

DFID RESEARCH STRATEGY 2008-2013

Working Paper Series: Sustainable Agriculture



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THIS WORKING PAPER ON SUSTAINABLE AGRICULTURE AND RENEWABLE NATURAL RESOURCES IS ONE OF A SERIES OF 10 PAPERS PUBLISHED ALONGSIDE DFID'S RESEARCH STRATEGY 2008-2013. IT PRESENTS THE CASE FOR DFID-FUNDED RESEARCH ON SUSTAINABLE AGRICULTURE AND RENEWABLE NATURAL RESOURCES – DRAWING ON THE RESPONSES GIVEN DURING A GLOBAL CONSULTATION THAT DFID CONVENED IN 2007 ABOUT ITS FUTURE RESEARCH.

The purpose of the Working Papers is two fold: to record the key issues raised during the consultation; and to spell out DFID's decisions on new directions, as informed by the consultation. As such, they constitute an important part of the feedback process, and provide an opportunity to clearly articulate DFID's strategic response to the consultations and to other global drivers of research. They also provide guidance to those implementing DFID's research strategy in the future.

Each Working Paper reviews the current state of DFID's research on a given theme, highlights the key questions asked during the consultation process, and documents the main feedback received. The Papers then tease out the implications of the consultation findings on DFID's work, and end by spelling out DFID's future directions on each priority theme. Where possible, each Paper makes clear how DFID has drawn upon the consultation responses to shape its plans.

Other titles in the series are: Economic Growth, including Infrastructure; Climate Change; Better Health: Education; Political and Social Science Research; Stimulating Demand for Research; Research Communication; Capacity Building; and Mainstreaming Gender in Research. Note that issues which are not directly addressed under this paper may appear in others (for example the impact of agriculture on climate change is largely addressed in the paper on Agriculture).

More information on DFID funded research can be found on the website www.Research4Development.info. This also offers the facility to sign up for e-mail alerts covering different sectors.

SUMMARY

No country has ever achieved significant poverty reduction without first raising productivity in agriculture. Agriculture is not only the way the vast majority of Africans make their living but with its high multiplier affect across the wider economy, it is also the sector most capable of growing the continent's economy in the medium term.

DFID has longstanding experience in managing research in agriculture and renewable natural resources. In 2006-2007 it invested over £30 million in research on sustainable agriculture and is committed to doubling funding on agriculture, fisheries and forestry to £80 million per annum by 2010. The Department's approach is spelled out in the Strategy for Research on Sustainable Agriculture 2006-2016 (SRSA), launched in March 2006.

DFID is considered to be a major donor and thought leader on agricultural and RNR research for development, growth and poverty reduction. The consultation validated the approach and content of the SRSA, while proposing ways in which it might be expanded and improved. Nine new research themes emerged in the course of the consultation: productivity-enhancing technology; low-input farming systems; sustainability, vulnerability, risk and resilience; social protection and agriculture-based livelihoods; agriculture and climate change; water and its management; livelihood diversification; access to markets, land, growth and farmer empowerment; and natural resource management.

In the light of extensive stakeholder consultation, research to promote sustainable agriculture will remain as a central plank of DFID's economic growth agenda – reflecting its demonstrated high rates of return and impact on poverty reduction. Certain topics in the SRSA will be given renewed emphasis or re-framed to better reflect links to our broader research agenda of economic growth.

DFID will work with its partners to strengthen research in six main research areas in agriculture and renewable natural resources over the next five years: new agricultural technologies that enhance and maintain productivity levels; high-value agriculture in areas of medium to high agricultural potential; rural economies; risk, vulnerability and adaptation; markets; and managing the resource base sustainably.

Additionally, DFID will continue to support agricultural research by ensuring provides for a balance between basic science, translational and adaptive research, and programmes to get research into use.

WHERE WE ARE NOW

1. DFID has longstanding experience in managing research in agriculture and renewable natural resources (RNR) that supports developing country priorities, as well as a proven ability to link the basic science community, especially in the UK, with key developing country problems and partners.
2. In 2006/7 DFID invested over £30 million in research on sustainable agriculture – including fisheries and forestry. The Government's 2006 White Paper – Making Governance work for the Poor – committed DFID to double funding on agriculture, fisheries and forestry to £80 million per annum by 2010.
3. The purpose of this increased investment is to build upon the impacts of agricultural research on poverty and growth. A series of studies have shown very high returns to agricultural research¹. A recent analysis by the International Food Policy Research Institute demonstrated that investment in agricultural research has a larger impact on poverty compared to investments in infrastructure and health in a number of countries studied.

¹ See World Development Report 2007, World Bank, 2007

4. The vital role of research in driving innovation and economic growth has long been recognised by the private sector where research and development (R&D) investments far outweigh those of the public sector in industrial countries. In developing countries the situation is reversed, with public investment generally low and private investment practically non-existent. As a result the agricultural knowledge and technology gap between North and South is actually widening.
5. International research in agricultural and natural resources is indisputably aimed at producing global public goods which are widely accepted to be under funded. Innovation based on sound science and technology is needed in response to key drivers of change with which developing country farmers will have to contend such as the changing nature of agricultural markets, climate change, new weather patterns and new pests and diseases of crops and animals.

STRATEGY FOR RESEARCH ON SUSTAINABLE AGRICULTURE (SRSA 2006-2016)

6. The Strategy for Research on Sustainable Agriculture (SRSA) was launched in March 2006. This sets out DFID's approach to research on agriculture, fisheries and forestry to get new technologies to poor farmers and to help governments to make better policies. It is part of DFID's overall approach to agriculture as described in its Agricultural Policy Paper Growth and Poverty Reduction: the role of agriculture. The SRSA aims to:
 - *Respond to demand* from developing countries. For example the African Union's and NEPAD's Comprehensive African Agricultural Development Programme (CAADP).
 - *Prioritise technologies* that will increase the productivity of labour, create agricultural related employment, trade and commerce – all of which are vital to achieving agricultural growth, reducing rural poverty, increasing investment and multiplying growth across other economic sectors.
 - *Maximise the returns in areas of high agricultural potential*. This means research to achieve significant increases in employment and output.
 - *Take full account of people's exposure to risk and vulnerability*, seeking to maintain high levels of resilience to short-term shocks such as drought, pests and diseases, and longer term trends such as climate change where agriculture, fisheries and forestry can contribute significantly to adaptation measures.
 - Incorporate research on market opportunities. Growing and secure markets are critical if farmers are to invest, innovate and improve their productivity. In Africa this largely means focusing on basic food staples and domestic markets. In Asia and other regions, which are more self sufficient in basic staples, emphasis will be on higher value commodities. As incomes of urban consumers rise food preferences and demands become more sophisticated. Hence opportunities for new products and value addition along the market chain must be constantly kept under review.

- *Ensure the sustainable and productive use of resources* such as soil, land, water forests and aquatic resources, to maximise their contributions to growth and poverty reduction, provision of environmental services, and ensuring environmental sustainability. Farming is only one component of rural livelihoods. There are strong linkages at household and landscape levels with the natural resource base such as forests, fisheries and rangeland, as well as with the non-farm economy through commerce, migration, tourism, rural industry and so on. All these activities need to consider long-term sustainability and productive enhancement of the renewable natural resource base.
- *Make aid to agricultural research more effective.* To work closely with other development partners for better coordination and harmonisation of support to agricultural and renewable natural resources research. Not just through funding more research per se, but also by strengthening linkages between parts of the research architecture at various levels from global to national and into the communities where poor people make their livings.

7. The SRSA has four components:

I. RESEARCH INTO USE

Programmes aimed at getting research outputs into use and building capacity of people to do, access and utilise research for better livelihoods and growth. This also entails public-private partnerships to get policies, products and technologies into widespread use by farmers in developing countries.

II. REGIONAL RESEARCH

Support to existing regional organisations in West, East, Central and Southern Africa, and regional programmes in South Asia and the Andes. This aims to capitalise on economies of scale and promote spill over between countries across regions with common problems through research on regional public goods.

III. INTERNATIONAL RESEARCH

Support to international agricultural research, especially the CGIAR, to deliver high quality and effective international public good research including technology, methodology and policy for poverty reduction and growth.

IV. ADVANCED RESEARCH

Responsive programmes with UK Research Councils to support collaborative research between UK and southern researchers on basic scientific aspects of sustainable agriculture and natural resource management which are translated and adapted to developing country circumstances with southern partners.

WHAT THE CONSULTATION ASKED

8. The main question we asked in the consultation was: “How can DFID build on its work on sustainable agriculture and develop its work on economic opportunities and growth?” Specific questions asked were:
- How can African economies best diversify to achieve the 7% annual growth needed to attain the Millennium Development Goals?
 - What technological innovations can best raise agricultural productivity and what policy reforms and infrastructure can make agriculture more competitive?
 - What is the likely impact of climate change on sustainable economic growth in Africa? and
 - How can developing countries harness new technologies and investment to accelerate growth?
9. A closely-related question which produced responses relating to agriculture and RNR was: “How can DFID improve research into the impact of climate change on poverty and environmental change more broadly?”

WHAT WE HEARD

10. DFID is considered to be a major donor and thought leader on agricultural and RNR research for development, growth and poverty reduction. During the 1990s the sustainable livelihoods approach gained prominence as a way of ensuring holistic treatment of rural issues, going far beyond the farm gate and probing issues related to resilience, policy process, empowerment and the interrelationships between social, human, financial, physical and natural assets.

DFID has been a pioneer in promoting pro-poor agricultural growth in Africa. DFID can further enhance its work by building research and analytical capacity of researchers, policymakers and parliament members, so they become the champions in promoting pro-poor agricultural growth.

11. Development and adoption of DFID’s SRSA was based on extensive consultation, and many of the respondents to the current consultation exercise were involved. Hence it is reassuring to find that this consultation implicitly supports the approach and content of the SRSA, and that respondents have largely made suggestions regarding how this might be expanded, improved, and which emerging thematic areas added, taking as given the on-going SRSA.

[We] strongly agree with DFID that research on sustainable agriculture is vital and agricultural growth is a key engine of economic development. This view was strongly supported at a consultation with 12 of our African Member Countries in Africa, September, 2007.

AGRICULTURE CONTINUES TO HAVE HIGH RELEVANCE FOR GROWTH AND POVERTY REDUCTION

12. The World Development Report 2008: Agriculture for Development presents a comprehensive analysis on the importance of agriculture in development and lays out opportunities and challenges for the future. The report makes the case that in many developing countries and for more than 2 billion people, agriculture is the main vehicle for escaping poverty. The report also calls attention to the fact that, notwithstanding the importance, the sector attracted only 4% of donor assistance and national public expenditure over the past two decades or so. It calls for much more investments in agriculture in general from donors and national governments now and in the future, and research in particular as a means of rapidly increasing agricultural productivity so it can better act as a multiplier of overall economic growth.

Is it just a coincidence that the first of DFID's "four priority research themes" is "sustainable agriculture, especially in Africa, moving towards a broader agenda of economic opportunity and growth"? Arguably not. First of all, agriculture is the sector where most poor Africans still make their livelihoods. Secondly, Africa is the region where the severity of poverty seems deepest and the challenge of large-scale poverty reduction has proved most intractable. Finally, any sustainable solution to poverty in Africa must be built on economic growth.

13. Responses from Africa and South Asia stressed once again that broad-based growth and poverty reduction depended on agriculture, at least in the short-term. In the longer term there was less of a consensus on the role of agriculture. Increasing the productivity of small-scale agriculture was seen as a priority, along with better use of scarce natural resources.

In light of heightened interest in agricultural productivity and competitiveness, and the growing awareness of linkages between agriculture, natural resources and environmental sustainability, DFID's decision to retain agriculture and natural resources prominently in its research funding agenda is seen as a reflection of its continued commitment to a sound evidence base in this area.

AGRICULTURE IS CENTRAL TO GROWTH

14. There is broad support for DFID's proposed focus on how economic growth can be achieved in equitable, socially responsible and sustainable ways in Africa. However the in-country consultations revealed concerns that the poorest do not always benefit from growth. There was general consensus on the need to ensure broad-based participation in agricultural development as an engine for economic growth and employment creation. This was seen as vital in order to turn around the mixed record of previous investments in agriculture.

15. Looking forward, people in Africa and South Asia see an increasingly uncertain future, with increasingly volatile commodity markets, less predictable weather, increasing pressure on water resources and land and rising input prices. The prospect of agricultural transformation in Africa depends on the extent to which these risks can be understood and mitigated. However, there was less of a consensus on the role of agriculture in the longer term. In some countries the development of large-scale commercial agriculture was considered to be a major long-term policy objective, in others, increasing the productivity and profitability of small-scale agriculture was seen as an important transformational measure, with longer term development dependent on the manufacturing and service sectors.
16. Understanding the wider impact of rapid agricultural development was said to be a priority in Africa and South Asia country consultations. New market opportunities (e.g. bio-fuels) increased trade and rising commodity prices were welcomed as ways to stimulate domestic markets and attract investment in badly needed downstream processing capacity. But there was general concern that the poor may not benefit and that the fragile natural resource base could be further strained. These changes need to be managed carefully.

We need to understand why certain territories and regions manage to develop in ways that result in economic growth, social inclusion and environmental sustainability, while other areas go in directions that are not as positive.

CONTINUED NEED FOR INTERDISCIPLINARY RESEARCH

17. Innovation as a means to foster broad-based growth has been stressed by respondents along with critical concerns and calls for more research to produce a stronger evidence base on the trade-offs between agricultural growth, equity and environmental sustainability; and the obvious, but under-researched, interactions linking health and agriculture, human nutrition, HIV and human productivity. In South Africa, those questioned highlighted the decline of multi-disciplinary approaches to research, despite their relevance to agriculture. The decline of mutually-reinforcing and synergistic connections between researchers and practitioners, as well as between social and natural science, risks missing opportunities to understand crucial issues relating to rural development, in areas such as land reform and agriculture among others.

The interconnectedness of agriculture and other sectors is not always appreciated by analysts and policy-makers who take an 'agriculture sector' view rather than a 'livelihoods' view of rural Africa, but these relationships are fundamental.

18. In general therefore, the consultation supports the SRSA by highlighting the significant interactions of policy objectives for accelerating agricultural growth with natural resource management (NRM), equity, environment, health and sustainability in driving wider economic growth in pursuit of poverty reduction.

There is an intimate relationship between the nutrition required for good health and agriculture. This should not be overlooked. Leading science on agricultural topics such as insect pest management can be highly relevant to the health area e.g. work to manage insect vectors of disease.

RENEWABLE NATURAL RESOURCES (RNR) REMAIN AS RELEVANT AS EVER

19. The economies of developing countries depend upon their natural resource base to a far greater extent than wealthy or middle income countries. In most of sub-Saharan Africa, renewable natural resources (fisheries, forestry, water and land resources) provide an income to the majority of the population, provide the vast majority of exports, supply the raw materials to industry, and feed the population. Moreover, renewable natural resources are capable of generating wealth continuously through management arrangements that protect their long-term economic value. Failure to establish effective management regimes can lead to short-term, high-yield use which leads to a collapse of economic value.

The global importance of fisheries needs to be recognised, for example when considering important sources of food, especially in developing countries. FAO statistics show that fish contributes approximately 16% of animal protein in our diet, worldwide.

20. The impact on poverty reduction of wealth derived from better management of renewable natural resources can be significantly greater than that from wealth generated elsewhere in the economy. Renewable natural resources tend to be diffuse, generating wealth across a wide geographical area, benefiting rural areas and sustaining the livelihoods of large numbers of rural people. RNR also provide safety nets for rural people during times when other opportunities are limited. This is particularly the case in post-disaster situations and in conflict or post-conflict states, where disruption to the formal economy limits income generating opportunities. Under these circumstances, reliance on RNR-based livelihoods can increase greatly, placing strains on the resource base and on formal and informal institutions.
21. Land was also highlighted as a priority for future research. Not enough is known about how the increasing demand for land will affect the rural poor. The pressure to aggregate land holdings into larger, more competitive units is likely to increase. In many countries, national policies on land, agriculture, economic development and social protection are not well aligned, especially with respect to the rural poor. Land quality is also directly affected by unsustainable farming practices which may support livelihoods in the short term, but ultimately result in degradation through “mining” the resource base. There is increasing evidence of low or declining soil fertility, water retention capability and erosion in many developing countries.

22. Climate change is one of many threats natural resources face. Uncertain and variable climate contributes to the impact on the vulnerability of rural producers of poorly functioning markets, inadequate infrastructure, and weak public institutions. Overall ecosystem degradation, already identified as a major threat, will be exacerbated by changing climates.
23. Country consultations as well as electronic responses gave very clear messages about the growing importance of water as a resource that must be shared amongst many competing users each with specific priorities and demands. The need for effective water use policy and functioning management institutions was highlighted. Water can no longer be considered as a “free” resource, available to all as and when needed and in unlimited amounts.

RESEARCH THEMES RAISED BY THE CONSULTATION

The principle research themes emerging during the consultation fall into 9 main areas:

PRODUCTIVITY ENHANCING TECHNOLOGY

24. There appeared to be no major consensus in response to the questions concerning specific technological innovations but the most common response was for research on increasing agricultural productivity from all farming systems.
25. Greater emphasis was called for research on the use of simple and low cost technologies such as rainwater storage and support for indigenous knowledge systems of crop and animal production. The use of new scientific approaches such as biotechnology was raised both in terms of the opportunities this presented as well as the need to undertake research into bio-safety and long term effects of genetically modified crops.

[We] urge DFID to be a much stronger supporter of agricultural biotechnology in answering development questions – for example by building capacity for specific biotechnology breakthroughs that are development-serving, such as the development of drought-resistant strains. DFID should also invest in initiatives that will take biotechnological innovations such as the development of new crop varieties from the laboratory setting into large-scale production. Research could also strengthen biosafety and food safety frameworks (8).

26. The need for new varieties of crops and livestock, to address future challenges was highlighted in Africa and Asia. For example crop varieties that are more resistant to salinity and drought, have lower requirements for fertilizer, and are better able to withstand common and emerging pests and diseases. In both crop and animal agriculture practices by the poor there is a greater demand for optimal solutions rather than maximising production per se.

27. Low-cost solutions to persistent problems such as animal and poultry feed were also mentioned as a means of improving livestock productivity as well as ensuring better health and survivability of multi-purpose animals kept by the poor.
28. Most emerging diseases have their origins in animals and are zoonotic i.e. transmitted from animals to people. Diseases such as Highly Pathogenic Avian Influenza (HPAI) pose severe threats to livestock and human health. Control strategies often favour large over small scale producers. In the case of HPAI some countries are attempting to prohibit backyard poultry keeping and others could follow, with very severe negative consequences for the poor. Bio-security strategies for both large and small scale producers are needed against HPAI and other zoonotic diseases to protect livestock and human health, and to enable both local and international trade.

LOW-INPUT FARMING SYSTEMS

29. As mentioned above the aim of research for increasing agricultural production levels and productivity is paramount. However there was concern that the technological focus, combined with single disciplinary research, can tend toward quick-fix solutions. In complex agriculture-based livelihood systems of the poor higher yields are often not the best solution to complex problems.

Mixed crop and livestock systems hold good potential, with the increased demand for livestock products and the scope for improving the productivity of these systems (26).

30. Nutrient re-cycling, low external input farming systems, zero-tillage systems, mixed cropping and livestock farming also need to be researched in order to generate technology and policy-based solutions for raising household productivity.

...due to the rising price of oil many chemical inputs are beyond the reach of many small scale farmers in Africa.... research should focus on the development of new seed varieties that are not dependent upon expensive oil-based inputs to reach their productive potential. This will probably require some kind of genetic modification (9).

SUSTAINABILITY, VULNERABILITY, RISK AND RESILIENCE

31. Most poor people in rural areas are dependent of agriculture for their livelihoods. Their lives are complex and risk-prone and the poorer they are the more they are at risk. Their vulnerability can affect them directly by destroying assets and reducing productivity, and indirectly by forcing them to invest in less risky but less productive activities

Given the inherent variability of returns to smallholder farming, especially in rain fed farming systems with a single rainy season, reducing variability in production and incomes might be as important as raising average yields and incomes.

32. The consultation called on DFID to focus more on the factors affecting investment in agriculture given that erratic weather, inconsistent policy regimes, or conflict and civil instability make farming a hazardous and highly risky enterprise. Much research already supported by DFID and others addresses the need to stabilise crop yields across existing variable weather conditions.

... weather-indexed crop insurance can protect farmers' incomes and stabilize precarious rural economies. The underlying idea is that insurance against weather-related crop failure can improve farmers' risk profiles, thereby increasing their access to bank credit – while at the same time reducing their vulnerability to climate variability.

33. The country consultations emphasised the need to factor in trends that will affect the poor. Respondents felt that the nature of markets is changing, a factor that will present new risks for poor people. The nature of domestic and international markets is changing rapidly with the emergence of new markets like bio-fuels and changes to existing high-value export markets like horticulture, increasingly dominated by supermarkets. Poor people are the least well-placed to benefit from these changes and the most at risk. Increasing grain supply, directing research towards less vulnerable crops, and ensuring markets can work for the poor were important elements of a response. Governments need to be aware of the implications of policy in enabling appropriate research, good extension services and collective action. People consulted also mentioned the role of stagnant or declining agricultural productivity in driving urban migration. It is widely believed that the “youth” of Africa and South Asia are no longer interested in agriculture.

SOCIAL PROTECTION AND AGRICULTURE-BASED LIVELIHOODS

34. Although the evidence base is growing on agriculture-linked social protection interventions such as free input distribution, input subsidies and inputs-for-work, more comparative analysis is needed on poverty impacts, links to growth and cost-effectiveness across these and other interventions – specifically on the ways in which new thinking on social protection can contribute to improved risk management and risk reduction for small farmers. Links to the private sector are crucial and governments need to be aware that subsidised distribution of inputs can actually reduce availability by destroying input markets. It creates dependency and an expectation of subsidy. There is a need to better understand how to move beyond social protection by making markets work better rather than substituting subsidies for markets.

35. The annual 'hungry season' that confronts millions of smallholder families across Africa and South Asia every year is an under-reported food, livelihoods and health problem that receives too little policy attention. Knowledge is required on how agricultural policies and social protection interventions in rural areas can be better focused on addressing the specific vulnerabilities that are presented by seasonality in agricultural production, household income and consumption, and disease vectors.

...neglected tropical diseases often include zoonoses e.g. cysticercosis is listed by WHO in this category - in particular for zoonoses there are opportunities in several dimensions, including using new participatory risk assessment approaches to identify key risks and strategies to engage appropriate local partners to address these.

AGRICULTURE AND CLIMATE CHANGE

There is a need to recognise that agriculture is a key, if not the most important element, in combating the challenge of climate change.

36. Agriculture and climate change was a major theme running through the consultations. This will need investments in good science and effective governance of innovation systems to ensure that science and technology efforts meet the needs of the poor living in complex, diverse and risk-prone settings.

37. The greater impact of climate change in Africa may be exacerbated by the changing nature of grain markets, pressure on land, and cost of inputs. Drought resistant crop varieties will help, but are not in themselves a solution. What people in African consultations discussed was the need for much better governance and management of water resources and new crops, as well as more responsive policies and programmes. There is a link here between mitigation and adaptation. The drive to mitigate impact will also have major effects on agriculture markets and on the sustainable management of natural resources, food availability and food security.

A key research output for DFID in this area will be satisfying farmers' demand for seeds that are able to cope with the different impacts of climate change which may include lower precipitation rates, an increased disease challenge and so on.

38. Use of water will increasingly become a highly disputed political issue, particularly in drought-prone areas in Southern Africa.

Changes in precipitation, river flow patterns and groundwater availability due to climate change are highly uncertain, and yet are of paramount importance for food security of millions of rural people especially in Sub-Saharan Africa. Appropriate measures in agricultural water management can greatly reduce their vulnerability by reducing water-related risks and creating buffers against often unforeseen changes in precipitation and water availability.

39. A further issue highlighted was the need to undertake research to provide farmers with information and forecasts on changing weather patterns and likelihood of drought or floods. This applies to existing climatic variability as well as future variability, which is likely to increase due to climate change.
40. Systems for carbon trading that favour the poor must be developed as the use of food-miles may exclude poor farmers from access to western markets. However, the African consultations questioned the relevance of poor farmers' access to export markets.

We must understand markets better and how to make them work for the poor. Certification and traceability will be increasingly important, especially in relation to export markets. Care must be taken to balance food-mile considerations with securing access of African farmers to global markets.

41. African participants predicted a time when most agricultural production would be "commercialised" though opinions varied as to whether this was a desirable objective. But there was widespread agreement that this would have large impacts on the rural poor – not least in terms of food security.

Climate change will impact on agriculture and food security and so must be integrated into research, technology development and management strategies for all agricultural and natural resource management related activities.

42. Research was also suggested on high carbon fixing land use systems – especially the role of soil organic carbon in simultaneously meeting climate change targets and promoting more productive agriculture suitable for rural poor. Calls were also made for an analysis of how energy price and energy policy affect world food supply and prices, and how bio-energy investment and policies affect both rural and urban poor.

WATER AND ITS MANAGEMENT

43. Respondents highlighted the need to address conservation of water and irrigation as a means of adapting and responding to changing climatic patterns, as well as the development of crop varieties better adapted to drought and flood stress, soil and water conservation, irrigation, rain water harvesting and groundwater management. These traditional topics require new solutions and ways of thinking about them. The role of Water Users Associations in protecting future water security, for example, was identified as an under-researched area.

Thinking differently about water is essential for achieving our triple goal of ensuring food security, reducing poverty, and conserving ecosystems. Instead of a narrow focus on rivers and groundwater, view rain as the ultimate source of water that can be managed. Instead of blueprint designs, craft institutions while recognizing the politically contentious nature of the reform process.

44. Research involving links between agriculture and water were highlighted in the consultation, as well as the need for investment in agricultural research to focus on improving water productivity. However, it was emphasised that this needed to be more holistic – rather than focusing on specific aspects of water management, efforts should address all aspects, from catchment management to water rights and private sector supply.

Gaining more yield and value from less water can reduce future demand for water, limiting environmental degradation and easing competition for water. A 35% increase in water productivity could reduce additional crop water consumption from 80% to 20%. More food can be produced per unit of water in all types of farming systems, with livestock systems deserving attention.

LIVELIHOOD DIVERSIFICATION

45. Viable alternatives and complementary activities to agriculture-based livelihoods need to be developed and promoted for African smallholders. These might include: diversification into rural non farm employment, small town growth, urbanisation, internal and cross-border migration strategies. Much research has already been carried out on coping strategies and diversification of livelihoods. However there is a lack of clearly documented and synthesised information on what works where and why in order to inform coherent rural development policies.
46. The African consultations were characterised by a certain degree of tension between policy that promotes specialisation and increasing “commercialised” agriculture whilst at the same time trying to direct inputs toward improving the productivity of small-scale farming through diversification. This is often seen as a means of spreading risk as opposed to increasing overall household productivity, a reality that is understandable given the uncertainty of weak or non-existent markets.
47. Land tenure was also raised by several respondents as an issue. Addressing the improvement of agricultural productivity within land reform programmes, particularly in Africa, is seen as a challenge.

ACCESS TO MARKETS, LAND, GROWTH AND FARMER EMPOWERMENT

48. Farmers need agricultural market opportunities, including business opportunities, in order to get money moving, jobs created, and local economies energised. Hence the often polarizing debate between subsistence and commercialised farming systems can get in the way of thinking through what role research can play in poverty reduction. Consultations indicated the degree of concern that the changing nature of markets and increasing grain prices will see people increasingly driven from the land.

49. As commodity chains become more integrated and markets more sophisticated the position of poor farmers becomes weaker. Despite this fact, there was sparse mention in the consultations around the potential for collective action by farmers in order to achieve greater voice and influence. This would appear to be an under-researched area. However, market intelligence systems were mentioned as vital elements of making markets work better for poor producers.

Domestic food markets in developing countries are changing very rapidly. These domestic markets are essential for the majority of family farmers. Yet, the issues of changes in these markets and how that affects the access of family farmers, receive little attention compared to export, high value markets.

However, focusing research on agricultural productivity alone will almost always make end users poorer. Where there is adoption, the market gets flooded and income to farmer plummets. Farmers respond to this situation by dropping the commodity from their list of enterprises. To sustainably raise agricultural productivity, technological innovations must be driven by market demands.

50. The consultation contained varying views and suggested approaches to answer the question of which pathways towards greater commercialisation of African agriculture offer most potential in specific local contexts. Is it more feasible and effective to intensify yields on existing plots? What combinations of inputs, technologies, farming systems will maximise yields? When and where should policy promote crop diversification away from 'subsistence' towards 'marketed' crops, or to consolidate small 'sub-subsistence' plots into larger more viable 'commercial farms'? These questions can only be specifically answered in relation to any given national and sub national context. However, research can fill the knowledge gaps at different levels, and guide the types of technological transformations which are appropriate.

A key issue is to understand how poor people can access markets more effectively. This should include exploring how farmers can gain entry to supply chains more readily. It should also look at how contract farming and outgrowing schemes could be used more imaginatively to help small-scale farmers achieve higher prices for their commodities.

51. Research was also proposed to improve understanding of the constraints on livestock trade due to inappropriate international standards and weak standard-setting bodies.

NATURAL RESOURCES MANAGEMENT

52. The wider need for better management of natural resources was also highlighted, with most respondents stating simply that work in this area was necessary and that environmental and land degradation must be addressed alongside the impacts of climate change on natural resources. This included looking at the links and tradeoffs between reducing biodiversity loss and the attempts to provide sustainable livelihoods and increase in agricultural productivity.
53. The threat and danger of deforestation was highlighted and also the need to take an integrated approach to the management of land, forests, reefs, fresh water and waste, as well as the control and management of maritime economic zones.

A wider policy and investment arena needs to be opened by breaking down the divides between rain-fed and irrigated agriculture and by better linking fishery and livestock practices to water management.

VIEWS ON APPROACHES TO RESEARCH (HOW TO DO IT)

54. As well as thematic considerations the consultation threw up insights on how DFID should pursue its research agenda in sustainable agriculture.
55. The SRSA places emphasis on the need to link up different levels and actors making up the global research system through support to Advanced Research Institutes (mainly in the North) linking with researchers in the South; support to International Agricultural Research, mainly though not limited to the CGIAR; working with regional and sub-regional organisations, and the Research into Use Programme initiated in 2006. Both across and within this virtual structure the consultation has highlighted a number of methodological and process considerations that should guide the approach.

There has never been a greater need for agricultural research that generates international public goods. Supporting CGIAR Centres should be an important component of the new research strategy. Such support should be designed to encourage the reform of the Centres and of the CGIAR as a whole.

56. There was some divergence on views on support to the CGIAR with most in favour but also emphasising the need for reform of the system, to strengthen the links to national systems and advanced research organisations (including in the UK) and for DFID to provide support.

CGIAR Centres have an important part to play in producing cutting edge science to benefit poor people. The CGIAR does carry out some excellent work. However, it is important to remember that they are only one part of the international agricultural research system.

57. South African respondents highlighted the importance of partnerships, linking funders and northern and southern institutions. The example of cooperative scientific programmes was mentioned as an example of modes for cross-sectoral collaboration. Poor linkages between people and researchers, and the need to improve them, were mentioned in all the consultations, including the tendency for increasingly specialist research based in universities at the expense of multi-disciplinary research. This is particularly the case for research targeting rural areas, where social and natural scientists have failed to develop effective partnerships.
58. Researchers should work more closely with practitioners such as NGOs and should target key policy makers much more effectively. DFID has a role in building bridges across bodies of work, synthesising knowledge and driving new research agendas. In countries with fractured governmental systems and policy environments, developing a meaningful engagement with government can be a problem.

RESEARCH ON INNOVATION SYSTEMS

59. The importance of innovation-based approaches to research was referred to in all the consultations – either explicitly or implicitly. Better understanding of innovation processes and interactions amongst actors is needed in order to identify key research gaps and obstacles to effective use of research. Establishing strong and inclusive partnerships was seen as a key element.
60. There is also a need to better understand the incentives and disincentives which catalyse or prevent innovation. Uptake by policy makers was generally viewed with scepticism by many of those consulted who consider that research is frequently disconnected from policy, and that policy is not usually evidence based. This was highlighted as a particular problem in decentralised governments where policy was fractured.

To ensure that associated social innovations are in place, the process of development must engage all stakeholders along the commodity chain in the development process. Input dealers, transporters, financial institutions, policy makers, extension service, researcher, farmers, and the output market (supermarket, consumers, etc) all must be involved in the process of the development of technological innovations...

FARMER PARTICIPATION

61. To increase the relevance of research, applicability of outputs and improve uptake leading to impact, significant interaction between intended beneficiaries, partner organisations and research providers should start at the project design stage and actively continue throughout the duration of projects. Funding should be allocated specifically for this purpose.

Technological innovations that can best raise agricultural productivity are those that are adoptable by end users. For innovations to be adoptable, they must be found suitable, acceptable and usable by end users. One of the best ways of ensuring this happens is by actively engaging the views of the stakeholders in the process of the description of the problem and the development of the solution.

62. Understanding is required of not only who is involved in the processes of knowledge generation, sharing and change, but also to identify where the relevant capacity is held and conversely where capacity development is required. Identifying and consulting with relevant stakeholders is vitally important if the likelihood of impact is to be enhanced. Stakeholder participation is important at all stages of the process, albeit in different ways. Active engagement and collaborative decision making in processes of prioritising, designing, implementing and communicating research will strengthen the voice of the users/ beneficiaries of new knowledge within developing countries.

63. Equitable research requires improving governance for better performance and effectiveness and inclusiveness of research and innovation. Funders of research have a part to play in getting users and beneficiaries of new knowledge and technology more closely linked to the governance of research for greater equity outcomes.

Underpinning DFID's research should be a determination to ensure that farmers are included in the research process. If research findings are to be adopted by farmers, then they need to be included in the process so they have the opportunity to shape research outcomes to suit their needs. In many sub-Saharan African countries the mechanisms do not exist to enable this sort of engagement to occur.

64. Mechanisms (principally collaborative decision making and consultation) that lead to improved ownership of processes and knowledge by weaker stakeholders in an innovation can greatly enhance the likelihood of the adoption of new knowledge or technology. This is about both principles and practical outcomes. Stakeholders have the right to be included in decisions taken that may impact upon them directly, and the decisions taken when they are included are likely to be better contextualised and better targeted.

65. Farmer participatory research which permits a better technology fit with farming systems and farmers constraints is capable of adjusting technology to particular environmental conditions; allows for more rapid testing, evaluation and adoption of technology; enables more effective identification of technology improvements which work for poor people and women; builds on local knowledge and farmers' capacity for experimentation; and can create channels for farmers to influence research priority setting. Participatory research methods increase the options and possibilities for complementary approaches, linking in-station trials with farmer designed and managed investigation. An important question is the extent to which research findings generated by location-specific, participatory research may be applicable and transferable to similar systems elsewhere.

....farmers and researchers inhabit very different social spaces and there are few mechanisms that allow them to engage in dialogue... farmers are frequently excluded from the research process as researchers pursue their own interests which do not always coincide with farmers' requirements.... researchers often take a very dim view of farmers' knowledge and refuse to accept that farmers possess in-depth knowledge that researchers rarely have of their ecosystems.

PRIVATE SECTOR INVOLVEMENT

66. Previous DFID research produced key lessons in innovative, transparent and effective research management systems, which combined research of a public goods nature for the benefit of poor people through new uptake and promotional pathways. It was successful in attracting some additional support from the private sector in knowledge transfer and capacity building. The programmes successfully captured marketing and technical advice, leveraging both financial and 'in kind' support from small to medium enterprises in promoting new technologies for socially and environmentally acceptable pest management technologies. These enterprises may be likely to play a significant role in poverty elimination and stimulating local economic growth in sub-Saharan Africa over the next decade.
67. Mechanisms to encourage support for the development of small to medium enterprises should be seriously considered to facilitate uptake of pro-poor innovations.
68. The pace of environmental, social and technological change is accelerating, and this has major implications for the poor and their development prospects. Traditional public sector linear approaches to agricultural research and transfer-of-technology can no longer keep pace with the complex, diverse, risk-prone and dynamic realities of poor farmers. For agricultural research to hit the moving targets of reducing poverty and increasing the sustainability of agricultural production systems, the research process must become less isolated, more interconnected and more responsive to the demands of research output users.

69. Agriculture is intrinsically a private-sector activity and where markets work the private sector funds the majority of research and development work. In developing countries the opposite is true, with around 95% being supported by the public sector. Research for poverty reduction and economic growth to meet the MDGs must be treated as global public goods (non-excludable and non-rival) since, where markets fail, it is difficult to appropriate the benefits of investment in research.
70. In order to tap the considerable potential for greater private sector involvement in research there is growing interest in public private partnerships (PPPs) such as enabling access to biotechnology appropriate for developing countries in which there is little commercial interest due to small market size. Other types of PPP include closer working between sectors along high-value commodity chains, and in-service delivery. Research is needed on how best to bring together private and public research actors to achieve widespread inclusive innovation and impacts.

Another key pathway for disseminating research results will be through the private sector. The audience for published research results are usually practitioners or academics. They are rarely the end users of research. Farmers, for example, need a supply of the new technologies and the knowledge to put them into practice as well as a mechanism to purchase any surpluses. Therefore most agricultural technologies should be developed with these issues in mind and the private sector must be drawn in as critical players early on in the research process.

CAPACITY BUILDING

71. In sub-Saharan Africa there was a general concern that people were less interested in science and agriculture. The commoditisation of the tertiary education sector was increasingly producing graduates who had no interest in science. Government have consistently under-invested in training scientists, with South Africa as a major culprit in this regard. South Africa has generally relied on drawing in the best students from across Southern Africa.

The International Foundation for Science, for example, has drawn attention to the missing generation of agricultural scientists and warned of an impending crisis in agricultural research. This has serious implications for the success of CAADP and the achievement of the MDGs, especially MDGS 1 and 7.

72. Performance in academic systems in the South tends to mirror those in the North. This may create disincentives for researchers to pursue development-focused research. Local ownership requires that the capacity of scientists and policy makers in partner countries not only be maintained but be substantially increased.

DFID should also support research and build capacity in understanding policymaking and political process in formulating and implementing policies and strategies for promoting pro-poor agricultural growth.

73. Among the range of stakeholders involved in agricultural innovation there is often an unequal distribution of or imbalance in power (derived in part from an unequal distribution of resources and knowledge). The least powerful are often those who have the least capacity. Identifying capacity gaps and addressing these is important, not only in research institutes but also the intermediary organisations necessary to make new knowledge more accessible to the users. Many bilateral donors have shifted their research funding to building local capacity, but experience in industrialised countries suggests the processes of strengthening these “capacities” are complex, expensive and time consuming.

In order to promote the right kinds of education and technical skills, capacity building should be targeted at building individuals with the potential to be leaders and influencers. Support to build technical skills should be targeted on real problems that need to be solved, with integral follow-up and impact assessments.

74. Some donors have chosen to strengthen particular university departments or the international agricultural research systems. Diagnostic mapping of innovation processes is likely to prioritise organisations that can tap into the world’s stock of existing knowledge and enable farmers to use research.

DFID should work towards a vision of research institutions in developing countries that are self-sustaining; can articulate research agendas at national, regional and global levels; and can conduct world-class research and engage at appropriate levels and with intermediary institutions in order to put research into use.

Research is needed to take a look at agricultural capacity building at all levels with a view to recommending how agricultural teaching and training can be revitalised and made contextually appropriate for the world of work, and to make agriculture once again a career of choice. UK institutions are well placed to contribute to African counterpart institutions in the remedial actions that are likely to be recommended.

FUTURE THREATS AND CHALLENGES

75. Whilst it is true that agricultural research has kept pace with increasing demands for food this has not been without environmental cost. Some 800 million people remain food insecure and few if any African countries will achieve MDGs for hunger.

76. Recent trends indicate a challenging future scenario for agriculture that research will need to respond to rapidly. Long-term declines in food prices have recently reversed sharply to a 40-year high and cereal stocks are at an all-time low. Various factors account for this including: rapidly changing patterns of demand with more grain needed to feed more livestock and the increasing middle class western-style demand for organic and Fairtrade-certified products; along with new demand for feedstocks for bio-fuel production.

The desire by governments worldwide to reduce their dependency on fossil fuels, in particular oil, is leading to tremendous growth in the demand for and production of bio-fuels.

77. Climate change is already thought to be negatively affecting agricultural production, exacerbated by agricultural practices and deforestation that add to greenhouse gas emissions.

78. In order to maintain agriculture's high potential contribution to poverty reduction and growth, research must continue to combat increasing pest, disease and weed outbreaks affecting livestock and crops, re-emphasise development of agricultural systems based on biodiversity and ecosystem services, reverse the trend for mismanagement of water resources, strengthen rural economic systems, and work out the trade-offs between agriculture for bio-fuels and agriculture for food in holistic ways.

Though bio-fuels (generally interpreted to mean bio-diesel and ethanol) have become a subject for active debate, the empirical evidence, such as it is, is at best conflicting and incomplete. Greater understanding is needed of whether or under what conditions bio-fuels might contribute to sustainable development and/ or poverty reduction. As well as the technical issues of production, energy balances, processing technologies, carbon emissions, etc., the political economy of global bio-fuel systems needs to be understood, providing a basis for policy to avoid negative impacts on the poor and their livelihoods. The secondary effects of climate change mitigation on agricultural and environmental systems may require research. For example, the effects on forest cover of planting bio-fuels, and the appropriate use of new tree planting versus protection of existing forests for carbon off-setting schemes.

RESEARCH INTO USE

79. In order to increase uptake of research findings farmers and agricultural extension workers need to be better supported to articulate demand and to become involved in action research activities. Research that stays 'on-the-shelf' represents a huge cost and missed opportunity. Particularly in the case of agriculture the consultation threw up a range of reasons for non-adoption, including poor dissemination and communication of research outputs, poor quality of public extension, lack of involvement of end-users in the research process, poor linkages between researchers, end-users and other key stakeholders, and lack of enabling policies.

80. Significantly, in Africa, when asked about whether funds should be invested in new research or research into use, respondents talked of between 50-60% of funds being invested in research into use, while emphasising that new approaches to research should be considered to ensure that in the future research would be more relevant with application being considered from the start.
81. Although many significant research achievements exist in the public domain through peer-reviewed publications, web sites and on-going research and development programmes of International Agricultural Research centres (IARCs), National Agricultural research Systems (NARs) and Non-Governmental Organisations (NGOs), There is an institutional inertia that stops them getting into use without significant and proactive effort.
82. In order to ensure that the combined future potential of past DFID research is not dissipated the Research into Use Programme was established in 2006 with the dual purpose of getting agricultural research (technology, methodology, policy) into use and to stimulate research on gaining a better understanding of the process. This work will continue and be expanded in other areas.
83. Methodologies which can better characterize the demands of poor farmers and link these to the research process and supply of technology innovation will be developed. This will be achieved by launching a new type of project that is funded through a variety of sources and has a broad mandate that addresses farmers' needs on crop protection, marketing, soil, livestock and natural resource management.

DFID must ensure that existing knowledge gets used and we don't continuously reinvent the wheel. (37)

IMPLICATIONS AND FUTURE DIRECTIONS

84. Research to promote sustainable agriculture is central to DFID's economic growth agenda. No country has ever achieved significant poverty reduction without first raising productivity in agriculture. Agriculture is not only the way the vast majority of Africans make their living but with its high multiplier affect across the wider economy, it is also the sector most capable of growing the continent's economy in the medium term.
85. More than 50% of the world's 6.6 billion people now live in cities. But this disguises the fact that the majority of the world's poor – in excess of 75% globally and up to 95% in some African countries – live in rural areas. Most poor people's livelihoods will be inextricably linked to agriculture for at least the next half century. Poverty remains, and will continue to be an essentially rural phenomenon. Furthermore, the world will need to increase total agricultural production by 40% before 2015 to achieve the MDG targets on combating hunger, to meet the food demands of increasingly sophisticated consumers in rapidly changing markets, and to provide raw materials for new industrial use such as bio-fuels. But increasing population combined with migration to towns means that a relatively smaller rural population, will have to produce the food for a steadily growing urban one.

86. The global situation with regard to staple grains provides opportunities and threats to agriculture as an engine of growth. Cereal prices are at their highest level for decades, whilst world grain stocks are at a 30-year low. As recently as 2006 prices for cereals were on a 30-year downward trend. In 2006 and 2007 production dropped due to historically low prices, reduced areas under production and adverse weather. The sharp increase in oil price led to a rapid expansion of bio-fuel production from cereal feed stock, causing a rapid price surge. Production is set to expand and prices will drop, but not back to historical levels in the short term. However neither grain stocks nor availability are likely to improve. Both these factors present great potential hardship for poor consumers but important market opportunities for farmers.
87. Recent research shows strong and accelerating long term future growth in annual demand for high value agricultural produce in developing countries – e.g. for vegetables (2.9%), fruits (3.0%), meat (4.0%) and milk (4.0%). This compares to relatively flat demand growth in developed countries. Hence significant opportunities for higher value agricultural products, and a greater value-adding food chain now exist in domestic markets.
88. Research on sustainable agriculture therefore remains increasingly relevant. We will continue to treat it as a priority, reflecting its demonstrated high rates of return and impact on poverty reduction² and DFID's strong track record in this area.
89. We will meet the commitments set out in DFID's Strategy on Research in Sustainable Agriculture 2006-2016, including investing £80 million in agriculture, fisheries and forestry research by 2010/11. In the light of extensive stakeholder consultation, certain topics in the SRSA will be given renewed emphasis or re-framed to better reflect links to our broader research agenda of economic growth.
90. We will work with our partners to strengthen research in six main research areas in agriculture and renewable natural resources over the next five years:
- a) *New agricultural technologies* that enhance and maintain productivity levels, including conventional breeding and use of new biotechnology to develop higher yielding and more nutritious varieties that are better able to resist drought and pests. Increased biological and economic efficiency and more sustainable agricultural practices will be pursued by research on nutrient re-cycling in mixed farming systems at farm and landscape levels.
 - b) *High value agriculture* in areas of medium to high agricultural potential as a means to boost labour productivity and create jobs, with the aim of increasing the availability of high quality and affordable produce for poor peri-urban consumers. This will include research on high value horticulture, fruit and intensive livestock rearing at small scale, particularly in peri-urban and urban settings.

² Rates of return of 40 – 80 % are typical for high quality agricultural research. A ten-year evaluation of the Consultative Group on International Development research showed that for every \$1 invested \$9 were returned in benefits to poor communities

- c) *Rural economies, with the objective of* gaining a better understanding of how the rural farm and non-farm economies interact and the influence of urban markets on livelihoods of the poor. This will include research on trans-locational households, short-term and seasonal migration. Research on spatial differentiation of contrasting areas will contribute to the design and implementation of more effective public policies for more equitable rural growth and sound environmental management.
- d) *Risk, vulnerability and adaptation.* We will maintain our traditional focus on promoting the resilience of farming communities to such short-term shocks as drought, pests and diseases, recognising that climatic variability will become greater and more unpredictable than in the past. Household and communities will need greater capacity to return quickly to their productive function following disruption (e.g. from drought, flooding, hurricanes, conflict, disease and so on). At National and Global levels we will ensure research keeps pace with the need to feed a growing population (until at least mid-century) with the quantity, quality and variety of produce demanded as incomes increase. Technology and policy will be needed to enable poor farmers to take advantage of this “consumer revolution”, and for poor consumers not to be left behind in a grain-scarce world.
- e) *Markets.* The rapid trend for food marketing chains to seek greater efficiency at wholesale and retail levels, including the rise of supermarkets, requires research on enhancing farmers’ assets for greater market participation. Inclusive transformation of agriculture will require greater understanding of land and labour markets, services markets, the role, function, representation and governance of farmer organisations, and increased competitiveness of small farms. Agricultural growth will leave winners and losers: our research will seek to mitigate negative impacts through policy analysis including the role of agriculture in social protection.
- f) *Managing the natural resource base* sustainably and productively. Renewable natural resources such as land, water, forests and fisheries are generally undervalued and overexploited but are an integral part of rural livelihoods, at community, national as well as trans-boundary levels. Climate change will bring increased pressure on natural resources, for example by affecting eco-systems and contributing to carbon emissions through increased deforestation. It will also bring opportunities – for instance through global carbon markets and off-setting schemes. We will expand our research into the wider issues of renewable natural resources and their sustainable use. We will look in particular at governance, policy reform and institutional questions about managing renewable natural resources sustainably to deliver on economic growth. Research will also look at assessing the value and long term impacts of loss of natural capital to provide evidence for long-term decision making.
91. We will continue to support agricultural research in four main ways as currently established in the SRSA. This approach provides for a balance between basic science, translational and adaptive research, and programmes to get research into use. We will ensure that we connect these four strands of research to enable the international agriculture research system to make a bigger impact.

The Department for International Development (DFID) will spend up to £1 billion on research between 2008-2013. DFID's Research Strategy describes how the money will be used for maximum impact on reducing poverty in developing countries.

This paper is one of ten Working Papers which were produced to accompany the Strategy. Their purpose was twofold: first to record the key issues raised during a global consultation that DFID convened in 2007 about its future research; and second to spell out DFID's decisions on new directions, as informed by the consultation.

Each Working Paper reviews the current state of DFID's research on a given theme, highlights the key questions asked during the consultation process, and documents the main feedback received. The Papers then tease out the implications of the consultation findings on DFID's work, and end by spelling out DFID's future directions on each priority theme. Where possible, each Paper makes clear how DFID has drawn upon the consultation responses to shape its plans.

The full series of Working Papers are: Economic Growth, including Infrastructure; Health; Sustainable Agriculture; Climate Change; Education; Political and Social Science Research; Stimulating Demand for Research; Research Communication; Capacity Building; and Mainstreaming Gender in Research.

More information on DFID funded research can be found on the website www.research4development.info. This also offers the facility to sign up for e-mail alerts covering different sectors.

DFID is the UK Department for International Development: leading the British government's fight against world poverty. For more information visit www.dfid.gov.uk