19 March 2002. Also patented in Europe (EP0572454) and Japan (JP2001226380).
[12] New York Times, December 5, 2005.
[13] US Patent 5,879,682, issued 9 March 1999.
[14] See "Is Biovigora safe?", at the Option Biotech website, http://www.optionbiotech.com/en/securitaire.htm

The new biomassters and their assault on livelihoods

Jim Thomas

http://pambazuka.org/en/category/features/67535

Watch out for the new biomass economy driven by large biotech, chemical, forestry and agribusiness companies, says Jim Thomas. The new biomassters are on a global looting spree of the world's natural resources to feed the consumption and capital accumulation of the industrialised North.

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Around the world, corporate and government strategies concerning climate change, energy, agriculture, technology and materials production are increasingly converging around one telling term: biomass.

Biomass encompasses over 230 billion tonnes of living things [1] that the earth produces every year such as trees, bushes, grasses, algae, crops and microbes. This annual bounty, known as the earth's 'primary production', is most abundantly found in the global South - in tropical oceans, forests and fast growing grasslands. It sustains the livelihoods, cultures and basic needs of most of the world's inhabitants. So far, human beings use only one quarter of land-based biomass for basic needs and industrial production, and hardly any oceanic biomass, leaving over 90 per cent of the planet's full biomass production still yet to be commoditised by industrial society.

But now, thanks to technological changes, particularly in the fields of nanotechnology and synthetic biology, this stock of annual biomass is being targeted by industry as a source of living 'green' carbon to replace or supplement the supplies of 'black' fossil carbons of oil, coal and gas that currently underpin northern industrial economies. From generating electricity to producing fuels, fertilisers and chemicals, shifts are already underway to purportedly elevate the importance of biomass as a critical component in the global industrial economy.

However, what is usually presented as a benign and beneficial switch from black carbon to green carbon is in fact a red hot resource grab (from South to North) in an attempt to capture biomass as a new source of wealth. Plundering the biomass of the South to cheaply run the industrial economies of the North is a deeply unjust aspect of 21st century imperialism that will almost certainly deepen inequality, and exacerbate poverty, hunger, disease and other social problems. Liquidating fragile ecosystems for their carbon and sugar stocks is also a

suicidal move on an already overstressed planet. Far from embracing the false promises of a new clean and green bio-economy, we should be extremely wary of the new biomassters and their inflated claims as they launch their latest assault on land, livelihoods and our living world.

HERE COMES THE BIO-ECONOMY.

It is now over two years since a sharp escalation in food prices created a crisis that broke into front-page headlines around the world. Suddenly, 'bio-fuels' was a topic of intense controversy and opposition among rural communities, particularly in the global South. The headlines at the time that focused on industry's enthusiasm for palm oil and corn ethanol were actually only the visible tip of a much deeper transition and trajectory in industrial policy that is still gaining momentum. That new trajectory, variously called the 'new bio-economy' or the bio-based economy, is gathering speed, political clout and many billions of dollars in public subsidies and private investment. Whether it delivers on its promises, the payload of the bio-economy carries even more threat to people, livelihoods and life on the planet than that portended by the ethanol rush.

Bio-economy describes the idea of an industrial order that relies on biological materials, processes and services. Since many existing parts of the global economy are already biologically based (agriculture, fishing, forestry), proponents often talk of a 'new bio-economy' to describe their particular re-invention of the global economy - one that more closely enmeshes neoliberal economies and financing mechanisms with new biological technologies and modes of production.

The rhetoric of the 'new' bio-economy, however imprecise, is woven throughout current agendas and headlines, wrapped in the post-millennial buzzwords of the 'green economy', 'clean tech' and 'clean development' that permeate environmental, industrial and development policies. When described in these contexts the new bio-economy appears positively: 'clean', 'green', 'fair', 'profitable', 'modern' and 'renewable'.

But an assault on older 'bio-based' economies is hiding in the rhetoric. Standing in the way of a new bio-economy are the billions of people who have preexisting claims on the land and coastal waters where biomass grows. Their knowledge systems are interdependent with a complex array of organisms that sustain us all: the biomass that has nurtured and been nurtured through millennia. Such communities co-exist in a traditional bio-economy, using seeds for food production, firewood and animals for energy, and harnessing local biodiversity for material and medicinal needs.

Indeed, those diverse biological organisms that are now recast as 'biomass' are not merely an inert resource for livelihoods and survival, but are interdependent with the communities that nurture them. To those who have found themselves on the receiving end of new industrial waves before, the story of a new bio-economy is all too familiar. It is yet another heist on the commons that will displace them and destroy their homes and livelihoods. Despite promises of 'development', human progress, and environmental rescue, the 'new' bio-economy is in fact another strategy to advance the corporate interests of the North.

The new bio-economy as currently planned by forestry, agribusiness biotech, and energy and chemical firms furthers the ongoing transformation and enclosure of the natural world by appropriating plant matter for transformation into industrial commodities so they perform as industrial factories, and redefining and refitting ecosystems as if they were just another set of industrial support 'services'.

The same transnational companies who fostered dependence on the petroleum economy during the 20th century are now establishing themselves as the new biomassters. If that coup is completed, many familiar corporate players will still be sitting at the head of the global economic order. But whether their cars run on biofuel, their computers run on bioelectricity and their credit cards are made of bioplastic, they will still have achieved a controlling clutch on the natural systems upon which we all depend.

WHAT IS BEING SWITCHED?

'Many think of biomass mainly as a source for liquid fuel products such as ethanol and biodiesel. But biomass can also be converted to a multitude of products we use every day. In

fact, there are very few products that are made today from a petroleum base, including paints, inks, adhesives, plastics and other value-added products, that cannot be produced from biomass.' - David K. Graman, US acting under-secretary to energy, science and environment for George W. Bush. [2]

A simple way to understand the ambition of the new biomass economy is to glance at a list of products and services currently being produced with fossil fuels. Then, imagine each sector switching its feedstock from fossilised to living plant matter.

Transport fuels: Currently an estimated 70 per cent of petroleum ends up as liquid fuels for cars, trucks, airplanes and heating. Biofuels such as ethanol and biodiesel mark just the beginning of converting the liquid fuel market to biomass. A next generation of hydrocarbon biofuels directly mimics gasoline and jet fuel.

Electricity: Coal, natural gas and petroleum are currently responsible for 67 per cent of global electricity production (International Energy Agency, Key World Energy Statistics, 2008). However, co-firing of coal with biomass is on the increase and there is a growing move in many industrial cities to burn woodchips, vegetable oils and municipal waste as the fuel for electricity production. Meanwhile, corporate interests are investigating ways to use nano cellulose and synthetic bacteria to make electric current from living cells, turning biomass to electricity without the need for turbines.

Chemicals and plastics: Currently around 10 per cent of global petroleum reserves are converted into plastics and petrochemicals. However, to hedge against rising petroleum prices, large chemical companies such as Du Pont are setting ambitious targets to switch to supposedly 'renewable' biomass feedstocks such as sugar for the production of bioplastics, textiles, fine and bulk chemicals.

Fertiliser: Global fertiliser production via the Haber Bosch process is an intensive user of natural gas. Proponents of biochar (carbonised biomass) claim that they have a bio-based replacement for improving soil fertility that could be produced on an industrial scale.

WHAT IS BIOMASS?

Strictly speaking, biomass is a measure of weight used in the science of ecology. It refers to the total mass of all living things (organic matter) found in a particular location.[3] Fish, trees, animals, bacteria and even humans are all biomass. However, more recently, the term is shorthand for non-fossilised biological material, particularly plant material that can be used as a feedstock for fuel or for industrial chemical production.[4]

According to the US National Renewable Energy Laboratory, 'Biomass includes organic matter available on a renewable basis. Biomass includes forest and mill residues, agricultural crops, and wastes, wood and wood wastes, vegetable oils, animal wastes, livestock operation residues, aquatic plants, fast growing trees and plants, and municipal and industrial waste.'

On closer examination, the latter includes tires, sewage sludge, plastics, treated lumber, painted construction materials and demolition debris. Even industrial animal manures, offal from slaughterhouse operations, incinerated cows and landfill gases all seem to fit the bill for biomass.

Plants have been a source of fuel and material production for millennia but the new use of the term 'biomass' marks a specific industrial shift in humanity's relationship with plants. Unlike the term 'plants', which opens to a diverse taxonomic world of various species and multiple varieties, the term biomass treats all organic matter as though it were the same undifferentiated 'plant-stuff', a particularly industrial view of life. Recast as biomass, plants are semantically reduced to their common denominators so that, for example, grasslands and forests are redefined commercially as sources of cellulose and carbon. In this way, biomass operates as a profoundly reductionist and anti-ecological term, treating plant matter as though it were a homogenous bulk commodity. The use of the term biomass to describe living stuff is often a red flag that industrial interests are at play.

CELLULOSE - THE WONDER SUGAR

If you were to scrape off the thin layer of living material on earth and boil it down to its basic chemicals, most of what you would get is one green sugar called cellulose. It is found in all

plants as well as some microbes as long chains of glucose in a fibrous or occasionally crystalline structure.[4] This common molecular component is rapidly becoming the darling of industrial attention for four reasons.

Abundance: The earth makes about 180 billion tonnes of cellulose every year.

Energy: Cellulose is the principle source of energy for animal nutrition and for heat when plant materials are burned.

Flexibility: Many of the early plastics were based on plant cellulose, which has the chemical advantage that it can be modified and used in many different ways to produce new polymers, coatings, oils and combustibles.[5] Recent work has also shown that cellulose nano fibres can be modified to exhibit previously unknown properties.[6]

Cellulose is not (necessarily) food: Vegetables and grains have a large cellulose component. And so do the non-food components of plants. Biofuel proponents argue that the cellulose found in plant stalks and leaves can be appropriated for industrial use while leaving the fruit or grains in the food supply.

But while cellulose is theoretically abundant, one significant obstacle to its industrial exploitation has been the difficulty of separating it from other plant components. In most instances cellulose is bound into a matrix of compounds known as lignocellulose, which in turn is composed of lignin (a hard, carbon-rich substance) and hemicellulose (a mixture of other sugars).

Breaking cellulose away from lignin and reducing it to simpler sugars requires either an intense heat process or the application of strong chemicals or enzymes, such as are found in the guts of cows and termites. The task of industrially separating cellulose has now become one of the most active areas of research in energy and materials science. [7]

GETTING ELEMENTAL: 'IT'S THE CARBON, STUPID.'

In an era of increasingly constrained oil supply, commercial excitement about biomass components such as cellulose can be explained by the industrial hunt for new 'unconventional' sources of carbon. Accounting of global carbon reserves by energy companies such as BP reveals that the billions of tonnes of carbon locked up in global biomass stocks far outstrips known oil and natural gas reserves and rivals coal deposits. Global stocks of carbon in all fossil fuels are 818 billion tonnes while global biomass holds about 560 billion tonnes.

GETTING GEOPOLITICAL: IT'S ALL IN THE SOUTH

'If you look at a picture of the globe… it's pretty easy to see where the green parts are, and those are the places where one would perhaps optimally grow feedstocks.' - Steve Koonin, US department of energy under-secretary for science and former head of research for BP. [8]

While from space the planet may look green and rich with biomass, the dirty little secret of the coming biomass economy is that, just like the fossil carbon reserves of oil and gas, the living carbon reserves of global biomass aren't equally distributed. Worldwide, land-based vegetation stores an estimated 500 billion tonnes of carbon. However 86 per cent of that (430 billion tonnes) is stored in the tropics and sub-tropics, while boreal and temperate eco-regions store only 34 billion tonnes and 33 billion tonnes, respectively. Correspondingly it is in the tropics where biomass also replenishes the most quickly, and where marine biomass, principally phytoplankton, is most productive. Exercising control over this global biomass therefore requires gaining ownership or political control over land and seas in the tropics.

FROM CRACKING OIL TO HACKING PLANTS

When advocates of the biomass economy talk of a switch from a (fossil based) hydrocarbon economy to a (plant based) carbohydrate economy they like to point out that we have been there before.

Chemically speaking, the difference between a hydrocarbon and a carbohydrate comes down to a few oxygen atoms. Carbohydrates are sugars of carbon, hydrogen and oxygen. A hydrocarbon by contrast is any molecule composed of only hydrogen and carbon and is classified as a mineral.

Historically, and still in local and indigenous communities today, it is plant carbohydrates that hold the upper hand in meeting human needs. As recently as 1820, Americans used two tonnes of vegetables for every ton of minerals as the raw material for dyes, chemicals, paints, inks, solvents and even energy. By 1920 that ratio had reversed, and by the mid 1970s Americans were consuming eight tonnes of minerals for every ton of plant carbohydrate.[9] Enabling that last switch were two factors:

- The higher energy density of fossil fuels. Half a tonne of coal contains the same amount of energy as two tonnes of green wood, and so coal, and later petroleum, took over as the preferred fuel for the industrial revolution.[10]
- The success of petro-chemistry. The first synthetic chemists learned to transform coal tar into profitable dyes and, eventually, to 'crack' petroleum into many molecules which could be refined into fuels, waxes, explosives, pesticides, plastics, paint, pharmaceuticals, cosmetics, textiles, rubber, gasoline, asphalt and much more.[11]

Today, however, worries over peak oil and volatile markets, interest in the money-making potential of carbon markets and the development of new technologies are all helping to drive a switch back. In particular, just as 19th century developments in synthetic chemistry made possible the hydrocarbon economy, so innovation in synthetic biology today is allowing companies to retrofit that economy for carbohydrate feedstocks.

SELLING THE SWITCH

ETC Group's analysis suggests that what is really driving investment in the new bioeconomy is good old capitalist opportunism. Nonetheless, advocates of the biomass economy have plenty of new clothes with which to dress up their old-style imperialist leanings. Below are just a few of the agendas commonly used to justify the new grab on biomass.

1. Sugar dreams: the carbohydrate economy

The term 'carbohydrate economy' was originally coined by activists from the Institute for Local Self Reliance (ILSR) in the US and describes a vision of making chemicals and industrial materials from plant materials instead of petroleum.[12] Their interest in bio-based (that is, plant based) materials is driven by the hope that such materials can be designed to more easily biodegrade in the environment, unlike petroleum-based plastics.

2. Green dreams: renewable resources and the hydrogen economy

Biomass has consistently been included in descriptions and definitions of what constitutes a renewable resource as plants and trees can theoretically grow back after harvest. Biomass is also occasionally included as a form of solar energy since plants harvest energy from the sun. Biomass is also regarded as a key resource for developing another 'green' vision, the notion of a 'hydrogen economy', as hydrogen can also be extracted from plants.

3. Cool dreams: the carbon neutral economy

The contemporary urgency to address the problem of human-induced climate change has put biomass at the centre. Because plants sequester carbon dioxide from the atmosphere, policymakers have regarded plant matter as a 'carbon neutral' feedstock for energy production, arguing that any emissions released in bio-energy production are re-sequestered when replanting. In 2005, The International Energy Authority (IEA) reckoned that biomass-derived energy represented 78 per cent of global 'renewable' energy production.

4. Patriot dreams: energy independence

In America at least, the idea of a home-grown bioeconomy as a patriotic bulwark against terrorism and oil wars has enormous power. By reducing dependence on foreign oil, biofuels and bioplastics are thought to strengthen national sovereignty while withdrawing funds from extremist petro-states. This notion cuts across political lines, tapping into anti-war sentiment on the left and jingoism and security fears on the right.

5. Leapfrog dreams: clean development and the 'green jobs' movement

How can you help poorer economies 'develop' while avoiding dirty industrial development? That's the supposed paradox that advocates of 'environmental leapfrogging' set out to

square by using new technologies to create cleaner, greener development. Meanwhile, a recent 'green jobs' movement in the industrial North argues that the green technologies of the bioeconomy are perfect fodder for rescuing their stagnating industrial workforce.

6. Geek dreams: converging technologies and 'cleantech'

'Converging technologies' refers to the way in which seemingly distinct technological fields such as nanotechnology, biotechnology and robotics combine to create a powerful hybrid technology platform. In European science policy circles it is proposed that converging technologies could be directed to 'sustainability' applications such as bioenergy and 'climate technologies' to drive economic growth.[13] Senior scientists and venture capitalists in the US have dubbed this next profitable wave of environmental technologies 'clean tech' - a multi-billion dollar investment category that covers biofuels, bioenergy, bioplastics, and most bio-based materials in general, as well as the underlying enabling technologies such as synthetic biology and nanotechnology.

A GRAB NOT A SWITCH

Attributing the recent rise of the bioeconomy and burgeoning interest in biomass to simply green-minded or patriotic consciousness is to wrongly assume that the captains of large corporations and OECD economies are driven by humanitarian or environmental concerns. As with any previous industrial transition, what is behind the dash to biomass is not high ideals but the calculated interest of the corporate bottom line. Hidden in the woolly promises of 'carbon neutrality' and 'energy independence' is the lucrative promise of a vast new resource grab, as hundreds of billions of tonnes of undifferentiated plant matter become a new commodity. Far from transforming to a new economy, the biomass transition is simply a retooling of the same old economy of production, consumption, capital accumulation, and exploitation - with a new source of carbon that is being plundered to keep the industrial machines going.

In economic terms, the effect of turning cellulose and other sugars into a viable feedstock for fuels, chemicals and electricity is to imbue previously worthless grasses, seaweed and branches with a new commercial value. More significantly, any land or water body that can sustain plants acquires an enhanced value as a potential source of biomass, a fact that is already accelerating the global land grab that was originally undertaken to secure food supplies. If the biomass coup is successful, then the technologies of biomass transformation (particularly nanotech, biotech and synthetic biology) become valuable keys to extracting that new source of value, elevating the industries that control them.

With biomass touted as the new feedstock of a global post-petroleum economy, it is essential to ask the question: Does sufficient biomass even exist on the planet to achieve such an historic transition? At the historical point when global society last relied on plant matter as the primary source for its energy needs (in the late 1890's) world consumption of energy is estimated to have been 600 GigaWatts.[14] Today's estimates of world energy consumption range between 12 and 16 terrawatts - at least a twenty fold increase in demand over the previous biomass economy. Today that energy output is met almost entirely from fossil fuels, with a sliver of nuclear and hydro and biomass power in the mix (around 1.5 terawatts).[15] According to MIT energy economist Daniel Nocera, global energy use is further projected to grow an extra 19 terrawatts by 2050.[16]

A review of 16 global assessments of biomass availability notes: 'In the most optimistic scenarios, bioenergy could provide more than two times the current global energy demand, without competing with food production, forest protection efforts and biodiversity. In the least favorable scenarios, however, bioenergy could supply only a fraction of current energy use, perhaps even less than it provides today.'

Why such a huge range of estimates? The short answer is that some energy economists have simply failed to see the forest for the trees. Living biomass stocks cannot be counted in the same manner as fossilised oil and coal reserves. The economic value of harvested plants as industrial raw materials for food, feed, fibre, chemicals and fuel must be weighed against the vital ecological value of living plants as the foundation of all (rapidly deteriorating) ecosystems upon which our existence depends.

Indeed, when taking into consideration the absolutely critical need to preserve and even restore and enhance (plant-based) ecosystems, the job of budgeting all global biomass takes on a whole different character and the notion that there is any spare biomass whatsoever quickly falls apart.

Earth systems studies that attempt to measure the current health and resiliency of ecosystems and biodiversity offer stark warnings. The 2005 Millenium Ecosystem Assessment concluded that 60 per cent of the world's ecosystems are already in decline. The 'Living Planet Index', a measure of trends in biodiversity based on tracking 1,313 terrestrial, marine and freshwater species, reports that between 1970 and 2003, the index dropped 30 per cent, meaning ecosystems are generally in steep decline. The World Conservation Union has reported that overall, nearly 40 per cent of species evaluated are threatened with extinction. Current extinction rates are now over 1,000 times higher than background rates typical over the earth's history. Land use change, including deforestation and agricultural expansion, is regarded as the leading cause. Meanwhile it is estimated that at least a further 10 to 20 per cent of remaining forest and grassland will be converted to human uses by 2050. In addition, the UN estimates that two thirds of the countries in the world are affected by soil desertification, affecting more than four billion hectares of agricultural land, which supports over a billion people.

Especially telling are the metrics from another measure, called the Ecological Footprint, developed by the Global Footprint Network.[17] This measures human (over)use of the earth's biocapacity. The term 'biocapacity' measures the amount of cropland, pasture, forest and fisheries that is sustainably available for human use after accounting for what nature requires for ecological resilience. Overuse of biocapacity damages ecosystems and drives them into decline. It turns out that since the late 1980's, we have been in 'earth overshoot' with an industrial footprint larger than biocapacity. In fact since around 2003 we have reached a shocking 25 per cent overshoot, 'turning resources into waste faster than nature can turn waste back into resources'. If we keep it up, on current trajectory, we will be using twice the earth's biocapacity by 2050 - an untenable proposition.

As industrial policies associated with the biomass economy press on, conservationists are fearing disastrous outcomes. For example in the Amazon Basin, expansion of sugar cane and soya (in part for biofuels), is driving deforestation to the point where a massive dieback is considered likely. [18] The potential impact of such an Amazon dieback would be a global catastrophe since this forest regulates rainfall and weather patterns over much of South America up through the US Midwest and even as far as South Africa.[19]

What such possibly rapid dramatic impacts tell us is that measurement of ecosystem 'services' and biocapacity, while useful warnings, give us an incomplete picture of the real limits to biomass extraction, providing an unrealistically linear view of how ecosystems function and how they can collapse. Just as the threat of an Amazon dieback can not be measured from a global 'biocapacity' index so there are likely many ecological 'tipping points' which once crossed could push ecosystem resilience into collapse with devastating non-linear effects. We may never see some of these tipping points coming until it is too late.

It is no coincidence that the most dogged proponents of the biomass economy in the past decade have not been environmental NGOs, but large biotech, chemical, forestry and agribusiness companies who hope to expand and consolidate their economic power. These new 'biomassters' are executing a large scale grab on plants, land and livelihoods, making the biomass economy only the latest version of resource extraction from the global South to feed the consumption and capital accumulation of the industrialised North - at the expense of the lives and livelihoods of the majority of the Earth's people, and the future of life itself on the planet.

- *Jim Thomas is a research programme manager and writer for the ETC Group. His background is in communications, writing on emerging technologies and international campaigning. http://www.etcgroup.org/en/about/staff/jim_thomas*

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Synthetic biology in Africa: time to pay attention

Gareth Jones and Mariam Mayet

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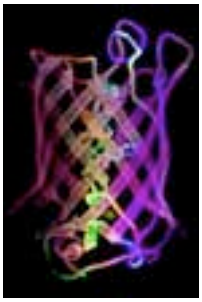

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Synthetic biology – the design and engineering of biological components that can be used to construct a variety of biological systems – is a hot scientific topic. But with enormous implications for human health, Gareth Jones and Mariam Mayet ask when the very real ethical concerns associated with the technology will be debated.

'…[synthetic biology] is broadly understood as the deliberate design of novel biological systems and organisms that draws on principles elucidated by biologists, chemists, physicists and engineers…in essence it is about redesigning life.' [1]

The emerging field of synthetic biology has been making waves in the global scientific community recently. Earlier this year, Craig Venter, the doyen of the genomics world, claimed that his company had created the world's first self-reproducing organism.

Scientists have proclaimed that the discipline is on the cusp of opening doors to almost limitless supplies of agro-fuels and pharmaceutical compounds. The ethical implications of this new technology are considerable, as not only will it ultimately offer the potential to create biological systems and organisms that do not occur in nature, but scientists have already been able to synthesise several lethal human pathogens and viruses.[2] However, according to an EU High Level Expert Group (HLEG) on synthetic biology, 'it seems likely that we do not as yet possess a conceptual ethical framework that can provide a common context for such debates.'[3]

As definitions of synthetic biology depend upon the scientific approach taken or the final application of a given project, a standard classification has remained elusive. However, it is generally accepted that the discipline utilises principles drawn from multi-disciplinary fields, including nano-technology, biology, physics, chemistry and genetic engineering, to design and engineer biological components that can be used interchangeably to construct a variety of biological systems. These systems could be constructed for a variety of uses, ranging from the production of pharmaceuticals, chemicals, hydrocarbons and food.[4]

FUNDING OF SYNTHETIC BIOLOGY

Research carried out by the Synthetic Biology Project [5] has revealed that there are currently over 180 organisations in the United States and a further 50 in Europe that are involved in synthetic biology research, development and commercialisation. The current annual research market for synthetic biology is worth an estimated US$600 million, a figure that could potentially exceed US$3.5 billion over the next decade. Other projections from the industry go even further, with one postulating that as much as 20 per cent of the $1.8 trillion global chemical industry could be dependent on synthetic biology by 2015.[6]

Since 2005, research related to synthetic biology has received approximately US$430 million from the US government, while the European Union (EU) and the governments of Germany, the Netherlands and the United Kingdom have spent in the region of US$160 million.

The United States Department of Energy (DOE) is by far the biggest individual source of research funds, with conservative estimates putting its largesse at US$350 million over the period (which could be as high as US$700 million). The US Department of Defence is also

reported to have committed US$20 million of its gargantuan budget for 2010/11 towards synthetic biology research, though further information is unavailable to the public.

Synthetic biology was earmarked as a priority research area in the EU back in 2003 and US$53 million in funding has been approved since then. The UK government is estimated to have spent between US$30 million and US$53 million since 2005. In 2008, three Dutch universities (Delft University of Technology, University of Gronigen and the Eindhoven University of Technology) announced an investment plan of US$90 million over the next five to ten years.[7]

Just four per cent of US research spending since 2005 has been devoted to the ethical, legal and social implications of synthetic biology. In Europe the figure is even lower, a paltry two per cent. Most disturbingly, not a single research grant dedicated to the risk assessment of synthetic biology can be identified.[8]

Private funding for synthetic biology research is directed overwhelmingly towards agro-fuel applications, with big-oil leading the way. In 2009, Exxon Mobil, in its first major investment in agro-fuels, entered into a US$600 million partnership with Synthetic Genomics to develop transportation fuels from algae.[9] In 2007, BP announced a US$500 million research agreement with the University of California, Berkeley (UCB), to develop synthetic agro-fuels.[10] Amyris biotechnologies, the company established in 2003 by Professor Jay Keasling, the principle investigator on the UCB's artemisinin project, recruited the former head of US fuels at BP to be its first CEO. Its largest stockholder is the French oil and gas giant Total.

This flood of capital into the field has, in the view of at least one professor of biomedical engineering, diverted skills and focus from areas where the discipline could potentially benefit the wider public.[11] The parallels with the genetic engineering of food crops could not be more striking. For the last decade highly lucrative GM commodities such as maize and soy (that are predominantly used to feed the animals raised in industrial agricutural production, which in turn feed the global minority who can afford that meat) have been bringing in record profits for the global agro-seed-and chemical complex. Over the same period the deluge of 'benefits' that were set to emancipate the wretched of the earth from hunger and poverty have failed to materialise.

MALARIA, ARTEMISININ AND SYNTHETIC BIOLOGY – ANOTHER 'AFRICAN SAVIOUR'

Ten years ago, when genetic engineering was still in its commercial infancy, its proponents held up the example of 'Golden Rice', genetically engineered for higher Vitamin A content, to dismiss any concerns or calls for precaution regarding the technology. At present, with Golden Rice still not commercially available, a whole new batch of 'climate ready' crops have been promised that will safeguard our future food supplies in the face of increasing climatic instability.

Undoubtedly, Synthetic Biology's own poster project has been the joint research carried out at UCB to create synthetic artemisinin, a key anti-malarial drug. The research began in 2004 and is a joint effort of UCB, the Institute for OneWorld Health (iOWH) and Amyris Inc, a private genomics company established by lead investigator Professor Jay Keasling. Initial funding of US$42.6 million was provided by the Bill and Melinda Gates Foundation (BMGF). It was announced in July this year that the project was ready to move beyond its development phase into full commercialisation, in partnership with French pharmaceutical giant Safoni Aventis and with the aid of a further US$10.7 million grant from the BMGF.[12] It was previously hoped that this would be available by 2009 or 2010.[13]

MALARIA, ARTEMISININ AND ACTS

The World Health Organisation (WHO) estimates that half of the world's population is at risk of malaria. The WHO recommends that artemisinin-based combination therapies (ACT) are at present the only remaining effective treatment for uncomplicated malaria, and claims that the appropriate use of ACTs works in more than 90 per cent of cases. [14]

By 2009, ACT has been adopted by 80 countries globally as a first-line treatment of uncomplicated P.falciparum malaria.[15] Procurement of ACT doses by the WHO has risen rapidly in the last decade, from 500,000 in 2001 to 160 million in 2009.[16]

The only known wild source of artemisinin is the A. annua plant, which is endemic to China. Its sister species, Artimisia Afra, grows in the wild in South Africa, but does not produce artemisinin itself. Since the discovery of artemisinin as an anti-malarial compound in the 1970s, A.annua has been cultivated in China and Vietnam. In the 1990s, cultivation spread to Africa.[17] The plant takes six to eight months to mature between planting and harvest and the total production cycle can exceed 14 months. Once manufactured most ACTs have a shelf life of 24 months or less, which presents significant logistical constraints, especially in countries where demand forecasting and storage facilities are limited.

Globally, a significant portion of the supply of artemisinin based anti-malarial medicines comes from countries with new, fast-growing pharmaceutical industries, notably China, India, Pakistan and Vietnam, but also many African countries including Ghana, Kenya, Nigeria, Togo, Uganda and Tanzania. A study by the Dutch Royal Tropical Institute concluded that it is possible to cultivate sufficient artemisinin to cure all the malaria patients in the world and that an ACT could be made available at an affordable price within two to three years (writing in 2006). However, achieving this would require significant investment, as well as a complete overhaul of the supply and distribution chain.[18]

In addition, the authors of the aforementioned study were of the opinion that the 'slow and cumbersome implementation of the WHO's 'pre-drug qualified policy' has resulted in a monopoly like situation. Only six companies [19] own a pre-qualified ACT, meaning the retail price is prohibitive for the majority of those who are exposed to threat of malaria on a daily basis.

This is a problem throughout the global pharmaceutical sector and is not just restricted to the case of malaria. In 2009, the pharmaceutical industry accounted for nine of the world's top 50 most profitable companies, with only the financial sector and oil and gas having a larger representation. In 2009, the profits of these nine corporations (in the middle of the greatest contraction in the world economy since the great-depression) were an eye-watering US$83 billion.[20]

The fact that ACTs are still not widely available in malaria endemic areas supports the position in developing countries that the local production of artemisia may be preferable to relying on synthetic production, for both access to its medicinal benefits and for the livelihoods its local cultivation sustains. The cultivation and extraction (with ethanol for example) of A annua can already be done with relative ease in developing countries.

ARTEMISININ CULTIVATION IN AFRICA

After China and Vietnam, East Africa is now the third most important growing artemisinin region in the world.[21] The high altitude, high light intensity (due to its proximity to the Equator) and cool night temperatures are all conducive to the successful cultivation of A. annua, though poor logistics and lack of market integration have been cited as potential hindrances.[22] That said, a fledgling commercial sector has emerged in Kenya, Tanzania and Uganda. It has been dominated by the activities of one holding company, Advanced Bio-Extracts Ltd (ABE) and two main subsidiaries: East African Botanicals (EAB), Ltd. in Kenya and African Artemisia Ltd. (AA) in Tanzania. In 2005, Novartis made a bridging loan of US$14 million to ABE, largely for expanding processing capacity, and pledged to purchase a significant proportion of production.[23]

In Kenya, where commercial cultivation started in 2002, with just three to four farmers on 40ha, by 2010 over 7,500 farmers were making their livelihoods from it.[24] One of the advantages, cited by farmers, is that they are less dependent on expensive chemical inputs such as fertilizers and pesticides when compared to more traditional food crops such as maize or wheat.[25] In Uganda, a joint venture between a local company and Indian pharmaceutical giant Cipla is set to take off, with the WHO recently pre-qualifying the processing plant set up to extract artemisinin from locally cultivated A. annua. Cipla has already opened a letter of credit covering a full year's purchase of artemisinin, which will be exported to India to be used in the manufacture of ACTs.[26]

This local cultivation and transformation of artemisinin is threatened by expansion of its synthetic production elsewhere. Following the increase of production to a commercial scale, Sanofi-aventis will now produce synthetic artemisinin in 100,000 litre vats. [27] Details as to

where this will take place are scarce, but given that the infrastructure is already in place in California, home to Amyris and the UCB, or indeed Paris where Sanofi-aventis is headquartered, it seems unlikely that Africa would be chosen as a site for capital investment.

If synthetic artemisinin is to be produced in huge vats in the industrialised North, will these new supplies of artemisinin be used to smooth out fluctuations in supply and demand (and therefore price), or will they completely undermine a fledgling industry that is developing in African countries? Issues around intellectual property are also likely to come more to the fore. The resources that Amyris and other Northern players have at their disposal will make this area a virtual non-contest unless sufficient public attention can be drawn to the issue, such as the civil society pressure on the pharmaceutical industry to provide cheap HIV/AIDS drugs for patients in South Africa.

Recent advances in plant breeding have also created hybrid Artemisia strains that can yield up to three times as much artemisinin as their wild counterparts. These plants are now being grown and harvested commercially in Madagascar, and are on trial in South Africa, Uganda and Zimbabwe.[28] What will the fate of this research be, if synthetic artemisinin can be ordered directly from the laboratory? As has been the case in genetic engineering, will the concentrations of expertise and capital divert valuable research funding and ideas into a few high profile 'silver bullets'?

IMPLICATIONS FOR AFRICA

As far as we know, there are no national, regional nor international biosafety rules in place to regulate synthetic biology in the world today, despite its ability to have far reaching implications for humanity and the natural world. Nevertheless, the issue is being discussed at international fora, including the Convention on Biological Diversity. At the 14th meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA14), synthetic biology was specifically debated. The report of SBSTTA 14 [29] contains several references to synthetic biology, in square brackets, including a de facto moratorium on the release of synthetic life forms.[30] However, square brackets means that it has not achieved unanimous agreement and will be further discussed at the 10th ministerial meeting of the UN Convention's Conference of the Parties (COP 10) that will take place in Nagoya, Japan between 18 and 29 October 2010.

Although the issue is on the international agenda, it is doubtful whether the proposed moratorium will survive in the face of the huge financial and strategic interests at stake. At the very least, those concerned with the implications of this technology for society and the environment may be able to obtain some form of rules and procedures to govern the use of the technology. Even this route will be highly contested and bitterly fought by those set to benefit the most.

The potential impact of synthetic biology on the African continent requires extensive public debate in an open and transparent manner. Valuable lessons must be heeded from prior experiences where exogenous technology has been imposed on the continent, without there being enough public engagement and adequate local authority and capacity to regulate it.

For the most appropriate example in this instance, one need look no further than what has been happening with biotechnology using genetic engineering techniques in Africa.

Currently, only three countries on the African continent commercially produce genetically modified crops: Burkina Faso, Egypt and South Africa.[31] This has not stopped a deluge of 'capacity building' initiatives, funded in the main by the biotech industry and their PR shock troops at organisations such as USAID and the Gates Foundation, throughout the continent.

While ostensibly the modus operandi of these initiatives is to help Africa to feed itself, in the absence of domestic biotechnology expertise it also conveniently provides the opportunity for the shaping of the biosafety discourse to suit the technologies' developers and others that stand to benefit from the use of the technology.[32] Further, the gains made at the multilateral level for the safe governance of biotechnology, through the Cartagena Protocol on Biosafety, are being undermined by efforts to 'harmonise' biosafety legislation across Africa through its regional economic communities (RECs). For example, from a recent draft GMO policy document from the Common Market for Eastern and Southern Africa

(COMESA), it was patently clear that the architects of the policy had close ties to an industry that would benefit enormously should such policies come to fruition.[33]

CONCLUSION

Synthetic biology offers yet more currency to the hubris that man is 'master' of his environment. Yet this mastery comes with a heavy responsibility. The potential to produce almost limitless amounts of cheap medicine and clean fuels must be tempered by the fact that the technology is still in its infancy, and that its real consequences cannot yet be predicted with any great certainty. As is the case with food, abundance alone does not guarantee availability. Will the provision of anti-malarial drugs be more effective in a centralised system, where a few companies exert exclusive control, or in a more nuanced fashion, where locally source material can be quickly and efficiently processed and distributed to those in most need?

To date the real money in synthetic biology appears to be following its energy potential, with the world's largest oil companies having already sunk hundreds of millions of dollars into the field. South Africa appears to be banking on the technology as a means to cement its place inside this global event. This unbridled enthusiasm, however, has taken place largely beyond public scrutiny or awareness of what is really and truly at stake.

- *Gareth Jones is a researcher at the African Center for Biosafety.*
- *Mariam Mayet is the director of the African Center for Biosafety.*

NOTES:

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[3] 'Synthetics: the ethics of Synthetic biology.' IDEA League Summer School, August 2007, The Netherlands. http://bit.ly/cA5rKE (accessed 14/09/2010)

[4] European Commission (2010). 'The Ethics of synthetic biology.' Luxembourg: Publications office of the European Union.

[5] The synthetic biology project was established as an initiative of the Woodrow Wilson International Centre for Scholars to 'foster informed public and policy discourse concerning the advancement of synthetic biology'. http://www.synbioproject.org/about (accessed 23/08/2010)

[6] Synthetic Biology Project (2010). 'Trends in synthetic biology research funding in the United States and Europe.' Woodrow Wilson International Centre for Scholars. http://bit.ly/9aAx8e (accessed 2/08/2010)

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[10] http://bit.ly/97yfy8 (accessed 23/08/2010)

[11] http://bit.ly/brrDoM

[12] http://bit.ly/bLr72V (accessed 17/08/2010)

[13] 'Extreme genetic engineering' (2007). ETC Group.

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[25] 'Small farmers cash in on Artemisinin production.' All Africa. 21 January 2009. http://allafrica.com/stories/200901210671.html (accessed 14/09/2010)

[26] Wakabi, M (2010). 'Uganda in double blow against Malaria - with local drugs' in The East African. http://bit.ly/bswVf0 (accessed 15/09/2010)

[27] Van Noorden, Richard (2010). 'Demand for malaria drug soars' in Nature news.http://www.nature.com/news/2010/100803/full/466672a.html (accessed 16/09/2010)

[28] Ibid.

[29] UNEP/CBD/COP/10/3 http://www.cbd.int/doc/?meeting=sbstta-14 (accessed 12/09/2010)

[30] The precision language on synthetic biology in the biofuels reads as follows:

1: [14. Decides to convene an ad-hoc technical expert group on synthetic biotechnologies and other new technologies that are used or projected to be used in the next generation of biofuels to assess their impact on biodiversity and related livelihoods.]

[16. Urges Parties and other governments, in accordance with the precautionary approach, to ensure that living organisms produced by synthetic biology are not released into the environment until there is an adequate scientific basis on which to justify such activities and due consideration of the associated risks for the environment and biodiversity, and the associated socio-economic risks, are considered.]

(2) This paragraph is in square brackets due to (i) financial implications, and (ii) a lack of consensus from the meeting on the need for the ad-hoc technical expert group and its mandate.

In the paper on new and emerging issues (L.14), the decision 2:

Invites parties, other governments and relevant organizations to submit information on synthetic biotechnology and geoengineering in accordance with the procedure of decision 9-29, for consideration of SBSTTA, while applying the precautionary approach on field releases of synthetic life, cells or genomes into the environment.

[31] James, C (2009). 'Global Status of Commercialised Biotech/GM Crops.' ISAAA Brief No. 41.

[32] GRAIN Briefing (2004). 'USAID: Making the World Hungry for GM Crops.'

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Pulp fact or fiction?

Clean Development Mechanism (CDM) plantation projects

Khadija Sharife

http://pambazuka.org/en/category/features/67534

cc OTHS

Using Norway-based Green Resources Ltd's plantations as a case study, Khadija Sharife looks at whether clean development mechanism projects like those undertaken by Green Resources in East Africa can actually bring benefits to people on the ground.

Green Resources Ltd, Africa's largest forestation company, appears to be an entity with a sustainable mission, ranging from ranging from recuperation of wood waste to carbon sequestration. This is no accident: just two days after the UN Framework Convention on Climate Change's (UNFCCC) Kyoto Protocol was adopted, the company (then known as Fjordglott) increased capitalisation from US$98,000 to US$1.4 million, later extending invitations to private investors, such as Norwegian corporation TRG, to acquire shares.[1]

These days, Green Resources' activities include plantations, carbon offsets, forest products and renewable energy. The company's wood production in Africa is pegged at 14,000ha of forest plantations of total 610,000ha under process for future development.[2] The company, primarily operating in East Africa, with 3500 employees[3] holds 12,000ha in Uganda[4] as well as significant areas in Tanzania (34,000ha of land, with a further 120,000ha in the process of acquisition), Mozambique (172,000ha) and Sudan (179,000 ha).[5] It also owns East Africa's largest sawmill, Sao Hill, and remains one of the continent's largest producers of transmission poles required for electricity, amongst other products such as wood for housing.[6]

The company's current major shareholder structure[7] includes: Phaunos Timber Fund (26 per cent), New Africa (26 per cent), Steinerud (ten per cent), Macama (eight per cent), Storebrand ASA (eight per cent), Verbene Investment Ltd (seven per cent), TRG (four per cent), Preben Invest AS (three per cent). Unlike the company's limited competitors, Green Resources has the comparative advantage of already having significant experience in land acquisition, described as a 'significant entry barrier' by the company. Competitors include the Global Forest Solidarity Fund[8], a private initiative active in Mozambique, funded to the tune of US$100 million from investors such as Harvard University, planting 5,000ha in the past decade. Other competitors include New Forest[9], financed by UK capital, operating in Uganda and Mozambique, planting 1,500ha in 2007; Actis/CDC[10], controlling 7,000ha of teak plantation in Tanzania, as well as logging rights in Sudan; Raiply[11], East Africa's largest forest industry company, owning 12,000ha in Tanzania, with operations in Kenya; and Rift Valley Holdings[12], self-described as 'one of the largest investors in agriculture and forestry in sub- Saharan Africa.'

As Mutuma Marangu, chairman of a Green Resources subsidiary recently explained[13], a tree that takes 70 years to grow in Norway, takes just 17 years in Tanzania. Given the geostrategic location of East Africa, and the rising need from emerging nations such as China for wood, Marangu believes that with major forests coming online, Chinese, Japanese and other major users of wood in the near- and far-East will move toward East Africa as opposed to Brazil, Argentina and Chile – their traditional mainstays for lumber.

'There is a shorter shipping voyage from China to East Africa rather than China to Brazil,' he stated. 'There is ample opportunity here. We have the least penetration of forestry and forest cover in the world, the greatest possibility for growing trees. We are leading by example.'[14] During his recent interview with Canada's Business New Network (BNN), Marangu said that each year wood is required for 300,000 homes in three different East African countries, with population growth at 'one million people, per year' in Kenya, Tanzania and Uganda.[15]

'In terms of power and demand, there is an extreme need for both (wood) production and (carbon) offsets. At present, there is not much multinational or foreign investment in the sector,' he said. Currently, 'high cost' producers such as the USA (producing over 600 million cubic metres of wood per year) and Russia (which producers over 400 million cubic metres yearly) amongst others like Uruguay, Brazil, Indonesia and South Africa, account for 80 per cent of supply.[16] The company notes that Russia's new log wood export tariffs (€50 per cubic metre) exceeds Tanzania's stumpage costs (the residual costs after subtracting various allowable costs such as transport).[17] Meanwhile, emerging nations such as South Africa are increasing local consumption of wood products.

Marangu's assessments of China and India are indeed correct: from 2002 to 2006[18], the latter's imports doubled as did China's during the past five years. And while China has increased domestic plantation of both hardwood and softwood (rising from 6 million and 7 million cubic metres respectively in 2000, to 25 million cubic metres and 16 million cubic metres annually in 2010), China's 'explosion' in wood imports will have only a 'modest impact'. It is precisely the company's vast wood resources that enable it to perceive carbon offsets as a viable means of generating profit through carbon sequestration or storage via plantations. Plantations are seen as a profitable means of mitigating climate change under the umbrella of the Kyoto Protocol's Clean Development Mechanism (CDM) projects. Africa has been the smallest recipient of climate reparations funds even though the continent emits just three pre cent of all greenhouse gases (GHG) worldwide.

Despite studies by Stanford University's Program on Energy and Sustainable Development, which reveal that between one-third and two-thirds of CDM projects 'do not represent real carbon reductions'[19] CDM projects account for 20 per cent of the total carbon market[20], valued at US$17.5 billion of US$94 billion (in 2009). The European Union carbon market comprises 77 per cent (US$72 billion), but the market itself is pegged to explode by 300 per cent once the US market officially comes online.[21]

The relevance of forests as a means of 'sinking' carbon was recognised by the Kyoto Protocol's Articles 6 and 12, related to project activities and emissions trading. Article 6 articulates that Annex 1 (or developed/industrialised nations accounting for more than 80 per cent of historical emissions), may transfer to, or acquire from, any other Annex 1 country, carbon credits – the result of projects aimed at reducing man-made emissions or enhancing carbon sinks.[22] Included in Article 6 are two key provisions stipulating that any claimed emissions reductions be from 'additional' to emissions that would have otherwise occurred.[23]

Meanwhile, Article 12 concerns the role of non-Annex 1 nations (developing countries) by defining the role of CDM initiatives, enabling – in theory – developing nations to move forward sustainably through technology transfer (for example, solar and wind power) from developed nations.[24] CDM in return facilitates compliance for continued C02 emissions on the part of developed nations through purchasing carbon credits generated via the lack of fossil-fuel use in developing nations. Aforestation (A) and reforestation (R) projects were adopted by the 9th Conference of the Parties (COP) in December 2003.[25]

Green Resources has declared that existing projects will generate over 60 million tonnes of carbon 'capture [26] during the next decade, with total forestation carbon capture expected to peak at 2 million tonnes per annum for existing projects under development (in 2009).[27] Additional projects are estimated to generate 9 million tonnes (by 2020 when 'net growth in biomass is the highest'). The Norwegian government, eager to offset some 6 million carbon credits[28] has already acquired carbon credits from Green Resources.[29]

Though the 1997 Kyoto Protocol, established under the umbrella of the UNFCCC entered into force in 2005, Tanzania ratified the agreement in 2002.[30] The UNFCCC's approval is vital as is the approval of the host country via the Designated National Authority (DNA) is a fundamental pre-requisite. Tanzania's official CDM guide for investors revealed, 'In Tanzania, before the DNA can approve the A/R project activities, it is addressed by the Ministry of Natural Resources and Tourism through the Forest and Beekeeping Division which has formed a task force to looking at A/R project activities and other factors related to carbon trade opportunities.'[31]

In order to 'speed up' and simplify the process for small-scale CDM initiatives, the government has implemented 'faster registration, only four weeks after submission, exemption from registration fee', as well as entities that are, 'validated, verified and certified by the same designated operational entities' (DOE). DOE's are responsible for checking that CDM projects conform to proper regulations. To achieve DNA approval, 'project idea notes' (PIN) – identifying the 'additional' nature of the project without which it would not qualify for CDM status – and project design documents (PDD) are required, while DNA involvement from the project start date is preferred. Projects earmarked for rural areas are also preferred, while technology transfer remains one of four key conditions pending approval by the DNA. The guide further reveals, 'Timing of the CER sales has an impact on the price which can be obtained. Contacting buyers at the PIN or PDD stage can be advisable if financing for the CDM registration is sought.'[32]

Green Resources's Idete Forest Project (IFP) is one such CDM initiative. 'The objective of Idete is to grow trees for carbon storage and to harvest forestry products for sawn timber, utility poles and renewable energy,' revealed Green Resources. While the company submitted the PDD in November 2008, planting at Idete had already begun in 2006 on degraded grasslands.[33] Forest Stewardship Council (FSC) certification, already achieved in 2008 at the company's Uchindile and Mapanda concessions, is fundamental to ensuring that best industry standards are maintained. According to Dr Blessing Karumbidza of the Institute or Economic Research and Innovation (EIRI) it is Norway – one of the world's leading oil producing nations – rather than Tanzania that stands to benefit.

'The Idete project was allegedly underwritten by Norway's Ministry of Finance. The Norwegian prime minister, who was present at the time of the launch, articulated the importance of carbon credits as a means of offsetting Norway's emissions. Tanzania was at the heart of the deal,' says Karumbidza, who also represents the African civil society organization Timberwatch. The irony, as Karumbidza points out, is that wood plantations are not forests but monocultures and thus should not receive FSC certification.

'Green Resources claimed that the acquired Idete land was degraded through fire, but unlike wood plantations where fire can destroy wood products, grasslands fires serve a very natural and quick, process of maintaining the ecosystem by removing dead herbaceous materials, recycling nutrients and other important factors,' he says. 'The purpose of this and similar CDM deals is not to transfer technology enabling sustainable development and renewable energy in developing countries in exchange for offsetting Western emissions, but instead, more of the same exploitation.'

Species are primarily composed of potentially invasive eucalyptus (59 per cent), and pine (40 per cent). The forest, situated in the Mufindi district, Iringa region, is located at an altitude of between 1,100m and 1,550m. The rainy season extends from November through May.[34] By 2008, 1,600ha of 8,000ha plantable area (from a total of 11,600ha of Idete land acquired by Green Resources) had been developed, generating a potential 172,471 temporary certified emission reductions (tCER) per annum.[35] The company estimates that total production over 20 years will generate almost 2.6 million tCER from Idete alone.[36] In 2009, Green Resources revealed that potential tCERs of over 6 million by 2020, sold at US$6 per estimated emissions reduction would generate US$36 million in revenue, for the crediting period (under CDM rules, the accumulated carbon can be sold every five years).[37] The economic challenges facing carbon offset projects in Tanzania have been described by Green Resources as projects beset by a 'high level of risk, low and uncertain tCER price, and high cost of project development and implementation'. Institutional and social obstacles include limited government understanding of the carbon certification process and difficulties innate in

government procedures and bureaucracies for approval, as well as similarly limited understanding on the part of communities.[38] The company further added in their presentation, 'Oveview of Plantation/Certification Development in Tanzania', that stakeholders and communities had very high expectations of perceived benefits.[39] Moreover, the company declared that private investors were placed in a disadvantageous position.

'While there are large amounts of funding available for forestry and carbon activities, very little of this benefits private companies,' Green Resources revealed. 'We estimate that private companies receive less than two per cent of the public funding available for forestation and carbon. In order to increase all the activity aimed at combating climate change, in particular in Africa, funding agencies should provide much increased grants to the private sector.'[40] While the company stated that project costs per hectare ranged from US$400-US$600[41] land is leased for a 99-year period from the Tanzanian government at just 2.3 Norwegian krone per hectare– (less than US$0.36), generating just under US$4200 for Idete's lease.[42] This represents a decrease of two-thirds from previous land-lease prices, lambasted by former managing director Ivar Løvhaugen who revealed that lease prices should be reduced as much as possible to diminish risk. His thoughts were echoed by John P. Haule, managing director of a subsidiary owned by Green Resources Ltd (then known as Tree Farms), who announced that leasing charges must decrease by 50 per cent to 750 Tanzanian shillings.[43]

Green Resource's head, Mads Asprem, further explained to Norway's civil society group Norwatch last year, 'It is interesting to note that the demand for land in Tanzania is very low and that there is little development within forestry and agriculture. The conclusion can only be that the price of land is too high.' [44] The company has pledged to re-invest 90 per cent of revenue back into further projects while, according to the company, the two villages leasing land will receive 10 per cent of the profit generated from carbon credits.[45]

'What Green Resources is doing is exporting the problem of pollution generated abroad to Africa. Tanzanians are receiving little in the process. This will become more evident in ten or 15 years when groundwater is depleted by wood plantations. The exploitative nature of the deal is especially evident in the fact that it was negotiated not in hard currency but Tanzanian shillings subject to currency depreciation,' Karumbidza explains. 'Tanzanian communities can expect to receive several million Tanzanian shillings from the carbon credit revenue in 15 years – whatever that is worth.'

Though Green Resources – the first company to receive Voluntary Carbon Standard (VCS) certification outside of the USA, has claimed that thus far the company has reaped no profits after 12 years of operation in Africa, plantations will soon be fully grown and ready to harvest.[46] Time will tell whether reforestation CDM projects are more fact than fiction.

- *Khadija Sharife is a journalist and visiting scholar at the Centre for Civil Society in South Africa.*

NOTES

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[3] Ibid.

[4] Ibid.

[5] Ibid.

[6] Ibid., p. 4.

[7] Ibid., p. 2.

[8] Ibid., p. 4.

[9] Ibid.

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[11] Ibid.

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Unclean development mechanism

Research notes on resource imperialism in the southern Tanzanian highlands

Blessing Karumbidza

http://pambazuka.org/en/category/features/67532

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'The funding of climate change adaptation and mitigation-oriented programmes in Africa has opened up new forms of resource imperialism, extractive investment and land grabbing opportunities, in particular for European and Chinese companies,' writes Blessing Karumbidza. Land-intensive projects negatively affect the livelihoods of people who rely on land for food and other resources. The case of Idete village in Tanzania, the site of a plantation by Norway-based Green Resources AS, is an example of how supposedly 'clean development' projects don't always benefit the community.

The use of plantations as a climate change mitigation strategy was heralded in some quarters as an innovative means of addressing the problem while leading to development in areas where such activities were rolled out. Unfortunately, the jury is out on the issue and the judgement is not as exciting. Preliminary results indicate that the plantation strategy is doomed to fail and cause more harm than good for those countries buying into this market mechanism. The funding of climate change adaptation and mitigation-oriented programmes in Africa has opened up new forms of resource imperialism, extractive investment and land grabbing opportunities, in particular for European and Chinese companies. To make this possible, terms such as 'afforestation' and 'reforestation' are deliberately confused and plantations are referred to as if they were forests. In the process, large grasslands and sensitive bio-diverse areas are destroyed in the race for establishing monoculture tree plantations of water-guzzling and invasive exotic trees, such as eucalyptus and pine, in the name of climate change mitigation and development. Facilitating this process, through means reminiscent of 19th century colonial expansion, are western- (largely, IMF, World Bank and UN) aligned think tanks as well as the private sector. Think tanks and businesses team up by influencing and ambushing local governments with promises of funding and development, to allow the expropriation of land at an alarming rate, inviting suggestions of a 'new scramble for Africa'[1] and 'carbon colonialism'.[2]

LAND: THE NEW OBJECT OF IMPERIALISM

Funding of climate change-related projects has led to the further commoditisation of Africa's land and natural resources while exploiting African labour to extract the surplus for Western accumulation. Proponents of this development paradigm have introduced a discourse that views Africa's land as degraded, marginal and of limited economic value. To facilitate 'economic use by foreign firms', thousands of hectares of land are being leased (in some cases sold) in the name of ensuring lasting land regeneration and conservation of natural resources, therefore deriving economic benefit. According to Mwesiga Baregu[3] this shift is consistent with the new character of globalisation that has rendered African labour redundant. The new object of imperialism is Africa's land. The justification given for financing the Clean Development Mechanism (CDM) and the UN's Reducing Emissions from Deforestation and Forest Degradation (REDD+) projects to conscientious shareholders, as well as critical voices in Africa, is that these are development projects which will go a long way towards addressing the conditions of poverty in many rural African communities.

The transfer of forest management to the local level in many developing countries is seen as a panacea for livelihoods and for managing forests. In Tanzania the transfer of land

management to the local level has opened the floodgates of foreign corporate entities swindling land from unsophisticated rural governance structures in the name of development. Using two outcome measures (adjusted household forest income and the share of adjusted household income from forest products) to evaluate the effect of the forest-sector reform on rural livelihoods, Jagger suggests a limited effect on livelihoods.[4] However, he qualifies his finding stating that 'for households and forests affected by the reform there is no evidence that both favourable livelihood and sustainability outcomes have been achieved' and that 'livelihood improvements are largely attributed to institutional failures, including selective enforcement that favours the wealthy and an absence of meaningful community engagement.'[5] Using the case of Tanzania, Blomley et.al.[6] also consider the importance of institutional arrangements for deriving benefits from forest resources. The recent rush for Africa's land through bio-fuel and climate-change related projects have led to a situation where tree plantations take precedence over agriculture, with scary implications for national and local food sovereignty. This has led to land grabs affecting many regions of the African continent.

Some examples of this land grab include the move by the Ethiopian government, close to both the USA and China, to earmark nine million acres for lease to investors using the persistent famine in the country as justification. It is alleged that millions of acres have already been 'allocated', with Saudi Arabian companies paying 50 US cents per acre. Behind the deals is Sheik Mohammed Al Amoudi – one of the world's 50 richest people – who controls big parts of Ethiopia's private sector. Saudi Arabia is not only involved in Ethiopia, but also in Tanzania, Mali, Senegal and Sudan. China has leased nine million acres in Congo-Kinshasa, Qatar has leased 250,000 acres in Kenya, and Indian companies have leased 800,000 acres in Sudan. Companies from Sweden and Norway have accessed land to cultivate jatropha for bio-diesel and timber for carbon credits. In Madagascar, such large-scale land transfer led to the mass movement that overthrew the president, who had given half of the island's arable land to the South Korean company Daewoo for 99 years. The people thought of this as re-colonisation. The Daewoo deal was expected to yield road and infrastructure development, similar to many deals made between African governments and foreign investors. One underlying factor in these deals is the lack of home grown development plans, focused on local African production and consumption.

Viewing forests as solutions to climate change has opened up a rush for African land. Robeldo et al.[7] place forests as both a cause and solution to climate change suggesting that 'forests can play a central role in climate change' and that 'greenhouse gas emissions from forests … account for up to 25 per cent of the current yearly emissions worldwide. This analysis does not shed light on why the main activities and contributors of the emissions that cause climate change are located away from the forests expected to facilitate its mitigation. The interest in African land, forests and timber plantations from European countries such as Norway and France, for instance, is pursued in the name of solving climate change. Norwegian company, Green Resources AS (http://www.greenresources.no) has mapped out its stake in Africa, claiming plantations in Tanzania, Mozambique, and Uganda, and is still searching for more land in the pursuit of carbon credits, in a manner that has inspired critics' use of terms such as 'carbon imperialism'. Climate change investment possibilities in the 'forest sector' have created massive opportunities for developed countries while presenting a threat to developing country economies and communities.

Idete village (Wally Menne)

THE CLEAN DEVELOPMENT MECHANISM CONCEPT

Carbon financing is a top-down response to climate change; based on the skewed view that money can always 'fix the problem'. Usually this means funding more of the environmentally damaging activities that created the problem in the first place, while avoiding any major changes to the dominant economic system.[8] This approach serves the wealthy countries in the North, allowing continued extraction and industrial processing of the natural resources of marginalised communities in the global South. Fossil fuels make up a big part of the resources that are transferred via this one-way system, concentrating the benefits of polluting industrial activities in one country, but the CO2 emissions are shared globally in the form of climate change. To date, attempts to finance climate change mitigation projects have had limited success; although many have demonstrated a greater potential to perpetuate conditions that drive, rather than ameliorate, climate change, and thus cause further problems for affected local communities.[9]

Since the establishment of the UN Framework Convention for Climate Change (UNFCCC) in 1992, various attempts have been made by industrialised countries to harness or to limit greenhouse gas (GHG) emissions. This culminated in the Kyoto Protocol in 1997 (although it was only ratified in 2005) which allowed for investment in 'clean' or low-carbon emission development in developing countries under the CDM. The carbon credits earned from such projects through 'additional emission reductions' could then be used by polluting industry and other sources of greenhouse gases in 'Annex 1' countries to offset a portion of their emission reduction targets. Theoretically, this would result in greater overall emission reductions, and simultaneously stimulate 'sustainable development' in developing countries.

Evidently, the climate benefits hoped for from the CDM have not been forthcoming. Despite the fanfare, and a vigorous and costly UN and World Bank campaign to promote it, the CDM has failed to deliver much more than a fraction of the GHG reductions hoped for. Instead it has led to financial speculation and this in turn to has led to corrupt relationships between consultants and project owners.[10] Global GHG emissions have increased rather than decreased, and their climatic effects will be experienced far into the future in the form of extreme weather events that cause ecological and infrastructural damage and human suffering.

CASE STUDY: TANZANIA

The study focused on Green Resources' tree plantation project, located on moist grassland near Idete village in the Mufindi area of southern Tanzania. Tanzania is a large country with diverse peoples and an extensive wildlife resource that attracts many foreign tourists. However, the main form of employment available to its 38 million people is subsistence agriculture, in association with a vast informal industrial sector based on the exploitation of natural resources, notably timber from forest and woodland areas. The majority of its people

still living in under-resourced rural areas facing challenges in energy, communication, appropriate technology transfer, as well as having low literacy levels, all of which threaten the standard of living.

The Tanzania case study shows that CDM financing is used to influence national governance structures in order to facilitate cheap access to natural resources, including land. It is driven by the profit motive, often at the expense of the developing countries where it is used, causing unintended, but not unanticipated, environment and social harm. The climate finance industry assumes that it is needed and that it will be effective against climate change. It also assumes that better alternatives do not exist, or would be poor substitutes for large-scale climate change mitigation schemes such as carbon offset/trading. The wisdom of this seems unassailable, because the Kyoto Protocol has decreed it so by supporting the use of market mechanisms. Simpler, more cost-effective solutions such as organic agriculture have been effectively excluded, probably because they offered few benefits to the carbon trading fraternity, and could even undermine business as usual for industrial-scale agriculture.

The case of Green Resources ruining valuable grassland to make money from perpetuating pollution demonstrates how ludicrous carbon trading is. Under the CDM it is already possible to use tree plantations for projects intended to reduce atmospheric CO2, even though it is unlikely they could demonstrate additionality (sequestering more carbon than the grassland they replace). REDD+, however, which could theoretically reduce GHG emissions from forest loss by between 12 and 20 per cent, is only now being debated for inclusion in a post-Kyoto climate regime. Unfortunately it is unlikely to be approved without being linked to a market-based mechanism like the CDM.

THE BEGINNING OF CLIMATE FINANCE ACTIVITIES IN TANZANIA

A 2002 report by Norwatch, a Norwegian watchdog NGO, raised concerns about the carbon-offset efforts of Norwegian-owned Green Resources with a tree plantation operation in Uganda. Green Resources, then known as Tree Farms Ltd., had embarked on a campaign to acquire land in different countries in East Africa with a view to establishing vast tree plantations. The areas targeted were in remote rural areas, and the company acquired long leases on land in southern Tanzania. Harald Eraker, the author of the NorWatch report, 'CO2lonialism', opened a can of worms that continues to squirm under the scrutiny of Norwatch. In 2009 Norwatch investigated the activities of Green Resources, and in June 2009 published a highly critical report focussing on how community land was leased to Green Resources. When Timberwatch learned that the company was attempting to register its controversial plantations as a CDM reforestation project, it decided to investigate further. During the UNFCCC meeting in December 2009, Timberwatch released a preliminary report based on the initial investigation. The defensive reaction from Green Resources only served to confirm many of the problems identified.[11] Further information on the 'proposed' Idete CDM plantation carbon sink project, which is already being established despite not yet being registered under the CDM, can be found the website of the World Rainforest Movement and in the original project description document. Green Resource's elaborate plans (available on the company's website) for expanding its plantations in the region are a real reason for concern from a land grab and livelihood sustainability point of view.

A Green Resources Ltd eucalyptus planting near Idete – Extremely poor plantation planning and management is evident. Tree plantations provide little employment for local people and eliminate opportunities for traditional farming activities.

THE CDM-ASSOCIATED TIMBER PLANTATIONS IN TANZANIA

The Tanzanian subsidiary of Green Resources has already planted 2,600ha of its cheaply acquired 14,000ha of land obtained from the Idete community. It hopes that 7,000ha of this land will be planted with a combination of eucalyptus and pine trees. The community is also encouraged to do its bit by planting trees which the company has promised to buy. The primary motivation given for this investment is to earn income from the emerging carbon market made possible by climate change. Once again, Africa's land and its forests, which have served as the lungs of the world, especially for the developed economies which could not have industrialized without exploiting land, is being called to service the developed world. Green Resources is hoping to acquire not less than 170,000ha of land in Tanzania alone, with the bulk (142,000ha) coming from the biodiversity-rich and high rainfall southern highlands. To achieve such a land grab without making a hefty payment, the company banks on the poverty, illiteracy, ignorance and associated desperation the communities. The Tanzanian government, like many unimaginative African regimes that exchange natural resources for low-return foreign direct investment, is a happy customer and facilitator of such projects.

The irony of Norwegians' support for this type of investment must be contextualised. Norway occupies an ambivalent position. On the one hand, Norway is a major oil producer and exporter through the state-owned company Statoil, and contributes substantially to global greenhouse gas emissions. On the other hand, Norway wants to be seen as a moral superpower and therefore seeks to position itself with progressive policies (in matters of social, environmental, human rights and other development issues). Claiming interest in taking the lead in climate mitigation, Norway joined hands with France through the Oslo-Paris accord, which appears to be nothing more than a platform to dominate and advance the acquisition of land as well as position itself at the forefront of the carbon market. This would make Norway the vanguard of the modern resource imperialist onslaught. In other words, Norway has become a modern day colonial regime of a special type whose companies such as Green Resources enslave local communities on their own land. Taking advantage of the climate change debate, the Norwegian government committed itself to mitigation projects around the world through the purchase of carbon reduction credits for the purpose of offsetting its domestic carbon emissions. As such, the Green Resources plantations in Tanzania are important as they are hoped to rake in 400,000 carbon credits.

GREEN RESOURCES: PROMISES, ACTIVITIES AND INVESTMENT

Green Resources owns and operates the Sao Hill timber mill (formerly owned by the Tanzanian government), where it produces transmission poles as well as carpentry. According to the Green Resources' 2008/2009 company report, the company is Africa's 'leading forestation company' which is 'growing trees to generate carbon credits and bio-energy and to manufacture wood products' priding itself in the fact that it has 'probably planted more new trees than any other private company in Africa during the past ten years; a record 4,200ha of new forest was planted in 2008.' The same report also indicates that the company 'holds more than 200,000ha of land for future planting and conversion, and started the first harvest from its own forest in 2008'. The CDM aspect of the Green Resources project in Tanzania is simply part of an array of other timber-based products. Talking to different officials at Green Resources, there is no consensus on whether the CDM aspect is the main activity in Tanzania or what percentage of its tree plantation-based activities it occupies. According to the company report, 'all green resources carbon offset revenues will be reinvested in new carbon offset activities or be used for community developments in Africa, making the credits some of the most attractive in the world.'

SOCIAL AND ECONOMIC IMPACTS ON THE COMMUNITY

On paper, Tanzanian land ownership systems empower the local community to make decisions on transactions with businesses regarding their land. However, local communities such as those at Idete and Makungu do not have the sophistication to deal with international land speculators masquerading as investors and agents of development. For this reason, such investment is organised through a national government agency, the Tanzania Investment Corporation (TIC). Based on experiences in Southern Africa, Brazil and India, it is the view of the researcher that the land equation should form the basis upon which these

investment programmes are either accepted or vetoed, taking into consideration the government of Tanzania's own admission that 'land is the engine for economic growth and population survival. In Tanzania 80 per cent of GDP comes from agriculture.' Therefore any mismanagement and careless transfer of land would have severe consequences for its people. As no one can own land, but only holds it in trust for future generations, the fact that the present generation can commit the land they hold in trust for a period of time longer than they will be alive should be considered an ethical issue. On this basis, the 99-year leases offered to investment companies are seen as morally and ethically indefensible. Other independent international bodies such as the Food and Agricultural Organisation (FAO), the International Fund for Agricultural Development (IFAD) and the International Institute for Environment and Development (IIED) also considered the possibility that these massive agricultural (and plantation) investments in Africa could be either land grabs or a development opportunity, suggesting that land is 'rightly a hot issue because land is so central to identity, livelihoods and food security'.

LAND AS A LIVELIHOOD ANCHOR AND IMPACTS ON LOCAL COMMUNITY ACCESS TO FOOD AND WATER

Tanzania is largely a rural economy and ownership, access to, and control of land is central to securing livelihoods. Investments that require vast land areas such as tree plantations, introduce pressure on poor communities. Green Resources is going all-out to persuade individual community members to grow timber in woodlots on community land, with the intention of sourcing the timber when mature; but also to derive immediate value from the plantations in their most fashionable and marketable form: as carbon credits. The cumulative impacts of individual woodlots (usually averaging between half to six hectares) of timber results in a negative impact on land availability for food production and other livelihood strategies of these communities.

Grassland-based livelihoods such as stock keeping are under threat (Wally Menne)

Thus, even if land remains in the hands of the community itself, if the main economic activity on such land is based on the production of a commodity for which the local community has no immediate need or use, it constitutes a form of land theft – as such land becomes practically unavailable to its rightful owners. This should also be contextualised in terms of the cost of clearing and restoring land after timber plantations have been grown on it, which is beyond the financial means of local communities.

Access to food and water has till now been mediated by the market, but has yet to be fully developed in rural Tanzania. Rural communities are operating at the fringes of the market for goods and services, which creates an economic articulation where the idioms of accumulation are stacked against rural people. In this scheme, the urban area is complex, mechanised and modern, while the largely traditional rural area is relegated to being a source of cheap labour and natural resources. One of the most important impacts on livelihoods in rural communities is that on food and water resources. Plantation trees, especially eucalyptus, are major water-guzzlers. In areas where plantations are established, downstream flow reductions are common.

Biodiversity-rich grassland such as this near Idete is used by local communities for grazing and shifting agriculture, and serves as a vital water reservoir during dry periods (Wally Menne)

HOW WILL THE COMMUNITY BE COMPENSATED FOR THEIR LOSSES?

The main benefits to the community are expected to accrue from job opportunities as well as infrastructure investment in the area. In the study area at Idete, the low standard of social services such as clinics and schools remains a far cry from what could constitute fair compensation to the community. It is also curious that the company's business proposal and feasibility study has the only existing cost-benefit analysis on the project. The government departments that sign on these deals did not perform their own studies to consider to extent to which the project could be mutually beneficial. A lack of capacity in community institutions precludes them from understanding the deals they are signing, let alone undertaking a cost-benefit analysis of the projects to which they commit their resources. While there is evidence of communication between company representatives, district officials and community leaders, the quality of such processes is doubtful. Traditional village leadership does not always represent every community voice. The rural areas of Idete and Makungu do not have community property institutions, but have traditional authority systems that link to government institutions. These are also paid and supported by the central government. The payment to traditional authorities shifts their loyalty away from the community to those that pay them.

CONCLUSION

Climate funding directed towards land-intensive plantation projects impacts negatively on communities by undermining rural people's land-based livelihood strategies and leaves them more vulnerable to poverty and food insecurity. In its enthusiastic attempts to pass off environmentally and socially harmful tree plantation projects as sustainable and beneficial, Green Resources has exposed just how flawed the CDM is, and in doing so, has provided an invaluable warning to other potential participants in CDM projects. The findings of the research indicate that a working model to bring lives out of abject poverty requires a redistributive public investment regime that is based on enhancing people's current livelihood strategies. Development for communities with access to land should focus on ensuring high productivity, food sovereignty and food security at the household level. Beyond food security, the next level is to link this production with a market in order to increase household income. Increased food security and household income would improve the household health and access to education. The cumulative impact of this is increased production, which leads to improved standards of living, multiplies income and increases the asset base, brings the poor out of poverty to subsistence and then puts them on track to an improved standard of living. This, however, requires increased government action in the poor sectors of the economy as well as better planning and coordination. It means that sustainable development for communities should focus on enhancing what communities are already doing and mainstreaming such activities. It also means mainstreaming technological innovations which improve the quality of products and shorten their production time. Unfortunately, many African governments do not have a good track record in carrying out

these types of development plans which they see as cumbersome. Thus, they prefer to outsource development to private investors.

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- *Blessing Karumbidza is a member of the Timberwatch NGO Coalition and is a researcher for the Social Economic Rights Institute (SERI), http://www.seri-sa.org/, in Braamfontein, Johannesburg.*
- *Wally Menne is the projects co-ordinator for Timberwatch, http://www.timberwatch.org*

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Of InfraREDD and InfoREDD

When biodiversity is reduced to biomass the climate is ripe for biopiracy

Pat Mooney

http://pambazuka.org/en/category/features/67536

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New mapping technologies make it easier to collect data on biodiversity, making biopiracy easier and taking intellectual property out of the hands of indigenous communities. 'New forms of biopiracy and new strategies for biomass control may mean that the realisation of rights, benefits and justice for indigenous peoples are receding,' Pat Mooney writes.

When the UN Convention on Biological Diversity (CBD) was adopted at the Rio Earth Summit in 1992, we coined the term 'biopiracy' to argue that the treaty signaled the biggest grab of indigenous knowledge and sovereign resources in 500 years. While claiming to establish national authority over the biodiversity within national borders and creating a modest (albeit welcome) space for the participation of indigenous and local communities, the de facto impact of the CBD was to establish that all of the biodiversity (genes and species) pirated by colonial powers prior to 1992 and kept in zoos, herbaria, botanical gardens or gene banks instantly became the legal property of the coloniser. In one myopic moment, all the biodiversity that had been collected (and studied and considered to have value) became the heritage of the thieves; leaving to indigenous peoples and post-colonial governments all the remaining biodiversity not collected and not known to have value. This was presented as a great victory for the people.

In the intervening 18 years, indigenous peoples and the governments of the global South have been fighting an uphill battle to gain acceptance of some kind of 'access and benefit sharing' deal that would be both fair and financially beneficial. Some now believe the goal is in sight while others fear it is slipping away – overridden by new tactics and technologies.

As much as the 1992 Convention imposed a mass intergovernmental amnesia that wiped away history, new developments at the CBD and under the so-called Reducing Emissions from Deforestation and Forest Degradation's (REDD+) agenda at the UN Framework Convention for Climate Change (UNFCCC), may allow new technologies to commercialise the biodiversity that has yet to be commodified, enabling a new wave of plunder of the territories of peasants and indigenous peoples. For instance, until now, forests have not been considered 'carbon sinks' within the Clean Development Mechanism (CDM) of the UNFCCC, because, among other reasons, of the difficulty of quantifying the amount of carbon dioxide they absorb. New technologies, including satellite surveillance, are capable of detecting the changes in forest biomass. The application of these technologies would necessarily lead to increased surveillance not only of 'trees', but the whole forest, as well as the indigenous peoples who live there. Furthermore, digital and genomic technologies will upload the remaining biodiversity onto the Internet where it can be modified and monopolised by those with sufficient techno prowess. Once digitised, the living biodiversity may become commercially irrelevant and the land ploughed to more profitable purposes in the service of the new Carbohydrate Economy.

INFRAREDD BIOMAPS

Satellites and fixed-wing aircraft can now combine to map and monitor (in three dimensions) tropical biomass in ways not imaginable when the Biodiversity Convention came into force. Cameras mounted on light aircraft or helicopters can use hyper-spectral imaging to analyse visible and infrared wavelengths that reveal variations in vegetation. Precise light measurements expose soil nutrients identifying not only the type of surface vegetation but what lurks beneath. The technology was originally developed to find burial sites but has branched out to service a multitude of interests from archaeologists to the CIA, and now to facilitate the privatisation and commercialisation of the 'air' of the forests.

The potential for biomapping (and biopiracy) is considerable. Plants are affected by the composition of the soil they grow on. Wavelengths in the range 400 to 2350 nanometres can be monitored from the air to detect any changes in water or soil chemistry. It is already possible for airborne police to identify human skin and determine whether the body is alive or dead.[1] The near-term possibilities include the aerial identification of proprietary crops or livestock with unique genetic traits or DNA markers and (importantly for indigenous and local communities) the opportunity to triangulate on soils, bugs or plants offering industrial uses. After it is pinpointed and pocketed, the biodiversity and its land can be used for other purposes.

In September, the Carnegie Institute at Stanford University announced that, with World Wildlife Fund and the Peruvian government, it had mapped over 16,600 square miles of Amazonian forest (about the area of Switzerland). While satellites mapped vegetation and recorded disturbances, the satellite images were complemented by a fixed-wing aircraft deploying Carnegie's proprietary LiDAR technology (light detection and ranging) to produce three-dimensional representations of the area's vegetation structure. On the ground, scientists converted the structural data into carbon density aided by a modest network of field plots. Carnegie's novel system brings geology, land use, and emissions data together to advise Peru – and anyone else with access to the data – that the region's total forest carbon storage weighs in at about 395 million tonnes with emissions of around 630,000 tonnes per year. The IPCCC estimate for carbon storage in the surveyed area was 587 million tonnes. However, under REDD-type programmes, Carnegie's high-resolution approach could yield more credit per tonne of carbon. [2] The system is also cheap. Peru's map costs US$0.08 per hectare and a similar map in Madagascar was only US$0.06.[3] So, in the world of carbon trading, how much biomass can the land produce?

The implications of these infraREDD technologies are substantial. It may be possible for industry or governments to cherry pick the biodiversity they currently regard as important while discounting and discarding the rest. Further, the technology may allow the tracking of the people in the forest influencing land rights negotiations. Additionally, the ability to assess the total biomass and its carbon value renders the biodiversity irrelevant and only the biomass commercially important.

INFOREDD – iBIO AND DIGITAL DIVERSITY

Complacency that industry can do without most of the world's biological diversity is terribly wrong – but that doesn't change the threat to biodiversity. Synthetic biologists – who insist they will be able to rebuild extinct species from scratch in their laboratories and build any new species commerce might desire – sometimes don't see the need to conserve the 'old stuff' just in case. At the beginning of this year, scientists at Cambridge University discovered a way to trick cells into reading DNA differently. The result is that instead of having only 20 amino acids from which to build virtually everything in nature, scientists now have 276 amino acids and claim they can construct almost any kind of living organism they imagine. In May this year, a company called Synthetic Genomics managed to construct the first-ever self-replicating artificial microbe – a species that has never before lived on earth. Now that they have established the 'proof of principle', synthetic biologists believe they can construct micro-organisms that can turn any biomass into food, fuels, pharmaceuticals or plastics.

New information technologies encourage their hubris. The International Barcode of Life project (IBoL) and the related Consortium for the Barcode of Life, hosted by the Smithsonian

Institution in the United States (which is not a signatory to the Convention on Biological Diversity), are mapping the genome of every known species, placing the electronic maps on the Internet. In addtion, thousands of samples are being sent voluntarily to the Smithsonian and other institutions of the global North, like the Biodiversity Institute of Ontario in Guelph, Canada. Once mapped, it will be theoretically possible for corporations – armed, perhaps, with the self-replicating technology patented by Synthetic Genomics Inc.– to download a genetic blueprint, tweak it at will, and construct new life forms. Life-science enterprises from pharmaceuticals to seeds might conclude that gene banks, zoos and botanical gardens – and conservation programs – are passé.

IBOL is not alone. One 'competitor' initiative called the Genome 10K project (dedicated to mapping the whole genome of 10,000 species) is expected to cost no more than US$50 million (US$5,000 per species). Again, it is expected the species map will be available to anyone with access to the Internet.[4]

Just like Carnegie's LiDAR technology, the cost of DNA sequencing is becoming negligible - a hundred-thousandth of what it was a decade ago. For example, the first human genome sequence (with 3 billion base pairs to assay) took 13 years and US$3 billion. Now, it can be read in 8 days for US$10,000. Oxford Nanopore Technologies and rival Pacific Biosciences both claim that within three years they will be able to map the human genome in 15 minutes for US$1000. Impressively, Pacific Biosciences says it will be able to assay a genome from a single DNA molecule.[5] If (or is it when?) that time comes, it will be possible to store a molecule of all the world's estimated 10 million species embedded on one side of a credit card-sized disc – with the digital map of each species ensconced on the other side… Eden take out.

Again, once digitized, the industrial world will see no need for biological diversity. Rain forests – or, more accurately, the land in which the trees stand – can be put to 'more productive' purposes maximising the production of biomass. According to some venture capitalists, the most important economic factor in the world today is that only 23.8 per cent of the world's annual terrestrial biomass finds its way to the marketplace – meaning that 76.2 per cent of the world's annual terrestrial biomass is available to be monopolised. At stake is the control over - not one but several multi-trillion dollar industries.

In 2010, the UN's Year of Biological Diversity, as indigenous and local communities and governments debate the fairness of an Access and Benefit-Sharing agreement and the rights of indigenous peoples, as well as their valuable contribution to conserving biodiversity,new forms of biopiracy and new strategies for biomass control may mean that the realisation of rights, benefits and justice for indigenous peoples are receding even further away than in 1992. For corporations, the issue is no longer who will own ecosystems and biodiversity, but who will be the new biomassters.

- *Pat Mooney is the executive director of ETC Group, http://www.etcgroup.org/en/about/staff/pat_mooney*

This article was originally written for the forthcoming No REDD! Reader compiled by Carbon Trade Watch, http://www.carbontradewatch.org and the Indigenous Environmental Network, http://www.ienearth.org. It highlights the dangers of REDD and REDD+ and features contributions from social movements and indigenous peoples' organisations worldwide.

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Eco-certification: Who watches the watchers?

Khadija Sharife

http://pambazuka.org/en/category/features/67521

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With raised consumer awareness about green issues, forestry companies have scrambled to acquire environmental certification. But as Khadija Sharife investigates, the credentials of those who keep an eye on the process is often murky.

More than half of the world's tropical forests have been devoured through market-driven consumption. But preventing global deforestation is not as easy a it sounds: the global supply chain from origin to disposal is rarely accounted for by self-regulated multinationals, from logging corporations to retailers. Yet the tide appears to be turning. Pressurised by consumer demand, companies such as Lidl, a leading German food retailer, have begun using 'green' certified wood fibre to manufacture products.

The movement that appears to have catalysed the paradigm shift, specifically targeting the vast ecological footprints of 'first world' consumers, is the Forest Stewardship Council (FSC), an international non-profit organization founded in 1993. Trained to interpret reality not as humans or even citizens but consumers, global populations have responded to the call through the only political tool accessible: wallets. The brand, adorning myriad products from toilet paper to books, is now worth US$20 billion - a massive increase from the US$5 billion estimated just three years ago (http://bit.ly/9Qo0kp).

FSC signifies a voluntary market-driven vehicle designed to introduce and implement a new value system structured around sustainability. There is even a day to commemorate the event - FSC Friday on 24 September. The system, present in over 50 countries, operates through services ranging from standards to trademarks and accreditation (http://bit.ly/bESZRZ).

Purchasing products branded 'green' by the movement, we're informed, constitutes a conscience choice to be 'part of the solution'. This is because, according to the FSC, the brand is the only system enabling consumers to invest in products protecting the rights of indigenous peoples, prohibiting 'conversion of natural forests or other habitat' around the world, the use of 'highly hazardous pesticides', and 'the cultivation of genetically modified trees'. Given that as much as 80 per cent of timber is illegally harvested in many developing nations, FSC's unique forest certification standard is not only backed by major 'green' muscle such as Greenpeace International and the World Wildlife Fund (WWF) but oftentimes it is perceived as the only acceptable system by organisations such as the American Green Building Council.

FSC is self-described as a membership organisation, comprised of concerned individuals and organisations. Members constitute the general assembly (GA), allegedly the decision-making body whose policies and standards are unanimously adopted by the FSC board of directors. The GA is divided into three chambers: environmental, social and economic, with representative directors reflecting equal status of all chambers (http://bit.ly/aRZBoj). According to the FSC, 'all policies and standards go through at least two rounds of public consultations. In these consultations everybody interested in the fate of the world's forests can comment.

'Buying FSC certified products is the only way to be certain that the interests of the forests, the species that live in them, and the people that rely on them to make a living are being considered,' stated Colin Butfield, head of the WWF-UK campaign (http://bit.ly/9ihUx4).

As far off as Romania and Bulgaria, timber-producing countries are acutely aware that first-world 'consumers' are increasingly active. To date, 120,052,350 ha have been certified (4.3 per cent of global forested land), an increase of 11 per cent since October 2009 (http://bit.ly/ad5K2e). Romania, for instance, now seeks to certify 40 per cent of forested land by 2011, with Bulgaria hitting lightly lower at 30 per cent (http://bit.ly/dunADd).

'If a European client is demanding an FSC certificate, timber companies are very motivated to get certified,' said Neli Dontcheva, head of Bulgaria's Forestry Certification Information Centre (http://bit.ly/dunADd). 'At the information centre we often get requests from people who have no idea what FSC is, but know that they must get certified or get dropped by their clients.'

Ironically, until 1997, when the FSC relaxed criteria, multinationals weren't biting. In 1993, just three approvals were issued. Relaxation allowed for multinationals to utilise the 'best standard' logo provided that 50 per cent of wood used came from acceptable sources. The remainder would make the cut on the basis of legal ownership of concessions.

In former Francafrique territories, French corporations exploited more than five times the legal concessions. According to one senior official at the Cameroonian Centre for Environment and Development based in Yaoundé, 'the police shy away from investigating the matter…because those who are profiting illegally from logging allegedly include senior police officials.' As one French national involved in the logging industry revealed to IPS, 'We're asked for bribes amounting to millions of CFA francs, and we often pay these out.'

France remained a key importer of illegally logged timber from Liberia during the reign of former president and warlord Charles Taylor. Taylor himself would admit that timber, logged by Dutch arms dealer Guys Kouvenhoven, generated 'more than half the gross national product', through Kouvenhoven's Oriental Timber Company (OTC). In 2001, for instance, OTC (accounting for 41 of 60 timber-loaded vessels departing from Liberia), exported timber to foreign buyers including France and China, two primary objectors to timber sanctions. Since 1996, in fact, half of all timber logged from Central Africa has been exported to Asia, namely China and Taiwan, making inroads in traditionally European strongholds through 'political non-interference' (http://bit.ly/9phlUX).

Taylor conceded during his trial that millions in 'covert' sums had been deposited into bank accounts from Taiwan. Yet even though downstream industries in importing 'South' countries such as Malaysia and China appear to represent demand, wood products are often exploited for the purposes of Western markets in Europe and the US. Beneath the emerging 'Asian' face of resource-hungry investors, lies the same old market driven logic, structured around comparative advantage, 'legality' in property rights, and the notion of the market as the most 'efficient allocator' of resources.

The dubiousness of legality is further compounded by the opacity through which corporations are certified, chiefly via auditing institutions such as SGS S.A., worldwide accredited and 'deputised' by FSC as watchdogs.

The company states, 'SGS Qualifor is the world's leading and most recognized forest certification program. Since 1994, wood processing enterprises and wood product producers have achieved the SGS Qualifor certification in 60 countries around the world (http://bit.ly/9Q2OeI).'

SGS, a Geneva-based auditing firm specialising in inspection and certification, supplies the forestry industry with both training as well as a chain-of-custody certification system including, 'audit of the transport and transformation of wood-based products from the forests, through processing, to final product at consumer outlets (http://bit.ly/9Q2OeI)'.

BUT WHO WATCHES THE WATCHERS?

The choice of Geneva, Switzerland as its corporate residence is far from accidental. Similar to the multinationals that require external auditing for accountability purposes, SGS

intentionally selected the only legal jurisdiction in the world characterised by complete opacity. This extends from banking secrecy and protected cell companies and sealing off of assets, to secretive ring-fenced legal and financial environments requiring little or no disclosure concerning beneficiaries, ownership and internal financing structures.

SGS was already a 90 year old business by the time the IMF and World Bank came knocking in the early 1980s via the pre-shipment inspection (PSI) industry. By the early 1990s, one quarter of SGS's revenues, reported at US$1.2 billion, was generated from PSI and the company maintained a presence in 140 countries, with just 40,000 staff. SGS would later be retained by the Bank, this time in an official capacity, as the Bank's 'global auditor' to conduct 'spot audits' in Kenya and other countries to sniff out corruption (http://bit.ly/aywlnC).

By 1997, SGS admitted to paying 'substantial commission' – conservatively estimated at US$15 million - to Pakistan's President Benazir Bhutto and her husband. Pakistani officials believe that, cumulatively, Bhutto and hubby made off with US$1.5 billion in total from a variety of sources. SGS payments were remitted in true SGS-style through shell entities incorporated in secret jurisdictions such as the British Virgin Islands. Two years later, SGS was banned from operating in Ethiopia for similar reasons. Of course, SGS was interlocked with, and even represented by, systemically powerful interests and persons, such as James Woolsey, a former CIA Director who listed SGS as a client (http://bit.ly/ao5eO4).

Following the boom and bust of SGS's PSI industry, and despite receiving an average of 12 per cent revenue from countries such as Zimbabwe, Madagascar and Indonesia, SGS shifted to certification targeting private industries rather than countries. More crucially, it also began focusing on eco-certification.

Despite mass deforestation through illegal logging and commercial and monoculture development taking place across the continent, Africa hosts a minute presence with just 2.9 per cent of forest cover certified by the FSC. Countries experiencing mass deforestation such as Cameroon and the Republic of Congo, chiefly through China and France, have certified just 2.7 per cent and 3.3 per cent of land. This is, of course, save for South Africa, a 17.8 per cent (1,567,811 ha) - averaging one-fifth of the continent's overall FSC certification.

Within South Africa 80 per cent (2005) of FSC-certified forests constitute industrial timber plantations (ITPs) composing 1,34 million and 1,8 million hectares of monocultures initially developed by the apartheid regime as a means of independently sourcing wood products (http://bit.ly/cmjULF).

The initiative began with state-led plantations between 1920 and1960. The development of ITPs under Mondi and SAPPI in the 1980s was preceded by the lucrative undertaking of private companies in the 1960s. The government established a tax incentive system, such as the general export incentive scheme, later voided by the ANC liberation government in 1994 (http://bit.ly/afOZzn). During that time expansion accounted for 45,000 ha annually (1990s), five times that of indigenous forests. By 1996, the Natal Agricultural Union reported an 82 per cent reduction in stream flow over a 20 year period in areas where grasslands were 'developed' by commercial plantations.

The ANC government further emphasised the importance of plantations to growth, gender income and employment. 'Forestry makes a significant contribution to the economy,' revealed Lindiwe Hendricks when Minister of Water Affairs and Forestry. 'In 2006 this contribution amounted to approximately R14 billion and 170,000 people were employed in the sector, which includes about 30,000 small scale growers most of whom are women. With forestry being a rural activity, this sector has enormous potential to contribute to the economy and to job creation.'

The two giants dominating the industry are Mondi and SAPPI. Mondi, formed by Anglo-American in 1967, manages over 450,000 ha with 35,000 employees in more than 30 countries. SAPPI, a global paper and pulp company incorporated in 1936, holds 465,000 ha in SA, with a further 75,000 ha in Swaziland (2007). By 2007, the company manufactured five million tonnes of paper and three million tons of pulp. While percentages of timber products from total exports have increased from 3.4 per cent in 1992 to 3.8 per cent in 2002, timber's

contribution to GDP has decreased in proportion from 2.2 per cent in 1992 to 1.6 per cent in 2002.

Water intensive plantations, covering 1.2 per cent of land, far outweigh natural forest cover (0.3 per cent). Mpumulanga holds 42 per cent of plantations, followed by Kwa-Zulu Natal, which accounts for 38 per cent, and the Eastern Cape, which accounts for 11 per cent. Plantations correspond to the poorest rural communities, aided by unchecked depletion of water sources, displacement, and the 'capture' of fertile land for monocultures.

Beyond ITPs, the reality of corporate 'self-regulation' - and the externalized social and ecological costs, often concealed under the guise of corporate social responsibility, is not limited to communities living in close proximity to the plantations.

In 2010, Mondi was named one of the top three polluters in south Durban, thanks to the company's paper mill (http://bit.ly/9atagv). 'My nose is painful from inhaling the air here. I just can't believe how people exist here like this. This is not normal air,' said Zodumo Mbuli, a spokeswoman for the Ministry of Environmental Affairs in 2003 (http://bit.ly/bulyuv). Meanwhile, in 2010, SAPPI came under fire in Durban for polluting a critical conduit between sea and land, the Thukela River, with highly toxic chemicals. Despite serious complaints, little has been done. 'I would have expected some clarity from the department of water affairs by now on what actions have been taken, and what recourse there is,' said Rudy van der Elst of the Durban-based Oceanographic Research Institute.

'The department has a responsibility to clarify the position for the public - but the reports of dead fish, the strong odour in the water and treatment with hydrogen peroxide are indicative of a serious problem,' he was quoted as saying by The Mercury newspaper. (http://bit.ly/aLrIQ0)

But such realities are not accounted for by FSC's green-washed branding. According to Timberwatch, a South African civil society organisation, 'The first FSC "forest" certification in South Africa was awarded in 1997. According to the timber industry, SA now has a far higher percentage (80 per cent) of its plantation area certified than most countries, but this is misleading. If the areas under illegal plantations and unmanaged feral trees were taken into account, it would be under 40 per cent.' (http://bit.ly/cmjULF)

The consequences, claims the organisation's report 'Life As Commerce', have been to grant respectability to historical and current destructive aspects of the timber industry, including:

- Community displacement, land dispossession, and social disruption
- Destruction of biodiversity resources and the natural landscape
- Impacts on water resources, drying out of wetlands and aquifers
- Pollution of rivers, streams and wetlands with pesticides, oils and fertilisers
- Contamination and compaction of soil within plantation areas
- Accelerated soil loss on site and increased downstream erosion. (http://bit.ly/cmjULF)

The report cites the example of Hans Merensky Holdings (HMH) in two provinces - Kwa-Zulu Natal (Singisi Forest Products) and Limpopo (Northern Timbers). Both are certified by SGS Qualifor (2003 and 2000). Interestingly, though HMH's activities were packaged as a shift toward the private sector, as the author's go on to reveal, 42.6 per cent of shares at the time were held by the Industrial Development Corporation (IDC), a 'wholly owned government entity within the national department of trade and industry (DTI). The decision to sell off the plantation holdings through government asset restructuring was allegedly prompted by the need for government to remove a conflict of interest in its role as an impartial regulator and industry player. But assets were merely shifted from one state enterprise, the South African Forestry Company Ltd, to another, the IDC.

South Africa holds one of the world's largest timber estates. As such, the need for a regulator without vested interests is fundamental to upholding human and environmental rights. The poverty innate in areas converted to alien plantations is characterised by, amongst other aspects, massive outsourcing and sub-contracting, rendering SAPPI a management shell, with significant reductions in direct employment.

Nonetheless, FSC certification - and auditors like SGS - are blind to these externalised realities.

Market-driven eco-certification, says Cori Ham, oftentimes has the opposite effect: 'As a net exporter of forestry products, South Africa's procurement of new markets and securing of existing markets were critical. The forestry industry saw certification as a marketing tool and accepted it fairly easily. What makes this certification effort more remarkable was that it took place without a national FSC standard and with very little government intervention.'

FSC certification has proved to be a powerful mobilising mechanism motivating for environmental justice. The real question is whether the brand delivers a solution for the environment, communities and consumers, or a green-washed veneer enabling corporate criminals and governments to engage in business as usual.

- *Khadija Sharife is a journalist and a visiting scholar at the Centre for Civil Society (CCS) based in South Africa.*

Is seed recuperation possible?

A story from Kathulumbi village in Kenya

Anne Maina

http://pambazuka.org/en/category/features/67531

Residents in the village of Kathulumbi in Kenya are building a seed bank to help strengthen biodiversity and access to uncontaminated seed varieties. Traditional staples like cassava and millet have been largely replaced by more cheaply available genetically modified varieties of maize. By preserving traditional seed varieties, villagers in Kathulumbi want to make seeds affordable, sustainable and more nutritious than their genetically modified counterparts.

As the sun rises this early February morning, Mumo jumps from her bed to prepare the family breakfast delicacy, millet porridge. She and her family like to take porridge for breakfast as it is filling and can get them through the day without lunch. Once in a while they take the porridge with sweet potatoes or cassava but these are hard to come by these days. Bread has become very expensive and Mumo says she cannot afford it for breakfast. Even the millet has to be sourced from far away, where some farmers still grow it and the prices sometimes are too expensive.

Mumo and her five children live in Kathulumbi village, about 100km outside of Machakos town in the Eastern Province of Kenya. She was recently widowed and was forced to move to the family plot since she could not afford the rent in Machakos town where she was teaching in a primary school.

TRADITIONAL CROPS IN DECLINE

Mumo grows predominantly maize on her quarter-acre plot because it is the staple grain for preparing ugali, or sima, as some would call it in Kenya. She says remembers when she was young people grew and consumed more of the traditional tubers and crops like yams, cassava, millet and sweet potatoes. But things seem to have changed with modernisation. Is this why people are no longer healthy and suffer numerous diseases? Even young children now have diabetes.

When 'Mrs. Mumo', as her students called her, moved to Kathulumbi, she found the community organised into a group calling itself Kathulumbi Seed Bank Community Development Committee. The local chief, Maleve, urged her to join the group and support the community in their development efforts.

PARTNERS IN BIODIVERSITY

Kathulumbi Seed Bank Community Development Committee works closely with the INADES Formation in Kenya. INADES is an active member of the African Biodiversity Network (ABN). ABN is a network of African organisations working in 12 countries, seeking to revive biodiversity and associated knowledge from the ground up, hand-in-hand with communities.

ABN works on the principle that the traditional ecological knowledge held by Africa's communities is the key to ensuring the long-term resilience of the continent's forests, ecosystems, food security and dignity. The ABN supports the Kenya Biodiversity Coalition (KBioC), a consortium of more than 65 farmer organisations, animal welfare networks, consumer networks, faith based organisations; and community-based groups. Members are stakeholders and have an interest and work in the areas of environment, agriculture and biodiversity.

MAGIC MAIZE SEEDS CAUSE TROUBLE

Why a seed bank? The community in Kathulumbi area realised that with the introduction of new seed varieties from companies in Nairobi, food production went down. The older members of the group remembered a time when well-dressed officials of multinational companies came to the village and introduced the 'magic maize seed' which was said to produce more than local indigenous varieties. They were supplied with fertilizers and pesticides together with the 'magic maize seeds'.

In the first few seasons, yields went up prompting more people to allocate more of their land to maize production. However, with time, the soils required more fertilizers and pesticides to tackle pests like the maize stock borer. The biggest challenge was that in case of a delay or insufficient rainfall, the maize crop died before maturity. The farmers previously used to save their seed for the next season, but with these new seeds, they needed to buy new ones from the local agro-veterinary shops, otherwise the yield would be compromised.

The local extension worker called these seeds 'hybrids'. There was even talk of genetically modified organisms. With support from KBioC, some of the seeds sold at the agro-veterinary shop were tested and found to be contaminated with GMOs. To make matters worse, the maize harvested started developing aflatoxins, which can be toxic if consumed.

BUILDING THE SEED BANK

The community was at loss. The elders held a special council meeting to discuss the food security challenges they faced. They discussed and realised that the biggest mistake they made was to forget their indigenous and traditional foods. There is a popular Swahili saying that says, 'Usiache mbachao kwa msala upitao', which means, 'Do not leave what you have at hand, for a passing cloud'. The elders resolved to take a lead in reviving and revitalising local seed varieties that had always withstood the test of time.

The role of women in the recuperation of local seed varieties was seen as key in ensuring the community at Kathulumbi was able to achieve food self-sufficiency. Older women were tasked with passing on this skill to the younger and professional women like Mumo. This traditional seed saving system was not all about yield, but encompassed all cultural aspects. Seed was chosen for special ceremonies like making millet beer for weddings. Different seed was also selected for different seasons. In times of little rainfall, the more hardy seed was planted. There was also a variety of crops planted, not just maize. Cassava, yams and millet are some of the hardy crops that were supplemented.

Mumo says she was happy to join the community in its efforts to revive and recuperate traditional seed varieties. With support from Arid Lands Resource Management Project, a community seed bank was built and people were encouraged to save and share varieties that had almost become extinct.

Now, the farmers in the community do not have to buy seed from the shop every season, since local varieties can be selected and planted without compromising on their productivity. Children no longer suffer from malnutrition and lack of a balanced diet. They now eat healthy meals.

The year 2010 has been blessed with sufficient rains, and yet in February, the Kenyan government approved the importation of over 280,000 tonnes (3.2 million 90kg bags) of a mixture of genetically modified maize into the country. This is in spite of the Kenya Biosafety Act 2009, which has not yet taken effect through the enactment of relevant regulations.

The walk towards a seed-secure Kathulumbi is still long and there are many challenges, especially with the threat of GMO contamination. The people of Kathulumbi want their area to be a seed-diverse and GMO-free zone, and they are keen to ensure that it happens. The challenges are great but they have begun a new thing.

- *Anne Maina is with the African Biodiversity Network (http://africanbiodiversity.org/abn_old/index.html)*

Geoengineering the planet: What is at stake for Africa?

Diana Bronson

http://pambazuka.org/en/category/features/67522

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Geoengineering is playing an increasingly more prominent role in northern-led approaches to tackling climate change, writes Diana Bronson, with proponents dismissively oblivious to the social and environmental consequences for populations around the world.

While geoengineering – the intentional large-scale modification of the earth's systems, including systems related to climate – may sound like science fiction, it is in fact an increasingly hot topic in climate change policy circles of industrialised countries. Less frequently discussed are the impacts this emerging policy orientation – and the technologies if they were ever deployed – will have on Africa.

With the publication of the UK Royal Society's report last year,[1] meetings organised by the National Academy of Sciences, parliamentary and congressional hearings on the topic in the UK and the US,[2] millions of dollars flowing in research funds from both well-known billionaires (such as Bill Gates, formerly of Microsoft, and Richard Branson of Virgin Airlines)[3] and new programmes on their way,[4] it is time for civil society actors and governments in the rest of the world to take notice. In fact, an international, transparent, democratic debate on these strategies and technologies is long overdue.

Changing the climate, as is obvious by the unintentional damage already inflicted on this overstretched planet, is not something that will respect national borders. Geoengineers (scientists, entrepreneurs and policy advocates) have a number of technologies they propose to study, experiment and eventually use. They fall into three broad categories:

1. The first set of geoengineering strategies is known as solar radiation management (SRM). These proposals aim to reduce the amount of sunlight reaching the planet by reflecting more of it back to space, therefore reducing atmospheric warming. This is known as increasing the Earth's albedo. SRM proposals include shooting massive amounts of sulphur dioxide or aluminium aerosols or engineered nanoparticles into the stratosphere, making clouds whiter by spraying seawater at them, covering deserts with plastic, painting mountaintops white or creating a layer of foaming bubbles on the surface of the ocean.

2. The second set of technologies is composed of attempts to draw mega-tonnes of greenhouse gases out of the atmosphere and lock them up either biologically or mechanically. Examples include dumping iron (or urea) into the sea in order to 'fertilise' areas that are poor in nutrients, thereby stimulating the growth of tiny phytoplankton, which will theoretically sequester C02 from the atmosphere in the bottom of the sea. This has never actually worked. Also in this camp are suggestions to change the chemistry of the ocean to improve C02 absorption (known as enhanced weathering), artificial trees or carbon-sucking machines and appropriating and burning forest and crop residues into a charcoal that is subsequently buried for carbon sequestration (called biochar).

3. A third set of geoengineering proposals dispense with controlling the climate and attempt instead to directly control weather – intervening to reduce or redirect hurricanes or seeding clouds for rainfall in drying regions. Such technologies are widely practiced (150 incidents in 40 countries according to one report)[5] and are often connected to military objectives and institutions, being used most famously by the US to impede enemy troop movements during the Vietnam war. Often discussions of geoengineering omit weather modification, but as historian James Fleming has convincingly shown in his book 'Fixing the Sky', the historical and philosophical roots of contemporary geoengineering proposals are found in much older attempts to control the weather.

All of these proposals will have social and environmental impacts that will be felt far away from where the decisions to deploy would be taken. In fact, as the scientific discussion gets more elaborate, and geoengineering gains credibility in Washington and London as climate 'plan b', the whole question of how such technologies could be internationally governed emerges. Increasingly, geoengineering advocates are dismissing the multilateral approach where all countries have a seat at the table and are speaking of 'bottom-up' or 'soft-law' or 'voluntary guidelines' as a stand-in for binding international law.[6] Seemingly oblivious to the fact that industrialised countries have sabotaged every sensible multilateral approach to climate change, they are now saying that more informal governance arrangements are required. Perhaps global governance by the OECD (Organisation for Economic Co-operation and Development), the G20 or the Major Economies Forum? Or simply a coalition of the willing – anything but the United Nations, where all countries have a seat at the table.

STRATOSPHERIC AEROSOLS … AND IMPACTS ON THE GROUND

One of the most talked about 'solar radiation management' technologies involves shooting tiny particles of sulphur dioxide or aluminium into the upper layer of the atmosphere known as the stratosphere (up to about 50km from earth). This essentially imitates large and powerful volcanoes by spreading dust, so that more sun gets reflected back to space than would naturally be the case, thereby creating a cooling effect without in any way reducing the amount of greenhouse gases in the atmosphere.

This artificial cooling is treating the symptom rather than the cause of global warming and is liable to entail many negative side effects. No one really knows exactly what those effects will be because computer models are notoriously simplistic and cannot accurately predict how a complex climate system will react to attempts to engineer it. Nor do even the best scientists really understand how the climate system works. Nevertheless, one effect that does show up on several computer simulations as well as historical record (after Mount Pinatubo erupted in 1991) is less precipitation and more disturbances in the African and Indian monsoons. Needless to say, this would cause a massive disruption in agricultural production, potentially threatening the food supplies of up to 2 billion people.[7] Other negative impacts of this technology could include whiter skies, damage to the ozone layer, less effective solar energy, obstruction of astronomy, continuing ocean acidification and a host of unknown other ecosystem disturbances. Finally, if the injections needed to be

stopped, very quick and very dangerous warming would occur without any time for human or ecosystem adaptation.[8]

This is also one of the most centralised of the technologies, and is arguably very cheap to execute and quick to cause an impact. Military institutions and contractors would certainly be used to develop the hardware (Boeing, for instance, is already working on this). A single state, a small coalition of countries, a corporation, or even an individual could execute such a plan for a relatively modest sum. Furthermore, who would decide at what temperature the earth's thermostat should be set? Who would control the size of the particles to be used? And who would have the power to cancel such an experiment should its effects be worse than anticipated? Wars are fought over much less.

Finally, there is no 'field' where the 'stratospheric option' can be tested – we have but one planet earth. While one very small-scale test has already been done in Russia,[9] it could not actually prove anything about how aerosols would act if deployed at the massive scale that would be required in order to affect the climate. As Alan Robock and his colleagues have written:

'… geoengineering cannot be tested without full-scale implementation. The initial production of aerosol droplets can be tested on a small scale, but how they will grow in size (which determines the injection rate needed to produce a particular cooling) can only be tested by injection into an existing aerosol cloud, which cannot be confined to one location. Furthermore, weather and climate variability preclude observation of the climate response without a large, decade-long forcing. Such full-scale implementation could disrupt food production on large scale.'[10]

BIOCHAR OR CHARCOAL FOR THE EARTH

Biochar is without a doubt the geoengineering technology that already sees Africa as its preferred testing ground. Unused agricultural 'waste', or crops and wood from trees grown for this purpose, are burnt under low-oxygen conditions in a process known as pyrolisis (a type of gasification) and then added to the soil where they remain stored allegedly for 'hundreds to thousands of years'.[11] In addition to supposedly safely sequestering carbon, the process delivers bioenergy as a by-product that can replace some fossil fuel uses. Already, biochar projects are underway in Burkina Faso, Cameroon, Côte d'Ivoire, Democratic Republic of Congo, Egypt, Gambia, Ghana, Kenya, Mali, Namibia, Niger, Senegal, South Africa, Tanzania, Uganda and Zambia.[12]

There is a huge amount of hype about biochar, and people who are desperate for solutions can be surprisingly credulous. Consider this interview with Laurens Rademaker from the Biochar Fund, a 'social profit' that is 'cash-flow positive' offering 'investment opportunities':

'The benefits to these farmers are instant and very significant. With biochar, they can jump from being undernourished to well-fed, and from subsistence farmer to a peasant that can sell some surplus—after only one or two harvests.'[13]

None of this has been scientifically proven and most of it is profoundly illogical. In fact, no reliable studies on the long-term impact of biochar on soils have been done. Sometimes parallels are drawn with the ancient Amazonian practice of terra preta, but they have more to do with public relations than science. We do not know for example how different feedstocks affect biochar's chemical and physical properties; or about its long-term stability in the soil; and then the social and economic constraints and impacts have barely been thought about.[14] UNEP (United Nations Environment Programme) advises that biochar plantations should be treated with great caution and that the impacts on long-term agricultural sustainability and biodiversity are unknown.[15] But this does not stop the carbon profiteers and charlatans from promoting it: in fact ConocoPhilipps Canada, which is involved in Alberta tar-sands production, is actively working to get biochar accredited in international carbon markets![16] It is what Eduardo Galeano would call upside-down: dirty oil that digs up long-buried carbon as fossil fuels and then buys carbon credits by burning up living carbon in Africa using a technology that is highly contested, but that markets itself as a solution.

The other main problem with biochar is the huge amount of land that would be required for its industrial production – hundreds of millions of hectares. If every last stalk and twig is grabbed to be burnt and buried, biodiversity would be undermined, soil nutrients would be robbed and people (especially those with insecure land tenure) would be forced off their land. Diverse and carbon-rich ecosystems would be further disturbed and commercialised as every last bit of nature is subjected to carbon markets that work in favour of those who design the rules and control the capital – and allow the overproduction and overconsumption of the industrialised North to continue unabated.[17]

2010 is the International Year of Biodiversity and it is also a year of critical decisions on these planet-altering schemes. The Convention on Biological Diversity (CBD) will hold its biannual Conference of Parties (a meeting of environment ministers from 193 countries) in Nagoya, Japan, in October 2010. That meeting will take stock of the crisis of biodiversity with species extinction, deforestation, overfishing and the energy and climate crises fighting for space on its agenda. Some voices at that meeting will seek to protect biodiversity from the ravages of overconsumption, monocultures, fossil fuel addiction and rampant urbanisation. Others will promote growth, market mechanisms and techno-fixes above all other considerations, blindly commodifying every last bit of air, land and sea. This latter group are liable to see geoengineering the earth as an option to be considered, rather than a dangerous practice to be stopped.

At the meeting of the CBD's Scientific Body on Technical and Technological Advice (SBSTTA), which met in Nairobi in May 2010, a moratorium on geoengineering activities was proposed: '[N]o climate-related geo-engineering activities [are to] take place until there is an adequate scientific basis on which to justify such activities and appropriate consideration of the associated risks for the environment and biodiversity and associated social, economic and cultural impacts.' This resolution alone will not be enough to stop the scientific hubris and political arrogance behind geoengineering, but it would at least stop the most aggressive entrepreneurs from being able to conduct experiments while the majority of the world's peoples and governments have only just begun to learn what these technologies are. It is vital that African countries and other members of the G77 and China stand firm on this moratorium and put the policy emphasis back where it belongs: on the responsibilities of the wealthy countries who caused the problem of climate change in the first place.

The CBD adopted a moratorium on ocean fertilisation back in 2008 and it has been largely successful, despite the Lohafex experiment which sailed off South African shores in early 2009.[18] Since then, the science on ocean fertilisation has overwhelmingly discredited the practice, with well-known oceanographers urging us all that 'it is time to move on.'[19] We must build on this precedent and ensure that no geoengineering experiments be allowed to take place on land, in the seas or in space. A civil society campaign calling for precisely such a moratorium on geoengineering experiments was launched earlier this year at the World Summit on Climate Change and the Rights of Mother Earth, hosted by the Bolivian government. It is called Hands Off Mother Earth, or HOME, http://www.handsoffmotherearth.org.

You can join the movement by sending your photograph – with your hand up to signal your opposition – a message of support to photo@handsoffmotherearth.org.

- *Diana Bronson is a member of ETC Group, http://www.etcgroup.org/en/about/staff/diana-bronson*

NOTES

[1] Geoengineering the Planet: Science, governance, uncertainty, Royal Society 2009 available at http://bit.ly/9g61pk

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[3] Bill Gates has given $4.6 million to geoengineers David Keith and Ken Caldeira and when this became a media controversy, the Fund for Innovative Climate and Energy Research disclosed what projects it had funded. http://bit.ly/91UBs2 Branson runs the Carbon War Room: See www.carbonwarroom.org which has battlefields and theatres of war concerning geoengineering technologies.

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[16] Chris Mooney, Copenhagen: Geoengineering's Big Break, 14 December 2009 available at http://bit.ly/bkDfuy
[17] An excellent briefing on the problems of biochar is by Almuth Ernsting and Rachel Smolker, Biochar for Climate Change Mitigation: Fact or Fiction? February 2009 available at http://bit.ly/9eh99e
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[19] Aaron Strong, Sallie Chisholm, Charles Miller & John Cullen Nature, Ocean fertilization: time to move on 461, 347-348 (17 September 2009); Published online 16 September 2009

Voices of resistance and hope from the World People's Conference on Climate Change

Silvia Ribeiro

http://pambazuka.org/en/category/features/67539

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Silvia Ribeiro summarises the outcomes of the World People's Conference on Climate Change and the Rights of Mother Earth, held in Bolivia this past April. The Accord of the Peoples, the product of the meeting, highlights the destructive nature of industrial agriculture, agrofuels and new technologies such as transgenics, 'terminator technologies' and nanotechnology.

TIQUIPAYA, BOLIVIA – More than 35,000 people responded to Bolivia's call for the World People's Conference on Climate Change and the Rights of Mother Earth (PWCC) in Cochabamba this past 19-22 April. Participants hailed from 142 countries on five continents, and represented social movements, peasants, indigenous groups, environmentalists, fishers, and women's groups. In addition to government representation from 47 countries, the

conference brought together academics, intellectuals, activists, artists, and musicians. Throughout the conference, participants focused their energy on the 17 working groups set up by the conference organisers and 127 self-organised workshops. One of the biggest indigenous federations in Bolivia, the National Counsel of Ayllus and Markas of Qullasuyu (CONAMAQ), along with other groups, set up the 'Working Group 18' to discuss issues they felt were not reflected in the conference schedule, such as critical dialogue on mining, gas and petroleum projects.

Summit participation exceeded expectations both in terms of numbers and content, becoming a historic achievement in the international climate crisis debate. While the powerful governments maneuvered in Copenhagen, Bolivia provided a platform for social movements and local communities from around the world to express their positions and demand that governments take heed. The conference also affirmed the networks and interactions between social movements, with an outlook of creating new global networks to tackle the climate crisis. The majority of participants felt that what is most needed is not a new international structure but rather more interaction and complementarity among existing movements.

The conference created a common base for the critical analysis and strategies to address the climate crisis, enriched by diverse perspectives from many cultures, peoples, and organisations from the continent and the rest of the world. The People´s Agreement on Climate Change and the Rights of Mother Earth http://pwccc.wordpress.com reflects this vision.

There was an energetic and repeated rejection of the Copenhagen Accord, the agreement developed by the countries most responsible for the climate crisis and presented last December by the UN Climate Change Conference (COP15) to the United Nations Convention Framework on Climate Change (UNFCCC). The cynical 'commitments' that were agreed to in Copenhagen will mean a rise in average temperatures by up to 4 degrees Celsius, a catastrophe in the eyes of the people of the global South.

The PWCC, in contrast, is pushing for a halt to global climate change, or 'decolonising the atmosphere', calling on industrialised countries to reduce their greenhouse gas emissions by 50 per cent. The PWCC rejects carbon market mechanisms in all their forms as a climate change solution. The PWCC also rejects REDD mechanisms on the grounds that they lead to the alienation of community forest management and promote tree monocultures.

At the heart of the PWCC critique is an impeachment of the real causes of the climate crisis. In the words of the Accord of the Peoples: 'We are confronting the terminal crisis of the model of patriarchal civilisation based on submission and destruction of human beings and nature that was accelerated with the industrial revolution. The capitalist system has imposed a logic of competition, progress and unlimited growth. This regimen of production and consumption seeks infinite profit, separating human beings from nature, establishing a logic of domination over nature, and converting everything into commodities: water, earth, human genes, ancestral cultures, biodiversity, justice, ethics, the rights of peoples, death, and life.'

The People's Accord condemns industrial agriculture and agribusiness corporations – directly responsible for half the emissions causing the climate crisis – as well as the mechanisms and proposals that support the advancement of transnational corporations and the devastation of Mother Earth. In particular, the Accord cites free trade agreements, the introduction of new and risky technologies such as transgenics, 'terminator technology', nanotechnology, geoengineering (climate manipulation) and agrofuels.

'We denounce the way that the capitalist model imposes infrastructure mega-projects, invades territories with extractive projects, privatises and commodifies water, and militarises territory, driving out indigenous peoples and peasants from their territory, impeding food sovereignty and deepening the social/environmental crises,' the Accord reads.

The declaration of 'Working Group 18' emphasises similar issues, criticising the Bolivian government's policies and projects of extraction and exploitation of hydrocarbons and mining. The declaration clarifies that the initiative was not meant to be 'a tribune to discredit the government nor to undermine the legitimacy of a conclave that we feel a part of… it is

about formulating proposals that help to right the course of change, taking on the responsibility to defend it and protect it, as conceived by the popular Bolivian social movement over many years of struggle.'

The PWCC also put forth strategies and proposals like reclaiming climate debt, the creation of the International Tribunal of Climate Justice, and the Universal Declaration of Rights of Mother Earth. The greatest challenge continues to be putting food sovereignty – based on peasant, indigenous and local ways of life and production – into action. Ultimately, promoting social justice and biodiversity and bringing the planet back to equilibrium depend on making food sovereignty a reality.

All this and more will be brought to the COP16 of the UNFCCC in Cancun, Mexico, from 29 November to 16 December this year, where the official climate negotiations will take place. Cochabamba has definitively become a building block in the climate crisis campaign and for civil society and social movement action around the world.

- *Silvia Ribeiro is a researcher and programme manager at ETC Group, http://www.etcgroup.org/en/about/staff/silvia_ribeiro*

For more on Bolivia's emerging global climate movement, watch Avi Lewis, host of Al Jazeera's program 'Fault Lines', as he travels to Bolivia and explores the country's climate crusade from the inside in the episode 'The other debt crisis: Climate debt'.

Biotechnology and dispossessions in Kenya

Khadija Sharife

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Kenya's agriculture has a history of producing for lucrative exports while the government upholds the marginalisation of dispossessed groups and reports of famines, writes Khadija Sharife. Resources that should be sustainably used to tackle Kenya's famines are depleted, Sharife argues, as part of a disturbing, broader trend which sees land completely dominated by elite interests and in which '[o]wnership that could be allocated to those requiring land for food production is instead shifted to those with capital (foreign) or political access.'

From 1998–2000, when food aid constituted almost 25 per cent of total imports, and 23 per cent of children were classified as underweight, just 10 per cent of Kenya's large-scale farms were productive. The rest remained idle for speculative purposes, such as foreign investment. More than a decade later, at a time when horticulture has become the country's most viable industry, exporting 450,000 tonnes annually worth of fruits, flowers and vegetables such as baby corn, tomatoes and green beans (2009), the Kenyan government declared famine a state of emergency, thanks to the drought affecting one in ten Kenyans, specifically Maasai pastoralists.

Historically, until the commoditisation of land, Maasai peoples structured grazing according to drought patterns. Land privatisation initiated by the World Bank and DfID (UK Department for International Development) evidenced the appropriation of 40–60 per cent of Maasai grazing land, locking the Maasai peoples to small sections of Kenya's Rift Valley, including the banks of Lake Naivasha, the country's third-largest lake, and a traditional

grazing area. The private ranches, established for the privilege of foreign investors and Kenya's elite, was the latest legally enforced acquisition negotiated by political representatives that gave no more than a cursory glance to the marginalisation of the Maasai.

Over 100 years earlier, the Maasai were deprived of the right to land via a colonial agreement between the British government, represented by the East Africa Syndicate, amongst other corporate entities, thanks to a seemingly random medicine man Laibon Leinana, who, ironically enough, was not vested with the authority to do so. The 'chief' provided the settlers with the right to land on Maasai land. The Maasai, cumulatively evicted from 90 per cent of traditional land, were shifted to annexed land termed 'protection areas' or reserves, a move similar to the bank and DfID's purported ecological motives.

By 1911, after losing 325,000 acres of land, Maasai had been evicted from the reserves when a further 2,300 square miles of the northern reserves were appropriated. These areas constitute the backbone of modern Kenya's dairy and beef industries, primarily exporting to Europe. By 2004, Brookside Dairy Ltd and Delamere Farms Ltd dominated the industry. Delamere's colonial ancestor had received 100,000 of the original 325,000 acres of Maasai land. These days, the Maasai – the face of Kenya's hunger, depleted water sources (affecting 70 per cent of wells: 2009), dying cattle (150,000: 2009) and malnourished children – are confined to the driest, overgrazed lands in Kenya and are unable to graze in sync with Kenya's climatic patterns.

In fact, Kenya hosts some of the world's best farmland (Bowden), thanks to the combination of fertile volcanic soils and perfect climatic conditions, with temperatures of 20 to 25 degrees celsius all year round.

During the famine, more than 100 tonnes of water-intensive non-native flowers continued to be exported daily, without disruption, to Dutch buyers. In April 2010, when Iceland's volcano resulted in the temporary closure of European air space[/url], the Fresh Producers Exporters Association of Kenya (FPEAK), exporting 1,000 tonnes of fruit and vegetable daily, would report a loss of US$3 million per night, accompanied by 3,000 tonnes of perished flowers. Kenya's industrial floriculture industry via some 30 commercial farms, comprises one of the agri-industry's top two primary sources of foreign exchange, estimated at US$1.3 billion (2009). FPEAK, composed of 150 growers, claimed that 82 per cent of exports were imported by the European Union. Included in these shipments are 88 million tons of flowers annually, located for the most part around Kenya's fertile Lake Naivasha region.

By 2008, the Kenya Flower Council announced that floriculture raked in US$585 million, led by companies such as Sher Agencies and Kenya Roses. These companies, exporting 97 per cent of fresh-cut flowers to Europe, command 25 per cent of the world's global market, a continuing trend that emerged at the turn of the millennium. But the industry, employing 50,000 people, is also in the business of exporting virtual water. Thanks to the country's 40-year-old floricultural industry, the lake has shrunk to 10,700 hectares, roughly half its size.

The lack of water-sharing agreements enables flower companies based around the lake to essentially self-regulate the volume of piped in, and the volume of toxic pesticides, fertilisers, fumigants and other chemicals dumped back into the lake. Many of these chemicals, such as DDT and dieldrin, are no longer allowed for use in the industrialised world.

The resources that should be sustainably utilised for Kenya's recurring famines are depleted: toxic chemicals have caused chronic problems not only for those subsisting off the lake's water, but also eutrophication: excessive concentration spawning algal blooms, resulting in a corresponding decrease in oxygen levels, killing and contaminating en masse fish, cattle and even humans. Lake Naivasha, previously one of the world's top-ten bird sites, is now characterised by pollution, overpopulation and overuse.

The lake itself has seen a drastic rise of permanent inhabitants during the past four decades of floriculture development, from 7,000 (1970) to 300,000 (2008) due to the industry acting as one of Kenya's primary employers. As the roses manager at Oserian, a major corporation stated: 'It's going to be a challenge to maintain the environment of the lake. The population around the lake have no sewage facilities, people are washing their clothes in the lake. They're all coming because of the flower farms.'

And it is the flower farms alongside the export industry set against the canvas of Kenya's systemically corrupt, structurally unjust land commoditisation and 'tenure' policy that has catalysed much of Kenya's hunger.

No one country is fertile in every region. But when confronted with famine in arid regions is a recurring reality, it is basic logic that fertile regions be used, in part, to ensure food sovereignty.

In the short term, this could be accomplished by mapping the peak hunger seasons of pastoralists (August–October) as well as other regions (November–January south-east and coastal areas) against the seasonal calendar. In the long run, it could be broadly accomplished by reform, ranging from direct agriculture aspects such as infrastructural development, idle farmland and government subsidised costs to political economy factors such as investigation of corrupt land acquisitions affecting some 300,000 titles according to a land report produced in 2004 by Paul Ndungu. Kenya's incumbent president controls a land conservatively estimated at 30,000 acres; former president Daniel arap Moi, for instance, held 100,000 acres, while the family of Jomo Kenyatta controls over 1 million. Paper records, rendering 'high politics' forgery easy, was the norm as late as 2008.

The political causes of this rampant and increasingly recurring famine are rarely placed in its true political context: Ownership that could be allocated to those requiring land for food production is instead shifted to those with capital (foreign) or political access. As such, land idleness, landlessness, underutilisation of land, artificial land shortages and land conflicts are manufactured and even sustained in order to fulfil aid requirements, concealing the root causes of famine. Communal tenure has often been directly substituted by private tenure, a privilege of the wealthy.

Key questions that need to be asked as a matter of urgency include an identification of the poverty of politics: Who are the destitute? Where are they located? What has been their historical experience? What is the level of access to political and economic tools, ranging from money to land titles? And most importantly, to what extent are they intentionally marginalised?

According to a study entitled 'Beyond land titling for sustainable management of agricultural land', published in the Journal of Agriculture and Rural Development (2002), 70 per cent of farmers residing in the semi-arid Ndome, Ghazi and Taita-Taveta district operated under tenure insecurity, primarily based on a lack of title deeds. The report states that a lack of land titles led to the direct proliferation of land conflicts (70 per cent). An estimated 80 per cent continued to use disputed land, but just 33 per cent of such land was subject to conservation measures.

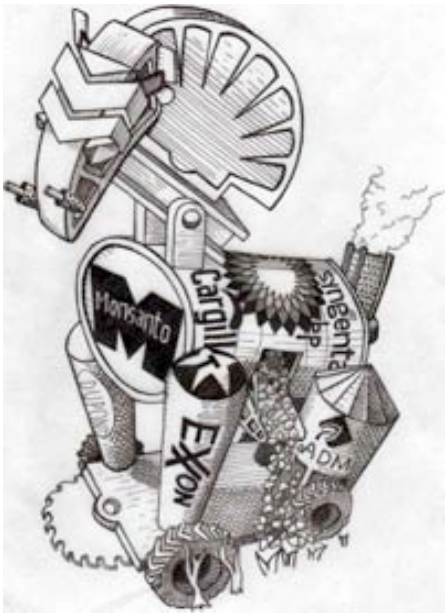
The report noted that poverty, farming and land tenure were closely connected in Kenya, suggesting that land titling policy enhance four key objectives to alleviate poverty countrywide: using as much land as possible for agricultural needs; equitable redistribution of land; effective approaches to control degradation of land; and deliberate preservation of agricultural land.

Cited for urgent attention: 'As a rule of thumb, priority for the use of prime land should be food production, given the importance of food security in economic and ecological development of the country. Any other alternative use of such land, must be pegged on its relative contribution to the above objective.'

This begs the question: Why has the government endorsed the inherited land system? Referring to a land tax, Lands Permanent Secretary Dorothy Angote revealed in 2009 that colonialism, 'introduced an alien concept of property relations in Kenya … We want Kenyans to move away from buying land and having it as an end in itself. People assume the acquisition of land is like the accumulation of medals to be worn on the chest.'

In Kenya, the problem solvers are also the most powerful people in the country, and the biggest landowners. Instead of equitable land reform, tackling corruption and the prevention of exploitative industries, hunger has been delinked from context: the proposed solution is genetically modified (GM) crops, specifically drought-resistant maize. Maize, grown in over 10 countries, constitutes a primary staple for over 300 million in Africa. Monsanto's

technology facilitates a process where 'the leaves of the fully grown maize plant curled up in dry conditions', after a particular piece of DNA in bacillus subtilis (cspB) is injected into the ordinary maize seed. The result? Less water lost to evaporation, rendering the crop resistant to Kenya's crippling drought seasons.



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Thanks to the corporate philanthropy of the Bill and Melinda Gates Foundation, one of the most contentious problems usually associated with the deployment of GM technology in Africa, royalties, is circumvented by distributing seeds royalty-free. For now, that is. According to seed suppliers Monsanto, 'We're not here because of charity. If you help small farmers, today they may not be good customers. But in 10 years, they may be good customers.'

Monsanto's strategy has already paid off: In 2007, 87 per cent of global GM and hybrid areas, including seeds and traits, were controlled by the company. The company accounted for 23 per cent of the global proprietary seed market, while the top ten seed companies control 67 per cent of the global market. Monsanto, DuPont and Syngenta control almost 70 per cent of the global maize market, including that of Africa.

'There is a deliberate move to transfer controversial technologies like genetic engineering into Africa to colonise our food security/sovereignty', said Anna Maina of Kenya's Africa Biodiversity Group. 'We have also seen a move towards harmonised and biosafety laws, these are aimed to open the doors to the penetration on GMOs into Africa even when doubts remain over their safety the world over,' she said (interview with author).

'Through USAID, in collaboration with the GE industry and several groups involved in GE research in the developed world, the US government is funding various initiatives aimed at bio-safety regulation and decision-making in Africa, which, if successful, may put in place weak bio-safety regulation and oversight procedures,' said Mariam Mayet of the Africa Centre for Biosafety.

At what cost? By 2014, the global agro-chemical industry, dominated by a handful of vertically integrated mega-corporations, is estimated to be worth US$196 billion, much of it generated by the in-built requirements of GM seeds. Fertilisers, imported by developed countries at exorbitant costs, contributed 57 per cent of the profit. The interlocked, vested interests connecting GM seeds and the agro-chemical industry, intimately intertwined with the 'aid market', enabled Monsanto to cash in on the global food crisis of 2008 that forced 100 million people below the poverty line when staples such as wheat and maize became too costly for those with limited budgets. Monsanto reported a profit increase from US$1.44bn to US$2.22bn.

In 2008, Miguel d'Escoto Brockmann, president of the United Nations General Assembly, commented on the situation saying: 'The essential purpose of food, which is to nourish

people, has been subordinated to the economic aims of a handful of multinational corporations that monopolize all aspects of food production, from seeds to major distribution chains, and they have been the prime beneficiaries of the world crisis.

'A look at the figures for 2007, when the world food crisis began, shows that corporations such as Monsanto and Cargill, which control the cereals market, saw their profits increase by 45 and 60 per cent, respectively; the leading chemical fertilizer companies such as Mosaic Corporation, a subsidiary of Cargill, doubled their profits in a single year.'

The example of Malawi is certainly instructive. Like Kenya, Malawi's inherited and endorsed colonial land policy manufactured the commoditisation and privatisation of land, marginalising inhabitants via the expansion of commercial agricultural estates. Not only was a new class of landless peoples created, but the best ecosystem resources were earmarked for sectors such as tobacco, tea, coffee and other export-oriented cash crops, subject to artificial depreciation in the market, liberalisation and debt. Four decades after independence, land acquisition favouring commercial estates and political elites evidenced the transfer of 1 million hectares of communal lands, plunging Malawi's rural population into poverty through many of the same factors affecting Kenya's Maasai.

Of the country's 9.4 million hectares of land, 5.3 million hectares, or 56 per cent, is cultivable. The fertile south is inhabited by small growers able to access just 0.33 hectares of land. Farmers in the south reported in 2009 that while there was no maize whatsoever in their district, the government had declared bumper harvests with enough for export. The cited reason was political. Malawi remained 'self-sufficient' in staples; the 1980s and the introduction of structural adjustment programmes saw the removal of subsidisation, price controls and currency devaluation. Since 1990, life expectancy in the country has dropped by almost a decade to 40 years. 'In 2007–8 the programme distributed 217 million tonnes of subsidised fertiliser,' revealed GRAIN.

'The big winner here is Monsanto, which holds more than 50 percent of the hybrid seed market in Malawi.' In 2007, the seed and fertiliser subsidy cost US$70 million, more than doubling to US$186 million in 2008–09 via the government's farm input subsidy programme, earmarked for 1.7 million small growers, running from November to April.

According to Alick Nkhoma, a representative from the Food and Agricultural Organisation (FAO) (IRIN), 'the fairly good rains and the subsidy input programme contributed a lot [to the maize harvest], especially as the inputs were very expensive, because planting occurred when oil prices were near record highs.'

AGRA's (Alliance for a Green Revolution in Africa) key joint founder and collaborator, the Rockefeller Foundation, not only derived its billions from oil (Standard), but was a crucial architect of the 'green revolution' concept formulated in the 1960s by the philanthropic arms of corporations, using DuPont scientist Norman Borlaug amongst others. The term was coined by William Gaud, the former executive vice-president of the World Bank's International Finance Corporation, also formerly of the United States Agency for International Development (USAID), who backed GM technologies, stating 'These [GM technologies] and other developments in the field of agriculture contain the makings of a new revolution … I call it the Green Revolution.' The result was the Consultative Group on International Agricultural Research (CGIAR), formerly co-opted by the World Bank in the early 1970s, joined several decades later by the Gates Foundation. The CGIAR constitutes the world's largest gene bank. Meanwhile, 'leaked minutes of a meeting between the aid agencies and USAID officials, documented by GM Watch, reveal the political muscling that constitutes aid: Agencies are told to immediately report to the local USAID mission receiving governments questioning the GM content of food aid shipments. USAID promises to take action that has been interpreted by African officials as sanctions of various hues extending to restrictions of lending by multilateral agencies such as the World Bank.'

'The United States Agency for International Development (USAID) appears to be at the forefront of a US marketing campaign to introduce GE food into the developing world. It has made it clear that it sees its role as having to "integrate biotechnology into local food systems and spread the technology through regions in Africa",' said Mayet (ACB: 2004).

No wonder then that Monsanto has created and funded various programmes (including the terribly respectable international scholars programme in honour of Borlaug) targeting some of the world's biggest markets.

But while this may spell good times for oil and agro-chemical corporations, the blessings do not necessarily filter down to ordinary citizens.

Nkhoma disclosed that the cost of the subsidised programme, backed by DfID, was not sustainable. While the bumper harvest had increased maize, it had not produced cheaper maize meal.

Erica Maganga, secretary of the country's agriculture and food security unit, disclosed that organic fertilisers and conservation agriculture was on the menu for consideration.

As a food security specialist noted to IRIN, off the record, increasing maize volume was as simple as targeting commercial farmers, capable of doubling production. Though the government's subsidisation programme identified part of the problem, the solution was diagnosed to fit the interests of corporate actors.

The vehicle? Intellectual property rights (IPR), enabling Monsanto to sue for patent infringement at will and divesting farmers of control and ownership of crops. Monsanto's silent goodwill partner, Gates, made his fortune through IPRs and remained a consistent backer in the corridors of power, from state to boardroom. In 1999, for instance, three of the world's four richest owed their wealth to Microsoft's IPR, according to a survey by Forbes.

Given that most intellectual property is handled through corporate entities located in secrecy jurisdictions, better known as tax havens – as Microsoft's multi-billion Irish-based Round Island One Ltd was formed to do – it is highly unlikely that links between Microsoft as a corporate beneficiary of Monsanto using secrecy jurisdictions would ever be accounted for. This is because not only are corporations able to avoid and evade billions owed in taxes by shifting tax liability and laundering profits, but disclosure of company accounts, beneficiaries and ownership need not be disclosed thanks to deliberate ring-fenced regulation servicing foreign clients.

Monsanto itself is registered in one of the world's leading secrecy jurisdictions, Delaware.

Over 80 per cent of Malawi's domestic agricultural production is grown by small-scale farmers, markets that companies like Monsanto have not yet been able to tap in to. In 2005, Monsanto donated 700 metric tonnes of hybrid maize through a network of NGOs (non-governmental organisations).

As such, one crucial vehicle, underpinning the Lugar-Casey Global Food Security Act (2009) and approved by the US Senate Foreign Relations Committee, is aid, more specifically, technology transfer through agricultural development via restructured aid agencies and long-term agendas. According to Senator Lugan, the US's national security is dependent on the food security of countries like Sudan and Iraq – key untapped markets. Supporting the bill before the Senate Foreign Relations Committee, as documented by AGRA Watch, were a host of systemically important power players including Bill Clinton, one of Washington's main GM-cheerleaders, and Bill Gates. Lugan revealed that he was 'excited by [the Bill and Melinda Gates Foundation's] vision.'

The vested 'beneficence' noted by Lugan and meticulously documented by AGRA Watch runs deep. The Gates Foundation, for instance, invested several million in an organisation which counts Monsanto as a key funder: the Donald Danforth Plant Science Center. Though the Gates Foundation was found to hold 500,000 shares of Monsanto stock, this conflict of interest represents the tip of the iceberg.

In Kenya, 70 per cent of grants allocated by the Gates Foundation's AGRA – formerly in 2006 in partnership with the Rockefeller Foundation, considered the foundation's philanthropic brand, in which it is a key funder – were directly connected to Monsanto.

Other prominent links cited by AGRA Watch included revolving door staff, such as Dr Rob Horsch, 'formerly Monsanto vice president of International Development Partnerships and current senior programme officer of the Gates Agricultural Development Program.'

During Horch's 25 years with Monsanto, he was part of the scientific team that created RoundUp, the company's multi-billion dollar herbicide, attached to all proprietary seeds.

The foundation's type of philanthropy – breeding opportunities for corporate penetration of developing markets – is nothing new. In 2007 the LA Times described how the foundation's (currently US$33 billion) 'blind-eye investing' saw at 'least 41 per cent of its assets invested in companies that countered the foundation's charitable goals or socially-concerned philosophy'.

Various companies and foundations engage this market via initiatives such as Water Efficient Maize for Africa (WEMA), funded by the corporate financed African Agricultural Technology Foundation (AATF). Involved parties range Warren Buffet and Jeffrey Sachs to the FAO, World Food Programme and US government using the vehicle of the Millennium Challenge Corporation. 'The Rockefeller Foundation is a philanthropic arm involved with AGRA. Others are international agrochemical companies, such as Yara and Monsanto, local seed and fertiliser companies, as well as banks, such as Standard Bank and Equity Bank (Kenya),' said Maina.

'The illegal importation on over 280,000MT tonnes of GMO maize into Kenya even when legal provisions did not allow it proves the deliberate move to contaminate local varieties,' she said. The GMO maize was supplied by South Africa, the foothold of agri-chemical corporations such as Monsanto. In 2009, when GM maize failed to produce for hundreds of farmers, with growers experiencing as much as 80 per cent crop failure (Africa Centre Biosafety), Monsanto refused to reimburse farmers who had received seeds royalty-free.

There are a number of socially and ecologically sustainable, citizen-centred solutions available. One such solution, highlighted by Greenpeace (2010), on the conventionally-bred maize variety ZM521, reveals: 'Scientists from CIMMYT [International Maize and Wheat Improvement Center] drew on thousands of native varieties of corn from seed banks, which were built up through decades of free exchange of landraces around the globe (Charles, 2001). By repeated cycles of inbreeding and selection, the scientists uncovered the previously hidden genetic traits that enable maize to withstand drought. ZM521 is a maize variety that not only exhibits remarkable vigour when afflicted by water shortage, but also yields 30% to 50% more than traditional varieties under drought.'

'Another of the pro-poor advantages of ZM521 is that it is open-pollinated. In contrast to hybrid and GE maize varieties, seeds from open-pollinated forms can be saved and planted the following year. This benefits smallholder farmers who often face cash constraints when buying new seed. ZM521 seeds are now available free of charge to seed distributors around the world and in several African countries, including South Africa and Zimbabwe, ZM521 has been released for cultivation on farmers' fields.'

The safety of GM crops is usually doubted by those scientists not on the corporate payroll. As the Scientific American magazine disclosed, 'Scientists must ask corporations for permission before publishing independent research on genetically modified crops. It is impossible to verify that genetically modified crops perform as advertised. This is because agritech companies have given themselves veto powers over independent researchers.'

Such policies are implemented in a bid to protect the biggest myth of all, that GM and hybrid foods are as safe as natural food. There is of course no regulation or investigation in place to assure that this is so, save for near self-regulation.

So what is the point of solutions such as proprietary seeds, ecological destructive agro-chemicals or major water-intensive irrigation projects including the Gibe III mega-dam, already identified as a major source of disruption to Kenya's Lake Turkana, in northern Kenya, affecting the lives of 500,000 people?

Though Kenya has long since been on the receiving end of GM maize, according to a source, 'the glass house trials are now taking place at Kenyatta University in Nairobi and they are nearly ready,' for open trials.

'The point is profit and more profit,' said Maina.

- *Khadija Sharife is a journalist, visiting scholar at the Centre for Civil Society (CCS) based in South Africa, and contributor to the Tax Justice Network.*

Further reading on biofuels, land rights and land grabbing

http://pambazuka.org/en/category/features/67520

cc TR

Links on biofuels, land rights in Africa and global land grabbing

Links on biofuels, land rights in Africa and global land grabbing

- Would Cecil Rhodes have signed a Code of Conduct? Reflections on global land grabbing and land rights in Africa, past and present

  Source: Robin Palmer (Mokoro)

  Summary: This paper includes land grabbing in early colonial Zimbabwe and Mozambique, contemporary land grabbing, biofuels, investment involvement and a conclusion.

  Date: September 2010 (African Studies Association of the UK biennial conference, Oxford)

  Download the full paper (PDF 333KB): http://bit.ly/cFEBgG

- An annotated guide to the bibliographies on biofuels, land rights in Africa and global land grabbing

  Source: Robin Palmer (Mokoro)

  Summary: An annotated guide to the two bibliographies, which includes some of the main highlights from reports, press cuttings, journal articles, books on biofuels and TV, video and radio clips. The last is included as they can be revealing of the attitudes of those engaged in the land-grabbing phenomenon.

  Date: September 2010

  Download the full paper (PDF 403KB): http://bit.ly/bYauKt

- Select bibliography of reports on biofuels, land rights in Africa & global land grabbing

  Source: Robin Palmer (Mokoro)

  Summary: A new updated select bibliography of reports on biofuels, land rights in Africa and global land grabbing. Over 70 organisations are cited, with the majority of reports coming from FAO, Grain, Sci-Dev Net, Pambazuka News, IIED, and OHCHR.

  Date: September 2010

  Download the full paper (PDF 479KB): http://bit.ly/aaEDd7

- Select bibliography of press cuttings on biofuels, land rights in Africa & global land grabbing

  Source: Robin Palmer (Mokoro)

Summary: A new updated select bibliography of press cuttings on biofuels, land rights in Africa and global land grabbing. It is organised geographically under the following headings: global, Africa general (33 African countries and regions), Middle East, Asia, Latin America.

Date: September 2010

Download the full paper (PDF 976KB): http://bit.ly/cKnsmM

- Suggested reading from ETC Group:

  Who Will Feed Us? Questions for the Food and Climate Crises

  http://www.etcgroup.org/en/node/4921

  Who Owns Nature?

  http://www.etcgroup.org/en/node/707

  Retooling the Planet: Climate Chaos in a Geoengineering Age

  http://www.etcgroup.org/en/node/4966

  Report Prepared for the South Centre - The Potential Impacts of Nano-Scale Technologies on Commodity Markets: The Implications for Commodity Dependent Developing Countries

  http://www.etcgroup.org/en/node/45

  ETC Group will be launching three new major reports on the bio-economy, nano-geopolitics, and geoengineering at the end of October 2010. Join their mailing list to receive notifications of papers and communiques that they are launching and news releases about hot topics they are following.

  http://www.etcgroup.org/en/node/5190

Hands Off Mother Earth: Support the international campaign

http://pambazuka.org/en/category/features/67573

Support the international movement opposed to geoengineering. The Hands Off Mother Earth, http://www.handsoffmotherearth.org/photos campaign is a part of the climate justice movement, fighting quick techno-fixes that put more money and power in the hands of the business interests and the politicians who caused the climate crisis in the first place. If you oppose using the seas, skies and soils of our home planet as a laboratory for unjust and risky technology, add your picture to our photo petition. Take a photo of your hand and help us say 'Stop geoengineering! Hands off Mother Earth!'

A note about ETC Group

http://pambazuka.org/en/category/features/67526

cc USFS

Twenty-five years ago the idea that would become the Rural Advancement Foundation International (and then, in 2001, ETC Group) began with a conversation about seeds. A quarter of a century later, ETC Group is still talking about seeds, but the world has grown more complex: new technologies have developed; economies have globalised; multinational companies have expanded their reach; and wealth and capital are concentrated in the hands of fewer and fewer giant corporations. Life itself has been manipulated, picked apart, reassembled – and then patented.

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ETC Group is an international civil society organisation.

We address the global socio-economic and ecological issues surrounding new technologies with special concern for their impact on indigenous peoples, rural communities and biodiversity. We investigate ecological erosion (including the erosion of cultures and human rights); the development of new technologies (especially agricultural but also new technologies that work with genomics and matter); and we monitor global governance issues including corporate concentration and trade in technologies. We operate at the global political level. We work closely with other civil society organisations and social movements, especially in Africa, Asia and Latin America.

We are 10 staff members and nine Board members scattered over five continents. We have offices in Ottawa and Montreal, Canada; Durham, USA; Mexico City, Mexico; and Davao City, Philippines.

ETC Group has consultative status with the United Nations Economic and Social Council (ECOSOC), the Food and Agriculture Organisation (FAO), the UN Conference on Trade and Development (UNCTAD) and the UN Biodiversity Convention (CBD), and also has a long history with the Consultative Group on International Agricultural Research (CGIAR).

The ETC Group's website is http://www.etcgroup.org/en.