Blind Alley?

Is DFID's policy on agriculture in danger of failing to deliver food and environmental security?

GM FREEZE
the campaign on
GM food, crops and patents

GM Freeze, June 2009

"The great complexity of poverty in terms of its causes and solutions requires an appropriate blend of long-term technical and social science, if research feeding into development policy and practice is to make a meaningful contribution to poverty reduction. There is little room for quick fixes in technology, even though these are often favoured by politicians – and some donors."

George Rothschild, former Director-General of the International Rice Research Institute and former Chief Scientific Adviser to the Minister for Overseas Development, Australian Federal Government speaking at 'Making Science and Technology Work for the Poor' – Seminar for the All Party Group on Overseas Development, 8 November 2005

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Abbreviations used in this report

AATF	African Agricultural Technology Foundation
AKST	Agricultural Knowledge, Science and Technology
CGIAR	Consultative Group on International Agricultural Research
Defra	Department of the Environment, Food and Rural Affairs
DFID	Department for International Development UK
GMO	Genetically Modified Organism
GURTS	Genetic Use Restriction Technology
FIPS Africa	Farm Input Promotions Africa
IAASTD	International Assessment of Agricultural Knowledge Science and Technology for Development
OECD-DAC	Organisation for Economic Cooperation and Development Development Assistance Committee
PRRI	Public Research and Regulation Initiative
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme.

Executive summary

The role of GM crops in providing a sustainable solution for hunger in Africa and the rest of the Global South is very controversial. Their use in this respect is being promoted by a number of parties, including biotechnology corporations, research institutions, charitable foundation and governments, including the UK. The UK's Department for International Development (DFID) is also supporting agricultural research and development in Africa which encourages more intensive farming methods, despite the fact that evidence from Europe and North America shows that this has hidden environmental and social costs, including soil erosion, loss of biodiversity, water pollution and disruption of the rural economy. Africa would be highly vulnerable to similar impacts were intensive cultivation to be adopted.

In 2008 the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) published reports which were the product of four years of review by 400 agriculturalists, scientists, social scientists and economists. IAASTD recognised the complexities of the problems facing world agriculture in delivering wholesome, safe and affordable food, without causing irreparable or long-term harm to local communities and the environment in a world facing significant climatic change over the next half century. It emphasised the multifunctionality of agriculture in providing more than just food, fibre, raw materials and biomass, stressing for example its role in maintaining ecosystem services and functions, landscape, cultures and livelihoods for billions of people. It also acknowledged the key role that the local knowledge of farmers, particularly women, and other small-scale food producers should play in the future in developing appropriate technologies and knowledge systems. The failure of past technological innovations and trade to benefit poor people and their potential to cause harm to the environment were acknowledged. The reports did not provide a ringing endorsement of the role of genetically modified crops in tackling the many problems facing farmers, based on evidence to date.

A key finding strongly supported a shift towards an agroecological approach (using ecological concepts and principles to study, design, and manage agricultural systems). The potential for the agroecological approach to farming to substantially boost yields was also highlighted by a UNEP/UNCTAD report on organic farming in Africa, published later in 2008.

The UK delayed signing up to the IAASTD findings and when they finally did so, the endorsement was not fulsome and so far there is no sign that either DFID or Defra has changed its policy on research and development. IAASTD's lukewarm response to GM crops and the touted benefits of free trade were likely to be behind this apparent lack of enthusiasm.

DFID is one of the largest donors to the Consultative Group on International Agricultural Research (CGIAR), a network of 15 research centres, the majority of which have active GM research programmes, and is therefore in a good position to influence the future direction of farming in the Global South. DFID donated over £63 million to the CGIAR (annual budget $506 million[1]), but as this sum is largely for core funding, how the money is spent is not transparent. The Executive Committee of the CGIAR issued a critical comment on the IAASTD report while it was still in draft form, presumably in an attempt to influence the final text or to discredit the process.

DFID also supports two programmes which are promoting intensive farming methods based on oil-based artificial fertilisers and pesticides, Farm Input Promotions Africa and African Agricultural Technology Foundation, apparently without any assessment of the long-term risks of such a policy[2] or analysis of their superiority over other agroecological approaches. The policy is all the more strange in that it comes at a time when prices of agricultural inputs are rocketing[3] beyond the means of many Northern Hemisphere farmers, let alone impoverished farmers in the South.

While DFID still supports research into agroecological approaches to farming (for instance the 'Push Pull' project in Kenya) there is a clear and well-defined move towards intensive systems and GM crops.

The agroecological approach to food production and land management needs considerable research investment to develop techniques and ensure that farmer-led extension services are appropriate and lead to the adoption of the best systems for each agro-ecosystem. DFID is potentially in a very strong position to ensure that this happens, but this will require changes to its present policies. GM Freeze recommends:

1. DFID should implement the findings of the IAASTD.
2. DFID should review its current spending priorities for sustainable agriculture research so that the focus is on multifunctional agroecological farming systems.
3. DFID should adopt a clear classification of biotechnology-related funding and transparent reporting.
4. DFID should ensure that local farmers, herders, fisherfolk and other small-scale food providers (both women and men) are fully integrated into and have a decisive role in determining research and development programmes.
5. DFID should review its relationship with the CGIAR centres and direct funding to programmes that move research towards more agroecological agricultural knowledge, science and technology.
6. DFID should increase funding for participatory plant breeding programmes and the development of locally-controlled extension services.
7. DFID should support the development of public research and training facilities that can train scientists in more participatory forms of research.
8. DFID should support the development of world-class regulatory and monitoring systems for countries in the Global South based on the precautionary principle.
9. DFID should insist, as part of its quality assurance, that institutions and countries in receipt of grants and aid provide a report to DFID each year.

10. The International Development Committee of the House of Commons should investigate DFID's funding of research and development to ensure that it meets the needs of poor farmers.
11. DFID should support and promote comprehensive assessments of risks and benefits of intensive farming and livestock production systems, including the use of genetically modified organisms.
12. DFID should redefine the role of farmers to reflect their multifunctionality rather than focusing on commercial viability.

1. Introduction

Despite its enormous footprint, the intensive food and farming system has failed to prevent widespread food shortages.[4]

Even so, the UK Government still sees a combination of intensive farming and GM crops as the solution to hunger and malnutrition in the Global South. In August 2008, UK Government Environment Minister Phil Woolas told the BBC that the Government's *"moral responsibility"* is to investigate whether genetically modified crops could help provide a solution to hunger in the developing world and said that, *"We see this as part of our Africa strategy"*.[5]

This policy goes against the key findings of the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD)[6] published in April 2008, and against the conclusions of the UNEP/UNCTAD report on Organic Agriculture and Food Security in Africa[7], also published in 2008. Both these reports demonstrated that an agroecological approach is more likely to succeed in achieving the multifunctional approach required of farmers around the world to produce food and other products, prevent climate change and protect natural resources and biodiversity.

This report looks at how the UK Department for International Development's (DFID's) current funding policies for agricultural research, development and extension fail to match up to the International Assessment of Agricultural Knowledge, Science and Technology for Development's (IAASTD) key findings. It looks at what the UK Government needs to do to meet the challenges laid down in the IAASTD's reports to achieve durable and sustainable solutions to hunger and poverty in the Global South.

2. The International Assessment of Agricultural Knowledge, Science and Technology for Development

"Agriculture is not just about putting things in the ground and then harvesting them…it is increasingly about the social and environmental variables that will in large part determine the future capacity of agriculture to provide for eight or nine billion people in a manner that is sustainable."
Achim Steiner, Executive Director, UN Environment Programme. IAASTD Intergovernmental Plenary Opening Address, April 7, 2008, Johannesburg, South Africa

In April 2008, the IAASTD – an international effort to evaluate the relevance, quality and effectiveness of agricultural knowledge, science, and technology – published its final reports, the product of four years of review by 400 agriculturalists, scientists, social scientists and economists.

The IAASTD reports provided a timely warning about the future of food production and the environment, as the impacts of climate change and peak oil begin to bite. IAASTD's message is that *"Business as usual is not an option"*. In a world where resources such as land, minerals, water and biodiversity are all limited, IAASTD found that *"agriculture has contributed to land degradation in all regions [of the world] … On average 35% of severely degraded land worldwide is due to agricultural activities."* It also noted that farmers are having to cope with *"declining water availability and quality, the loss of biodiversity, farmer access to seeds and local plant and animal genetic resources, and local capacities to mitigate and adapt to climate change …"*[8] Professor Bob Watson (Director of IAASTD and Chief Scientist at Defra) summed up the reported:

"Agriculture has a footprint on all of the big environmental issues, so as the world considers climate change, biodiversity, land degradation, water quality, etc. they must also consider agriculture which lies at the centre of these issues and poses some uncomfortable challenges that need to be faced. We've got to make sure the footprint of agriculture on climate change is lessened; we have to make sure that we don't degrade our soil, we don't degrade the water, and we don't have adverse effects on biodiversity. There are some major challenges, but we believe that by combining local and traditional knowledge with formal knowledge these challenges can be met."[9]

2.1 The IAASTD process

The IAASTD process was initiated by the World Bank in 2002 with co-sponsors from the UN, governments, civil society organisations, the private sector and scientific institutions from around the world. A 60 person governing Bureau was formed to set the methodology for conducting the assessment in a transparent and inclusive way.[10]

Professor Bob Watson (former Director of the Intergovernmental Panel on Climate Change and currently Chief Scientist at the UK Department for Environment, Food and Rural Affairs (Defra) was appointed IAASTD Director. The Bureau selected 400 scientists, from a wide range of relevant disciplines including biological, biotechnological, environmental and social sciences, to analyse the impact of agricultural knowledge, science and technology (AKST) on the current state of agriculture, food supply and the environment and the role that AKST, trade policies and socio-economic factors had played in the development of agricultural economies in the Global South. The scientists also examined the potential role of AKST on the future development of agriculture in the Global South and what structural, institutional, economic and social changes would be needed to achieve the purpose of IAASTD.

The IAASTD presented its *Synthesis Report of the International Assessment of Agricultural Science and Technology for Development* at an intergovernmental plenary meeting in Johannesburg in April 2008.

Five sub-global reports were produced and each was summarised to create a Summary for Decision Makers (SDM). A global Synthesis Report (SR) with an executive summary was also prepared. The SR was wide ranging; the topics it covered in detail include biotechnology, natural resource management and women in agriculture[11].

Each report was peer reviewed twice to ensure that data and information used as evidence were accurately interpreted by the authors. These outcomes were summarised in 22 Key Findings.

At the April 2008 plenary meeting, the SDMs and the executive summary of the Synthesis Report were approved by 57 countries, mainly from the Global South. The UK approved the documents two months later. Three countries (Australia, Canada and the US) did not fully approve the documents and added reservations, which are included in an annex[12] because they were unhappy with the findings on biotechnology and trade policy and the emphasis on agroecology. The IAASTD panel was not convinced by these minority arguments. However, despite not signing up to the final paper because of these particular issues and the need for fundamental transformation of AKST, the three countries otherwise support the majority of the text.

2.2 The IAASTD's findings

The IAASTD reports recognised the complexities of the problems facing agriculture in delivering wholesome, safe and affordable food without causing irreparable or long-term harm to local communities and the environment, all this in a world facing significant climatic change over the next half century.

They emphasised the multifunctionality of agriculture in providing more than food, fibre, raw materials and biomass, recognising that it also provides, for example, ecosystem services and functions, and maintains landscape, cultures and the livelihoods of billions of people. They called for more agroecological research and development. They also acknowledged the key role that the local knowledge of farmers, particularly women, and other small-scale food producers should play in developing appropriate technologies and knowledge systems. The failure of past technological innovations and trade to benefit poor people and to cause harm to the environment was acknowledged.[13]

On the issue of genetic modification, the IAASTD found no compelling evidence that GM crops offer a low risk way to meet the challenges of feeding the world:

> *"Assessment of modern biotechnology is lagging behind development; information can be anecdotal and contradictory, and uncertainty on benefits and harms is unavoidable. There is a wide range of perspectives on the environmental, human health and economic risks and benefits of modern biotechnology, many of which are as yet unknown."* [14]

and

> *"The application of modern biotechnology outside containment, such as the use of GM crops is much more contentious. For example, data based on some years and some GM crops indicate highly variable 10-33% yield gains in some places and yield declines in others."*[15]

What is agroecology?

Agroecology is defined as the use of ecological concepts and principles to study, design, and manage agricultural systems. The five main principles are: recycling of nutrients, building of soil organic matter; minimising losses from the system; maximising biodiversity and genetic diversity; and enhancing biological interactions.[16]

2.3 The UK's position on IAASTD

The UK Government was fully committed to the IAASTD process from the start and sent representatives to the inter-governmental plenary in April 2008. The UK Government did not exercise the option to object to any part of the text using footnotes in the text, as did Australia, Canada and the US.

Immediately before the plenary, DFID and Defra issued a joint press statement which endorsed the IAASTD process:

> *"The UK welcomes the reports of the International Assessment of Agricultural Science and Technology for Development (IAASTD) and congratulates the authors, editors, Director and all those involved with the process. Given increasing food prices and their impact on poor people combined with the challenges to agriculture by climate change, they are very timely.*
>
> *"The IAASTD is a unique assessment involving governments, civil society and academics. The IAASTD reports are a very valuable and important contribution to the debate and understanding on agricultural knowledge, science and technology and its potential to reduce poverty and hunger around the world.*
>
> *"The UK is pleased to see that many leading British social and agricultural scientists have been involved, and that Professor Bob Watson was the Director of the Assessment. The UK Government also provided over £500,000 to support the Assessment."* [19]

When the UK Government approved the IAASTD texts in June 2008, Douglas Alexander (Secretary of State for DFID) made the following statement:

> *"I am today announcing the Government's position on the reports of the International Assessment of Agricultural Science and Technology for Development (IAASTD). The UK Government approve the global summary for decision makers, the North America and European regional summary for decision makers, and the executive summary of the synthesis of the global and regional reports, and accept the chapters of the synthesis report. We would note these reports, and the background IAASTD reports, provide a valuable contribution to our understanding on agricultural knowledge, science and technology for development,*

The Global Synthesis for decision makers[17] sets out 22 key findings, which are summarised here[18]:

1. PRODUCTION INCREASES: AKST has contributed to substantial increases in agricultural production over time, contributing to food security.
2. UNEVEN BENEFITS: People have benefited unevenly from these yield increases.
3. NEGATIVE CONSEQUENCES: Emphasis on increasing yields and productivity has in some cases had negative consequences on environmental sustainability.
4. ENVIRONMENTAL DEGRADATION: The environmental shortcomings of agricultural practice in increasing deforestation and overall degradation.
5. INCREASED DEMAND EXPECTED: Global cereal demand is projected to increase by 75 per cent between 2000 and 2050 and global meat demand is expected to double.
6. MULTIFUNCTIONALITY OF AGRICULTURE: Agriculture operates within complex systems and is multifunctional in its nature.
7. STRENGTHEN AGROECOLOGICAL SCIENCES: An increase and strengthening of AKST towards agroecological sciences will contribute to addressing environmental issues while maintaining and increasing productivity.
8. REDIRECT AKST: Strengthening and redirecting the generation and delivery of AKST will contribute to addressing a range of persistent socioeconomic inequities.
9. INVOLVE WOMEN: Greater and more effective involvement of women and use of their knowledge, skills and experience will advance progress towards sustainability and development goals; a strengthening and redirection of AKST to address gender issues will help achieve this.
10. BUILD ON EXISTING KNOWLEDGE: [using] more innovative and integrated applications of existing knowledge, science and technology (formal, traditional and community-based).
11. USE NEW AKST APPROPRIATELY: Some challenges will be resolved primarily by the development and appropriate application of new and emerging AKST.
12. RESEARCH FOCUS ON SMALL-SCALE: Targeting small-scale agricultural systems helps realise existing opportunities.
13. CREATE OPPORTUNITIES FOR POOR FARMERS: Significant pro-poor progress requires creating opportunities for innovation and entrepreneurship which explicitly target resource poor farmers and rural labourers.
14. DIFFICULT POLICY CHOICES: Decisions around small-scale farm sustainability pose difficult policy choices.
15. PUBLIC POLICY AND REGULATION CRITICAL: Public policy, regulatory frameworks and international agreements are critical to implementing more sustainable agricultural practices.
16. NEW INSTITUTIONAL ARRANGEMENTS REQUIRED: Innovative institutional arrangements are essential to the successful design and adoption of ecologically and socially sustainable agricultural systems.
17. NEGATIVE IMPACT OF INTERNATIONAL TRADE: Opening national agricultural markets to international competition can lead to long-term negative effects on poverty alleviation, food security and the environment.
18. EXPORT AGRICULTURE UNSUSTAINABLE: Intensive export oriented agriculture has adverse consequences such as exportation of soil nutrients and water, unsustainable soil or water management, and, in some cases, exploitative labour conditions.
19. CRUCIAL CHOICES: The choice of relevant approaches to adoption and implementation of agricultural innovation is crucial for achieving development and sustainability goals.
20. MORE INVESTMENT IN MULTIFUNCTIONALITY: More and better targeted AKST investments are needed, explicitly taking into account the multifunctionality of agriculture.
21. CODES OF CONDUCT NEEDED: Codes of conduct by universities and research institutes can help avoid conflicts of interest and maintain focus when private funding complements public sector funds.
22. MULTIDISCIPLINARY APPROACHES REQUIRED: Diverse voices and perspectives and a multiplicity of scientifically well-founded options are needed, through, for example, the inclusion of social scientists in policy and practice of AKST.

and while presenting an overall consensus they also provide a diversity of views.

"The IAASTD has produced a series of options for governments and other stakeholders to consider to help ensure that agricultural knowledge, science and technology fulfils its potential to the reduction of hunger and poverty. The Government will be considering these options in their support of agricultural knowledge, science and research for developing countries."[20]

Given that the UK were enthusiastic supporters and funders of the IAASTD process from the start, this response can best be described as lukewarm.

Since this statement the UK Government has not indicated how it intends to implement any of the IAASTD findings in any policy area at home or abroad. The Government's reticence in implementing the IAASTD's findings may be due, in part, to the report's ambivalence about GM technology and trade liberalisation's purported benefits for the relief of poverty and hunger. The IAASTD authors failed to find convincing evidence of GM benefits for development despite examining hundreds of references. DFID, on the other hand, remains convinced that biotechnology has *"the potential to provide significant benefits for poor people"* [21] and that liberalising trade will work for the poor.[22]

IAASTD pointed the need to tailor international trade agreements to help poor, small scale farmers:

> ***"Decisions around small-scale farm sustainability pose difficult policy choices.*** *Special and differential treatment for developing countries is an acknowledged principle in Doha agricultural negotiations and it is accepted that developing countries can have this special treatment especially on the grounds of food security, farmer's livelihoods and rural development. Suitable action is considered necessary at the international and national level to enable small farmers to benefit from these provisions. New payment mechanisms for environmental services by public and private utilities such as catchment protection and mitigation of climate change effects are of increasing importance and open new opportunities for the small-scale farm sector." [23]*

Whilst DFID acknowledges that trade rules, and in particular agricultural subsidies in OECD countries, need reform, and despite the apparent collapse of World Trade Organisation negotiations due to rejection by countries it claims to support[24], DFID remains committed to the view that liberalising trade will work for the poor:

> *"The move to a more liberalised international agricultural trade regime will not bring the same benefits to all countries. It may cause difficulties for some developing countries, in particular those dependent upon food imports or those losing preferential access to markets. Measures will be needed to help these countries to adjust. Nevertheless, in the long-term, liberalisation should result in a more favourable international structure of agricultural prices which should benefit most poor countries." [25]*

2.4 Criticisms of the IAASTD findings

In addition to US, Canada and Australia, cricitism came from several other organisations, all of which have a strong interest in transgenic crops.

The criticisms began even before the final drafts had been agreed. For instance the Public Research and Regulation Initiative (PRRI, a pro-biotechnology forum of publicly-funded scientists and regulators) wrote an open letter to IAASTD participants attacking the approach on GM crops and biotechnology. Among the funders of PRRI are Monsanto, the International Service for the Acquisition of Agribiotech Applications and Croplife International[27]. Croplife International is an international federation representing the plant science industry including biotech corporations.[28]

An IAASTD panel member representing the biotechnology industry, Deborah Keith from Syngenta[29], withdrew before the final plenary in April 2008. The context of this withdrawal was explained by Janice Jiggins (another panel member):

> *Sadly, one of the main players ducked the challenge of maintaining the dialogue. In the closing weeks, participants from the biotech multinational Syngenta repeatedly failed to deliver key text, even though deadlines were extended for them. The company eventually walked out of the governing bureau)… Nonetheless, many of us see the final drafts, due to be debated next week in Johannesburg, South Africa, as the most comprehensive, rigorous assessment of knowledge, science and technology in the world's largest industry.[30]*

Another set of critical comments came from the Executive of the Consultative Group on International Agricultural Research (CGIAR), which raised concerns about trade liberalisation, the concentration on smaller farmers and biotechnology:[31]

> *The section from the SR on biotechnology is also characteristic of the problem of the assessment in terms of lack of balance and selective use of evidence, accentuating the potential risks while minimizing actual and potential benefits.*

The CGIAR's Science Council meeting in Rome in October 2007 also signalled its intention to attack the IAASTD report well before it was published:[32]

> *The study is timely in that it provides an excellent opportunity for the SC to present an objective and convincing rejoinder to the IAASTD report.*

The CGIAR network receives considerable funding from DFID for research (see section 3.4 below).

2.5 UNEP/UNCTAD Report

In October 2008 the UNEP-UNCTAD Capacity-building Task Force on Trade, Environment and Development published a report titled *Organic Agriculture and Food Security in Africa*, which supported the IAASTD's findings that agroecological approaches to land management provided the best options for dealing with the many tasks being asked of farmers. It concluded:

> *Organic agriculture can increase agricultural productivity and can raise incomes with low-cost, locally available and appropriate technologies, without causing environmental damage. Furthermore, evidence shows that organic agriculture can build up natural resources, strengthen communities and improve human capacity, thus improving food security by addressing many different causal factors simultaneously.[33]*

3. DFID and agricultural research and development

3.1 DFID and the shift away from supporting small farmers

DFID has a long history of funding research into agriculture but their programmes have been criticised in the past for being "top down" and not farmer-led and hence for failing to deliver real long-term benefits for the poor farmers whom they are intended to help.[34]

Since the turn of century, DFID policy towards research and development has been deliberately shifting away from small farmers providing for their families and local markets towards those who are "commercially viable" (ie suit international export and trade, with heavy emphasis on cash crops rather than food for local consumption). This shift in policy away from resource poor farmers was enshrined in DFID's 2005 Policy Paper, *Growth and poverty reduction: the role of agriculture*, which listed among its guiding principles the aim to *give priority to agricultural development in places where significant productivity gains are possible and the potential links to the wider economy are strongest.* [35]

Subsistence-oriented farmers, or so-called "commercially unviable" small farmers appear to have been left aside[36, 37]. Given that the majority of EU cereal farmers have survived for much of the last decade because of the subsidies available through the Common Agricultural Policy, DFID's definition of "commercially unviable" has to be questioned.

In 2007, the House of Commons Committee of Public Accounts conducted an examination into DFID's performance in tackling rural poverty in developing countries, and found that, "DFID could not establish the trend in its assistance to the rural poor over recent years" and "DFID does not know what proportion of its contributions to multilateral assistance is spent on the rural poor"[38] – even though DFID acknowledges that: "Three quarters of the world's poor are in rural areas where poverty must be reduced if the Millennium Development Goals are to be met"; and "Rural areas are usually significantly poorer than non-rural areas".

The Committee of Public Accounts encouraged "DFID to find out what share of its bilateral aid accrues to the benefit of the rural poor and adjust its programmes to address their needs". The Committee adds that "DFID does not have a clear picture of the costs of service delivery in rural areas". The Committee noted that "DFID's professional staff spends less than a week in rural areas each year."

Also in 2007 the National Audit Office estimated that the rural poor are receiving less DFID assistance per head than other poor people.[39]

3.2 DFID and biotechnology

The 2005 DFID Agriculture Policy paper[40] supported the role of biotechnology saying that it *"has the potential to provide significant benefits for poor people"*[41]and dismissed traditional breeding by boldly stating *"there is limited potential to improve yields of major staples from existing varieties"*.

In April 2008, DFID launched a revised Research Strategy[42]. The document pledges to double expenditure on research into agriculture, fisheries and forestry by 2010, to £80 million. No one would dispute that this represents progress. However, the document is coy about using terms such as 'GM', 'genetically modified' or 'transgenic' – in fact it does not. Instead, 'biotechnology' is employed throughout the document.

Biotechnology is defined as *"using parts of living organisms to create products"*. Such a broad definition could covers anything from the manufacture of meat pies to synthetic biology. Nevertheless it is clear that DFID intends to support new technology rather than traditional techniques which have become associated with the term, such as fermentation or selective plant breeding. A section headed *Future challenges and opportunities* is more open:

> *As this is a new area of work, we will initially examine two themes: looking "beyond aid" to find out what makes development processes more likely to succeed; and how to make sure developing countries can make the most of new and emerging technology (such as biotechnology, ICT and nanotechnology).*

And DFID's support for new forms of biotechnology is also shown in the 'Sustainable agriculture' chapter under the subheading 'New agricultural technologies' to maintain and improve agricultural productivity appears the commitment:

> *"We will invest in research to develop food that is more nutritious, produces larger crop yields and is resistant to climate variations and pests. We will invest in such research whether it uses traditional breeding approaches or newer approaches such as biotechnology".*

The importance which DFID places on biotechnology is further emphasised under the section *New and emerging technologies*:

> *"New and emerging cutting-edge technologies are being developed for industrialised markets. Many of these could have real relevance to the needs of poor people. Three important technologies receiving significant investment are: biotechnology, information and communication technology (ICT), and nanotechnology (working with molecules at a tiny scale)".*

The broad definition of biotechnology adopted for the research strategy is ambiguous and DFID needs to be clear what it means. If they mean GM crops they should say so.

In August 2008, Environment Minister Phil Woolas openly admitted that GM crops were *"part of our Africa strategy"* [43].

In contrast with DFID's confidence about the role of GM crops in Africa, a few week's earlier Syngenta Chief Executive, Martin Taylor, said that the "focus on farmers in rich countries meant it would take 20 years to launch crop varieties designed to address the problems of the developing world".[44]

Neither view takes into account the fragility of Africa's farmland. DFID needs to explain how its current approach is designed with the best efforts of the recipients in mind, rather than its apparent fostering of their dependence on UK aid indefinitely.

DFID's scientific advisor is currently Professor Gordon Conway, a vociferous advocate of GM technology for the Global South[45] and of "new technology" to promote growth[46]. Professor Conway also sits on DFID's Development Sciences Working Group. DFID has recently formed a scheme to fund biosciences research with the Biotechnology and Biological Research Council worth £6million[47].

DFID also funds UK institutions linked to research centres in the CGIAR implementing GM technology. For example, the John Innes Centre (JIC) in Norwich received over £18 million of public funding in 2004, including a significant sum from DFID. GM research at JIC include work on cereal, legumes and tomatoes. Other institutions receiving grants from BBSRC for GM research include Rothamsted Research and the Warwick HRI.

3.3 DFID's agricultural research funding

DFID agricultural research budget mainly goes to CGIAR centres and programmes (86% for 2008-13[48]). The UK provided 26% of CGIAR's Challenge programme funding

in 2007[49]. Overall the UK provided 9% of CGIAR's $495 million income in 2007.[50]

As the third largest OECD-DAC donor[51] and one of the world's leading donors to agriculture, DFID has a powerful position, and a great deal of responsibility, to influence the future direction of agricultural research and development, including the types of technology fostered in the Global South. DFID's budget for research was doubled in 2006 to reach £80 million in 2010[52].

There is a lack of transparency in how DFID's research and development grants for agriculture are spent. This could allow large sums of public money to be spent on transgenic research or intensive production systems without proper public or Parliamentary scrutiny.

In financial terms, DFID is showing the way to other nations – but serious doubts remain as to whether this money will be used wisely to meet the findings set out by the IAASTD, or merely wasted going up blind alleys.

3.4 DFID and the CGIAR

The CGIAR network is a major recipient of DFID research funding.

Formally created in 1971, the CGIAR is a network of 15 research centres across five continents, each specialising in particular crops or areas of research, ranging from potatoes, to cereals, to livestock and biodiversity, and the majority have active GM research programmes.

The centres are funded through voluntary contributions from CGIAR members, who include donor countries and foundations, the World Bank, the European Commission and national governments. Membership is marginally weighted towards the developed countries (24 out of 47) with only six African countries represented.

The UK is a founder member of the CGIAR and is actively engaged in its governance, organisation and management[53]. DFID is calling for a doubling of the CGIAR, with preconditions[54], for instance the establishment of an international research fund through which future DFID contributions would be channelled.

DFID's has supported CGIAR since 1972. In December 2003, the UK Secretary of State announced an additional commitment of £30million to the CGIAR over the next three years, effectively doubling annual donations from £10m to £20m. From 2004, some of these funds have been provided as unrestricted contributions to the core budgets of the centres[55]. DFID has also funds the four CFIAR's Challenge Programmes:

- Water and Food Challenge Programme
- Generation Challenge Programme
- Harvest Plus Challenge
- Sub-Saharan African Challenge Programme.

How the CGIAR network spends DFID's funding is not at all clear. Some information about DFID's funding to CGIAR centres (and other institutions working on transgenic crops) is available through Parliamentary Answers and DFID's database[56]. DFID's[57] use of different methods of funding and, particularly, its support for particular projects on plant biotechnology conducted in CGIAR centres during the period 2000-2006 was not in the public domain, although some information was obtained through correspondence with DFID officials.

However, DFID's answers to direct enquiries, far from providing any clarification, raised even more questions because of the lack of clear definition of the terms used. First, nobody in DFID seems to agree on the terms to be used[58]:

> *"… a range of different terms have been used to varying degrees by the different stakeholders for the three main mechanisms for funding the CGIAR:(1) Core or 'Unrestricted' funding; (2) Attributed, programme restricted, restricted core, MoU-restricted, soft restricted or donor-directed funding, which is targeted to broad areas of the Centres' work; and (3) Restricted, project-restricted, contract-restricted, earmarked or targeted funding, which involves closer targeting by donor-imposed conditions, for example by specifying expenditures against detailed budget lines. In practice, DFID's 'Attributed' funding was classed as restricted although the CGIAR Secretariat has a slightly different definition of restricted funding."*

In plain English this seems to mean there are three types of funding from DFID to CGIAR:

- money institutions can use for any purpose
- money which has to be spent on broad areas of work
- money which has to be spent on specific projects to a pre-agreed budget.

Secondly, donors have different view on which funding mechanisms to use to do what. DFID's view is that:

> *"Unrestricted or Core funding allows for flexible and simple allocation of resources according to the Centres' priorities"; and "DFID moved from 'Attributed' funding of the CGIAR (which still permitted longer term relationships, effective consultations on support to projects, with advance notice of fundable, three-year commitments and timely payments) to the more flexible provision of core or unrestricted funding to CGIAR Centres in 2004/05. This also brought our funding to the CGIAR more in line with our funding of other multilateral institutions, and aiming for greater donor harmonization, alignment and core budget support."*[59]

In 2001 DFID switched directed funding to CGIAR centres and challenge programmes[60] to unrestricted core funding[61].

The has allowed DFID to adopt a system which allows institutions to pursue their own research agendas. This policy fits very well with moves, led by the big donors, towards concentrating their efforts on country capacity and ownership as prerequisites for sustained poverty reduction and development[62]. In practice, however, it hides the significant role that DFID still retains in orienting the type of research carried out by the recipient institutions whilst publicly claiming to follow a neutral, "hands-off" approach.

Each year the members of the CGIAR network, funders (including DFID) and other research centres meet to decide of the future orientation of their research. Core funding involves a complex process of negotiation between funders and centres. If, at the end of the negotiations, some of the priorities originally set by the

centres do not receive enough funding, the World Bank provides additional money. The World Bank has become a 'swing funder' of agricultural research, increasingly able to influence funding movements in favour of the initial priorities set by "its" centres. Special project funding on the other hand is a one to one process which DFID is also engaged in. However, DFID does have a significant role in the allocation of core funding (Table 1 below).

The right of recipients to spend the donation as they feel most benefits poor people has to be balanced with the UK taxpayer's right to know that money is being spent wisely. With the new DFID funding mechanisms, it seems that we have the worst of both worlds. For most of the UK's aid donations, institutions do not have to report back on how money is spent, so neither people in countries in the Global South nor UK citizens can see that it has been used to benefit those primarily targeted.

3.5 How DFID funds the CGIAR's work on biotechnology

The CGIAR is committed to transgenic research. Their website makes this clear:

> ***Genetic Modification***
> *Where enhanced traditional breeding techniques have not been able to solve a specific problem, such as improving the vitamin content in rice, CGIAR supported crop scientists consider that genetically modifying organisms through genetic transformation can be a valuable option. Potential benefits and risks together with the social and environmental implications of all new technologies are rigorously assessed. The research centers offer advice to national partners on social and environmental standards and biosafety options and all center research takes place within national legislation and guidelines.*
>
> *As transgenics could offer important options for meeting food demand and environmental challenges, many scientists dedicated to reducing hunger and creating wealth among poor farmers, consider such new technologies to be one part of the tool box of possible solutions.*
>
> *Currently about 7 percent of CGIAR research is dedicated to exploring the solutions new technologies have to offer, and of that, approximately 3 percent is dedicated to the exploration of genetically modified organisms.*

DFID has stated that as it does not provide project-restricted funding to the CGIAR and therefore no special CGIAR projects on plant biotechnology can be attributed to them[63]. Yet a study of information gathered from different sources shows that DFID is being disingenuous to pretend that this is the case.

Distinguishing between core funding and special project is difficult but evidence about how the CGIAR centres spend DFID money was gathered through a number of routes:

- direct contact with CGIAR centres to request further information on their plant biotechnology projects
- scrutiny of scientific papers, conference proceedings and policy papers.[64]

In a Parliamentary written answer[65] in April 2008, DFID minister, Gareth Thomas, revealed:

> *"In 2005-06, DFID contributed £1,553,000 to two programmes that included research using genetically modified (GM) techniques. These were the Plant Sciences Research Programme and the Aquaculture and Fish Genetics Research Programme. The main institutions that received grants included: Bangor University; Overseas Development Institute; Bath University; World Fish Centre; Stirling University; and Asian Institute of Technology".*

However, the answer also admitted that:

> *"Since 2003 DFID has given £20 million per annum in unrestricted funding to the centres of the Consultative Group on International Agricultural Research. A list of these, and other international organisations receiving DFID support, is shown as follows. Some of these use GM techniques however it is not possible to attribute DFID funding to specific activities".*

CGIAR's Challenge Programmes (which receive funding from DFID) was started in 2003 and "is a time-bound, independently-governed program of high-impact research, that targets the CGIAR goals in relation to complex issues of overwhelming global and/or regional significance, and requires partnerships among a wide range of institutions in order to deliver its products"[66]. Two of the projects, Harvest Plus and Generation Challenge include GM research.

'Harvest Plus'

Harvest Plus is an international initiative to develop "new varieties of staple food crops consumed by the poor that have higher levels of micronutrients, through a process called biofortification".

One of its main projects is a GM rice, known as Golden Rice, which is claimed to tackle vitamin A deficiency common is regions where rice is a staple food:

> *"[…] work on transgenics is upstream in nature, taking place in laboratories and at research stations […] Presently, there are no plans to undertake activities that would facilitate release of transgenic varieties[67]. For example, it may be that discoveries made by the nutritional genomics team will lead eventually to breakthroughs in the levels of betacarotene expressed in the endosperm of improved lines of Golden Rice. Harvest Plus is in close collaboration with programs and institutions in biosafety testing. We recognize that there would be many steps involved in eventually moving varieties to farmers and consumers." [68]*

Recent publicity announced that field trials were being conducted in the Philippines[69] and that the International Rice Research Institute had been funded to gain approval for Golden Rice in Indonesia, Bangladesh, India and the Philippines.[70]

Despite years of development, the Golden Rice project has so far not delivered a commercial variety which meets the need of the people it is supposed to benefit. Serious doubts still exist about its ability to deliver safe doses of beta carotene, (needed to combat Vitamin A deficiency) and about the overall safety of the crop[71]. Uncertainties also surround the licensing agreements, which should allow poor farmers to grow the rice free

of royalties but not to export their crops. Farmers' rights to save seeds for replanting are also unresolved. Some commentators[72] have pointed out the weakness of the case for producing single nutrient enhanced crops, *"The general issue, though – which plant breeders need to accept – is that nutritional deficiencies are rarely focused on one nutrient (e.g., vitamin A, iron, selenium, zinc or others). In most cases, they are complex conditions and there are many sources for the various nutrients. The real challenge is to address these complex problems not by reducing them to single nutrients but by integrating existing and future approaches in the most efficient way. It is this approach – not a single, biofortified crop – that will allow us to reduce the DALYs[73] caused by nutritional deficits and insecurity"*.

'Generation Challenge'

The Generation Challenge Programme (GCP)'s self-assigned aims are:

"[…] to create public goods from the raw materials of plant genetic diversity and the advanced tools of genomics science for use in plant breeding programmes. These public goods serve to overcome complex agricultural constraints that prevent staple crops from producing reliable harvests for the poor farm families that rely on them daily for food, as well as for income with which to rise one day from poverty.

"The main outputs of this CP will be enabling technologies to improve cultivars using new gene based marker assistance to conventional breeding. However to make full use of the knowledge, new varieties, probably including transgenic cultivars, will be developed through the purposeful transfer of drought genes." [74]

CIMMYT (which received the largest grant from DFID of all the CGIAR centres from 2000-06) is open about its commitment to GM technology[75]:

CIMMYT believes that biotechnology (which includes a range of techniques such as tissue culture, marker-assisted selection, genomics, and genetic engineering) has an important role to play in improving the productivity, stability, quality, and use of maize and wheat varieties in developing countries while preserving the environment. CIMMYT, along with its CGIAR sister centers, is committed to making these new opportunities offered by biological sciences available as public goods and thereby complementing private-sector research so that technologies can reach resource-poor farmers and malnourished poor consumers.

4. DFID promotes intensive farming systems

DFID's support of organisations working to move poor farmers into intensive fossil fuel-based farming systems is further evidence that it is moving away from the farmer-led agroecological approach advocated by IAASTD. These projects involve public private partnerships with seed, chemical and biotechnology corporations intent on promoting their own products.

Table 1 CGIAR Centres with Active GM Crop programmes

CGIAR centre	DFID funding 2000-06	Known biotech industry /research collaborators	GM crops programmes
International Maize and Wheat Improvement Centre (CIMMYT) Mexico	£9,715,000	Syngenta Foundation	Maize, Wheat
International Centre of Tropical Agriculture (CIAT) Columbia	£6,820,343	None known	Cassava. Rice and Tropical fruit
International Crops Research Institute for the Semi Arid Tropics (ICRISAT) India	£5,605,000	None known	Pigeonpea Chickpea Groundnut Sorghum Including biofortification
International Rice Research Institute (IRRI) Philippines	£5,290,000	Monsanto Fund, Grain Biotech Australia Pty. Ltd. (Australia)	Rice
International Centre for Agricultural Research in The Dry Areas Pest (ICARDA) Syria	£4,514,210	Bayer CropScience Monsanto	Chickpea, Lentil and Faba beans
International Institute of Tropical Agriculture (IITA) Nigeria	£3,747,120	None known	Cassava, Yam, Banana. Plantain and Cowpea
International Potato Centre (CIP) Peru	£3,755,112	UK Bioindustries Association	Potato
West Africa Rice Development Association (WARDA) Nigeria	£1,645,000	John Innes Centre	Rice

The shift in policy does not appear to be accompanied by any assessment of the long-term risks to health and the environment of intensive farming (or comparing its supposed benefits to other methods) in the Global South and occurs at a time when fertiliser prices are rocketing (the price of urea fertiliser has trebled since 2003[76]). Africa is also highly dependent on groundwater from near-surface aquifers which have to be recharged in relatively short time periods by rainfall[77] and therefore supplies are vulnerable to agrochemical leaching.

Two DFID-supported projects exemplify this approach.

4.1 Farm Input Promotions Africa (FIPS Africa)

FIPS Africa is a not-for-profit company which aims to improve the productivity of small-scale farmers in Sub Saharan Africa by *"the dissemination of appropriate farm inputs and information on their most effective utilisation."* [78]

DFID funding[79] of the FIPS Africa was £298,000 since 2000, largely spent between 2003-06.

FIPS Africa[80] is a project based on the current vogue for public/private partnerships. FIPS Africa aims to provide access for smaller farmers to agricultural technologies marketed by the project's industrial partners, who include Monsanto, Bayer and Pioneer Hybrid, as well as a number of Kenyan seed and agrochemical producers.

It is clear from the FIPS Africa website that the project is an integral part of Monsanto's marketing operation to small farmers in Kenya:

> *"FIPS-Africa also works with Monsanto to make herbicides more accessible to small scale farmers. Glyphosate sold as Roundup by Monsanto is an excellent post emergence herbicide. It is especially useful for the control of grass weeds such as couch grass. It greatly assists in land preparation, and is a component of conservation tillage.*
>
> *"Monsanto has packaged its Roundup Max granulated product in 100 g sachets for FIPS-Africa's promotions."*

The summary of the project on DFID's 'research4development' database uses vague terms such as 'improved' and 'appropriate' seeds[81] but Monsanto and the Rockefeller Foundation have been involved from the outset in 2003[82]. References to zero tillage, poor weed control and increase use of chemical fertilizers indicates that FIPS Africa is promoting the intensification of small scale farming in Kenya which would open up new markets for the corporate supporters.

4.2 African Agricultural Technology Foundation (AATF)

AATF has a very clear mission:

> *"The African Agriculture Technology Foundation is a not-for-profit organisation designed to facilitate and promote public/private partnerships for the access and delivery of appropriate proprietary agricultural technologies for use by resource-poor smallholder farmers in Sub-Saharan Africa."*

DFID's 2003 policy paper on agriculture and poverty trumpeted its support for AATF[83].

> *"A commitment of £5 million over 3 years to the new African Agricultural Technology Foundation (AATF) which delivers affordable technology to African Farmers."*

Its industrial partners read like a who's who of the agricultural chemical and biotechnology industry: Monsanto, Arcadia Biosciences, BASF, DowAgro, Pioneer/DuPont, Syngenta and Academia Sinica.

AATF's strategy document, *Bridging the Gap to New Technologies for Smallholder Farmers in Africa: AATF Strategy (2007–2015)*[84] *makes its support for new technology very clear:*

> *4. AATF focuses its attention on innovative proprietary technologies that are currently not readily available to African farmers, especially the resource-poor*

Contradictions in DFID's strategy: tale of two techniques

One of AATF's main projects is the control of Striga, the major parasitic weed of maize in Africa. AATF's approach is to work with the German agro-chemical and biotech company, BASF, to distribute non-GM hybrid maize seed which is resistant to the herbicide Imazapyr, used to kill the Striga. In 2005 and 2006, the AATF project "facilitated an extensive on-farm demonstration and awareness programme among some 13,000 farmers in western Kenya."[86]

Yet DFID is also funding another project to combat Striga in maize crops which does not involve the use of herbicides but promotes simple crop management techniques (decoy and companion planting) which suppress the parasitic weed and also controls the corn borer (an insect pest of maize). This is known as the "Push Pull" project, and it fits well with the IAASTD's model of agroecological and multifunctional farming. Its advantages are[87]:

- increased maize yield
- continuous supply of cattle feed from Napier grass and the desmodium legume
- reduced fertiliser costs due to the nitrogen-fixing properties of the desmodium legume
- soil protected from erosion as desmodium acts as a cover crop
- soil retains water as desmodium acts as a mulch
- income for farmers from the sale of desmodium seed at a good price
- increased income from milk sales
- frees farm labour
- wind protection for the maize crop afforded by Napier grass
- farmer's dependence on corporations is diminished or eliminated as their inputs are not needed.

DFID's funding of the 'Push Pull' project from 2002 to 2005 was £222,250. The amount spent on the AATF project is not known. However, overall AATF received 22 times that amount from DFID over a three year period.

smallholder farmers who comprise the bulk of the continent's agricultural producers. Such technologies tend to encourage commercial, market-oriented farming activity and can thus help to re-energise African agriculture.

5. The Foundation is committed to the adoption and use of new agricultural technologies, and to facilitating the adoption process by intervening when necessary to provide stewardship and ensure that new technologies are deployed and used appropriately.

AATF is promoting GM technology[85] quite openly and lists Monsanto as a collaborator in its projects on transgenic crops on cowpeas and water efficient maize.

5. The need for change

5.1 Shifting DFID's policy on research, development and extension services

The budget available from DFID in the next few years for research, development and extension to farmers is large enough to start the sort of agricultural, social and economic reforms envisaged by the IAASTD report. However the current UK government appears to be committed to transgenic crops to deliver a technical fix to overcome almost anything from drought to saline soils to malnutrition. Similarly DFID continues to support the liberal use of oil- and mineral-based agro-chemicals at a time when prices are escalating.

These policies need urgent revision and a thorough risk assessment.

Research into the risks and external costs of agriculture in the Global South is not extensive or comprehensive, however some impacts of intensive farming are obvious:

- acute and chronic pesticide poisoning of farm workers and local residents[88]
- dwindling water supplies[89] due to over use of water for irrigation
- nitrate pollution due to use of nitrogen fertilisers[90]
- soil erosion[91] and salination due to unsustainable use of irrigation
- agriculture is a major emitter of greenhouse gases – carbon dioxide. methane and nitrous oxide
- loss of diversity in crop plants and farm livestock and poultry.

The external costs of agriculture (ie costs due to pollution, soil erosion, loss of habitats etc) have been calculated by several institutions. The most recent estimate for the UK is £1140- 3050 million per annum.[92]

The ability of intensive agriculture and genetic engineering to meet DFID's policy objectives, including by the Millennium Development Goal of halving the proportion of people living in hunger and extreme poverty by 2015, needs to be reviewed in the light of the IAASTD findings and the fact that current approaches seem set to fail miserably. Relying on price-volatile commodities, such as oil and fertilisers, to secure the future food security and incomes of the poorest farmers has to be seriously questioned.

6.2 GM crops

The role transgenic crops might play in providing the calorific and nutrient requirements of poor people remains mired in controversy, as it has been since Monsanto placed their ill conceived "Let the Harvest Begin" advertisements in national papers in 1998[93]. Some commentators have an almost messianic belief in the ability of GM technology to "feed the world" and others see it as an expensive, risky and inappropriate fix for farmers in the Global South.

To date, the biotechnology industry has failed to produce a single commercial GM crop which is aimed at solving food shortages and malnutrition and which is currently available to poor farmers. Indeed, many small farmers and Governments in the Global South oppose the use of GM in agriculture.[94]

Current GM crops have largely been developed for global commodity markets served by large scale farmers growing GM maize, soya, cotton and oilseed rape. The six transnational corporations[95] who lead research and development into GM crops do so to enhance their profits and hence shareholder dividends, not to serve the poor farmers of the world.

So far, commercial varieties have mainly involved two relatively simple genetic engineering events using single gene constructs or combinations of two. These traits are: tolerance to a specific weed killer, such as Monsanto's best selling herbicide glyphosate (RoundUp); and insect resistance produced by inserting Bt genes from the soil bacterium *Bacillus thuringiensis* in crops making the whole crop insecticidal for a specific group of pests.

More complicated genetic modifications, such as drought tolerance, salt tolerance and nitrogen fixation, have been long promised but have been slow to materialise because they seek to change the physiology of the crop plants in a major way and the genetic engineering required to achieve this has proved to be more complex and difficult. Some scientists suggest it might in fact be impossible, or would require plants to divert so much energy to operate the GM trait that their value as a crop would be overwhelmingly damaged.

The controversy about the safety of GM food and feed for human and animal health and the environment remains a live debate, as do arguments about the ethics of transferring genes across species barriers, the economics and effectiveness of GM cropping, intellectual property and patenting and the socio-economic impacts of rural changes brought about by transgenic crops and corporate/industrial agriculture across the board. Transgenic crops have been developed for, and used in, intensive farming systems and are mainly grown in North and South America. They are subject to the same pest pressures, pesticide usage and fertiliser regimes as monocultures of non-transgenic crops and therefore have very similar environmental impacts to conventional monocultures, with the additional problems of increased risk of pest resistance, contamination and dependency on single pesticides for weed control.

Conventional crops still dominate global agriculture while only 2.2 per cent of farm and commercial forestry plantations are under transgenic crops or trees[96]. Industry claims that GM crops yield more than

conventional ones cannot be supported by peer reviewed evidence, as revealed during the IAASTD process, and in many cases the reverse is true[97]. Similarly claims about the role of GM crops reducing pesticide usage do not stand up to independent scrutiny.[98]

Experience of growing, harvesting and moving GM crops has shown that containing the GM traits is impossible and examples of contamination due to cross pollination and mixing of seeds or harvested crops abound[99] in the South and North.

Meanwhile, conventional plant breeding techniques (sometimes applying modern techniques such as marker assisted breeding) and crop management techniques are continuing to produce good results[100], despite the relatively small amounts of public research investment they receive compared to investment in GM crops by biotechnology corporations, donors and institutions.

Genetic engineering of crops is expensive to research and develop because of the many steps required before a GM crop can be sold commercially and the complexity of the science employed. This includes finding and identifying genetic traits in a wide range of organisms, the initial genetic engineering events, trait and variety testing in greenhouses and the field and research into the environmental and health impacts of the crops. Even when regulatory approval is obtained, GM crops have to gain public acceptance across a hugely diverse market for food stuffs across the world.

6.3 Intellectual property rights

Concerns about patents, plant breeders' rights and monopolistic power of the seed and agricultural chemical companies are among the many reasons that farmers and consumers around the world have objected to the introduction of GM crops. In the Global South, farm saved seed[101] is of vital importance to the 90 per cent of farmers who follow the practice through economic necessity. Saving and re-sowing seeds in this way also helps maintain agricultural biodiversity. Yet the practice is threatened by the use of patents on transgenic traits and plant breeders' rights on hybrid varieties which legally prevent the saving of seed. Free and open access of all plant breeders to plant genetic materials is essential if progress is to be made in developing crop varieties that perform well in the adverse environments and conditions they face in the Global South.

DFID's research strategy fails to recognise patenting and plant breeders rights as issues that could seriously impact on research for agriculture for development and in ensuring progress for farmers is maintained. The prospect of the biotechnology companies developing Genetic Use Restriction Technology (GURTS), such as Terminator Technology, to prevent effective seed saving by poor farmers needs to be addressed by DFID's research strategy. Until now the UK position on GURTS has been ambiguous and they have so far not supported the *de facto* moratorium agreed by the UN Convention on Biodiversity, preferring to assess GURT-containing GMOs on a case by case basis, should application for release be made.[102]

It is hard to see what advantages transgenic crops could provide poor farmers in the Global South, when many of the barriers to improving crop yields are already being tackled using conventional plant breeding techniques and agroecological approaches, with real benefits already accruing to farmers (see the 'Push Pull' example above). These, of course can't be patented, so do not yield profits or incentives to commerce, but do enable farmers to share and build on knowledge.

6.4 How should UK Government policy be adapted to meet the challenge of IAASTD's Key Findings?

All 22 of the IAASTD's key findings have implications for policies of several UK Government Departments in particular DFID, Defra and Business, Enterprise and Regulatory Reform.

Agricultural Knowledge Science and Technology, traditional knowledge and women (IAASTD Key Findings 1, 2, 8 and 9)

All Government departments need to acknowledge and utilise the fact that traditional knowledge held by individuals and communities should carry equal weight to the products of formal scientific research and practice. More meaningful involvement by farmers and, in particular, women farmers and other small-scale food producers needs to be demonstrated in UK-funded projects, as do the benefits of any approach advocated. Projects which solely focus on production need to be adapted so that accompanying socio-economic changes ensure poor people benefit, are fully included in decision making and are the primary beneficiaries.

Assessing risks (IAASTD Key Findings 3 and 4)

All applications of AKST carry some form of risk, the consequences of which can outweigh the purported benefits, for example long-term contamination of groundwater with nitrates or pesticides or the loss or degradation of natural ecosystems or soil losses. The poor are often the victims of such mistakes. It is essential that the Government adopt appropriate risk assessments on projects it funds, using regulations based on the precautionary principle and seek to promote the same approach by other funding bodies and research institutions.

Consumption patterns (IAASTD Key Finding 5)

The over-consumption of high fat animal products, produced using soya and maize grown thousands of miles away, is a major cause of health problems around the globe, such as obesity, heart disease and bowel cancer. The Government needs to look at policy across all departments to reflect the impacts of over-consumption on human health, the local environment and climate change, both here and overseas. Similarly support for exports of out-of-season vegetables, flowers and fruit needs to reviewed in terms of the overall impact on the availability of local food in the Global South.

Agroecology and multifunctional land management (IAASTD Key Findings 6, 7, 10, 11, 18, 19, 20 and 22)

Agroecology appears to be on the margins of DFID's thinking at present. A search of the DFID website for "agroecology" and "agroecological" produced a handful of documents, in which it is mentioned fleetingly. Similarly, attention to the multifunctional aspects of agriculture receives scant attention in DFID's documents. Recent R&D funding from DFID has been targeted at

the Consultative Group for International Agricultural Research (CGIAR) centres (87% of a £150 million DFID research grant announced recently fund will go to CGIAR[103]) who openly attacked the IAASTD process and findings immediately before the final reports were published[104]. This research focus has to change and all Government departments need to put farmer-led agroecology at the heart of research and development and policy.

Trade reform (IAASTD Key Findings 14 and 17)
All sections of government subscribe to the view that the opening up of markets and free trade are the best ways to alleviate poverty but as the IAASTD pointed out these reforms often bypass poorer farmers who are still being squeezed out of local markets by cheap imports from subsidised farmers elsewhere. Government needs to review their trade policies so as to support smaller farmers using agroecological methods.

Targeting the poor (IAASTD Key Finding 13 and 16)
In recent years DFID's policy has shifted from helping the poor to giving *"priority to agricultural development in places where significant productivity gains are possible and the potential links to the wider economy are strongest"*.[105] The IAASTD report highlights reasons why smaller farmer are unable to gain full benefits and need specially crafted support. The Government needs to urgently review its policy in the light of the IAASTD findings and provide protection from the growing influence of transnational retail and food corporations currently using farmers in the Global South to produce fruit, flowers and out-of-season vegetables.

Governance and guidance (IAASTD Key Finding 15, 21 and 22)
The IAASTD findings also point to the need to strike the correct balance between the public and private sectors in research and development projects and ensure that weaker voices are heard when shaping research and prioritising expenditure. At present much of DFID's funding is in the form of core grants to governments and institutions and there is a lack of accountability for how the money is spent and with what outcomes. The Government recognises that *"Some of the by-passed options originate in traditional knowledge or civil society experience and may be better able to contribute to poverty reduction, social inclusion, equity and generate multifunctional outcomes"*. All bodies receiving funding from the UK need to address this; thorough monitoring should be introduced with recipient governments and institutions; failure to carry out satisfactory monitoring should result in aid being withdrawn and re-allocated to bodies that meet these objectives.

6. Discussion and Conclusions

DFID's policy for agriculture has moved significantly during the current decade away from providing support for smaller farmers feeding their families and supplying local markets towards commercially-orientated farmers producing crops for export as well as domestic consumption. This shift is also reflected in how they fund research and extension services.

In Africa, DFID is already funding two organisations with very clear links to agro-chemical and biotechnology corporations, FIPS Africa and AATF, both of which are seeking to increase the intensity of production practices of small farmers. Yet DFID's support for a project highlights vastly different approaches to the same farming problem: AATF's project for the chemical of control Striga (a parasitic weed of maize crops) in collaboration with the German chemical and biotech corporation BASF, takes on-farm practice in an opposite direction to the "Push Pull" project, also part funded by DFID, which has developed a method of controlling Striga that avoids use of both herbicides and GM technology by using companion planting – a classic example of integrated pest management based on the agroecological approach recommended by the IAASTD.

DFID has committed massive financial support to the CGIAR centres which in turn have an expanding programme of GM crops and institutional commitment to the GM approach.

Farmers in the Global South represent a huge and largely untapped market for the biotechnology corporations. In places such as India and South America, where the infrastructure to market seeds already exists, companies such as Monsanto, Syngenta and Bayer are already actively selling GM seeds. Africa is the next target for GM seeds produced for intensive systems as industry representatives already admit that developments aimed specifically at smaller farmers are 20 years away (see 3.2 above). The corporations are already active in public/private partnerships and African scientists are being trained in genetic engineering and molecular biology by the biotechnology corporations and through studentships at northern universities. In places such as India, funding for extension services which talk directly to farmers about agroecological approaches to farming problems has been reduced, providing openings for industry representatives to purvey seeds and chemicals.

The development of good quality locally produced seeds is something that DFID has supported in the past. However, in Africa many countries lack the formal infrastructure to distribute these seeds or the fertilisers which DFID deem necessary to grow crops. There is need to train plant breeders working with farmers to fill this void and develop new varieties suited for local conditions It is also important that there enough well-trained extension workers to make sure that farmers have access to seeds, as well as advice on best practice in multifunctional agriculture and agroecology. It is also vital that women farmers play a full and active part in these developments since 70 per cent of the world's farmers are women.

Modern science will also have a major role to play in developing sustainable practices which meet the linked demands for healthy food, climate change mitigation, enhancement of soils and efficient management of water. Independent molecular biologists can help in plant breeding programmes by identifying which plants contain beneficial traits needed by plant breeders (marker assisted breeding) and to ensure open assess to this genetic material. This will require equipping state of the art laboratory facilities at key centres if they are lacking at present.

In the light of the recommendations emerging from the expert panels involved in the IAASTD's four years of deliberation on the best way to deploy science and technology to develop agriculture in the Global South, DFID should reassess its current thinking to ensure that farmers farm with many objectives in mind including limiting greenhouse gas emissions, conserving water and protecting water resources, protecting biodiversity, fixing carbon and producing high quality safe food.

For the allocation of research to be truly demand-driven and beneficial primarily to small-scale farmers, DFID has to ensure that its budget is not diverted to fund GM technology instead of projects which are quicker to implement and whose results are accessible and affordable to poor people. Crucial for poor farmers are solutions which do not rely on expensive inputs such as fertilisers and pesticides.

The adoption of the new research strategy for 2008-13 was an opportunity for DFID to refocus on the most pressing research challenges such as taking into account the multifunctionality of farming and the need for change to be led by farmers and communities in greatest need, especially women, and to move away from technology-led solutions towards bottom-up solutions which place greater emphasis on agroecology[106].

DFID however appears to be setting sail in the opposite direction and will need to review its current policies to reflect the findings of the IAASTD panels. GM Freeze recommends:

1. DFID should implement the findings of the IAASTD, in particular moving research towards more agroecological AKST, and review its research policies and priorities in response.
2. DFID should review its current spending priorities for sustainable agriculture research so that the focus is on multifunctional agroecological farming systems including organic techniques, integrated pest management, water management and locally-controlled technologies and techniques.
3. DFID should adopt a clear classification of biotechnology-related funding and transparent reporting so that projects that propose to, or might potentially, use genetic modification of crops (transgenics) and/or genomics and marker assisted breeding are explicitly recorded as such from the outset.
4. DFID should ensure that funding is targeted to ensure that the local knowledge of small-scale women and men farmers, and local control of research priorities and resources by their organisations and institutions, are fully integrated in new developments and research.
5. DFID should review its relationship with the CGIAR centres and restrict funding to programmes that move research towards more agroecological AKST.
6. DFID should increase funding for participative plant breeding programmes and the development of locally-controlled extension services, including farmer to farmer training, that will enable farming communities to develop locally-adapted sustainable agricultural methods incorporating appropriate AKST.
7. DFID should support the development of public research and training facilities that can train scientists in more participative forms of research with small-scale farming organisations and to assist plant breeders to focus on identifying beneficial traits and ecosystem functions that can be developed and controlled locally, independent of the influence of corporate sector agribusinesses.
8. DFID should support the development of world-class regulatory and monitoring systems for countries in the Global South based on the precautionary principle.
9. DFID should insist, as part of its quality assurance, that institutions and countries in receipt of grants and aid provide a report to DFID each year with an account of how the funding was allocated, by project, with details of any technologies developed, promoted or used.
10. The International Development Committee of the House of Commons, as part of the standing agenda for its annual review of DFID, should investigate DFID's funding of research and development to ensure that it meets the needs of poor farmers.
11. DFID should support and promote comprehensive assessments of risks and benefits of intensive farming and livestock production systems, including the use of GMOs, pesticides, artificial fertilisers, irrigation and so on, in terms of their impacts on poor people and communities, local production and markets, as well as local ecosystems and the environment.
12. DFID should redefine the role of farmers to reflect their multifunctionality rather than focusing on commercial viability.

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Any errors in the text are entirely the responsibility of GM Freeze.

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    • supporting a tight focus on poverty reduction and food security giving priority to the needs of South Asia and Sub-Saharan Africa;
    • contributing to a better understanding of the livelihoods of the poor, including different types of sub-group (gender, age, ethnicity);
    • supporting the use of regional processes for more effective programme planning and priority setting;
    • supporting efforts to build capacity in national agricultural research systems and encouraging partnerships with the private sector and civil society.
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GM Freeze, 50 South Yorkshire Buildings, Silkstone Common, Barnsley S75 4RJ
Tel: 0845 217 8992
www.gmfreeze.org