

# Royal Society response to the Department for International Development consultation on the Research Funding Framework 2005-7

**July 2004**

## **Summary**

- The Royal Society acknowledges the substantial response from the Department for International Development (DFID) to the recent concerns from the science community and positive steps it has taken in addressing these, including the welcome announcement of the creation of the post of Chief Scientific Adviser (CSA). Science should be a fundamental component of development work and must be integral within DFID culture to ensure that its aims of meeting the Millennium Development Goals are realised.
- The formulation of a Research Funding Framework is a positive step towards the production of a long-term research strategy. However further development and consultation are needed if the Framework is to engender broad support and involvement from the scientific community. In particular, substantially more detail is needed, especially with respect to the proposed research themes and how they will be implemented. In addition, significant research areas pertinent to development are not included in the Framework.
- The Royal Society has concerns over the current capacity within DFID to identify, manage and review research introduced within this framework. While the science management infrastructure is being developed within DFID, it is essential that this role is addressed by seeking external support that ensures the quality and focus of the research management. Possibilities include involving other UK research funders or external support.
- The CSA should take control of the DFID research budget. The Society recommends further responsibilities for the CSA and supporting team should include:
  - Implementing mechanisms to assess the marginal benefit of competing research proposals
  - Strengthening research links between DFID, the research community and DFID country offices
  - Initiating a review to identify the areas where the UK research community holds comparative research advantage and outlining mechanisms to link these with the work of DFID
  - Overseeing expenditure on multilateral research institutions and programmes
  - Fostering a stronger scientific ethos and approach across the Department
  - Developing this Funding Framework into a long-term research strategy
- DFID needs to capture the best from UK science. Closer collaboration with other Government Departments, UK scientists, Research Institutes and Universities would be a positive first step. The introduction of a CSA will help develop these links with the research community. The Society considers it essential that the post of CSA is introduced at the level of at least Grade 2 and preferably 1, comparable to positions in other Government Departments such as DEFRA and the MoD. This will ensure the necessary impact within DFID and status to link with the external science community and across Whitehall.
- DFID should actively encourage collaboration between UK centres of excellence and the international organisations that it supports.

## 1 Introduction

This response has been approved on behalf of the Council of the Royal Society by Professor Dame Julia Higgins FRS, Foreign Secretary and Vice-President. It has been prepared in consultation with Fellows of the Royal Society and other leading experts. Full details are given in Annex 2.

The Royal Society warmly welcomes the opportunity to contribute to the Department for International Development's (DFID) consultation on its Research Funding Framework (RFF) 2005-7<sup>1</sup>. However, we note, with some concern, that only 2 weeks have been given for the views of respondents on this draft to be included in the completed framework.

The RFF outlines the long-term use of DFID funds for research towards 'the uptake and production of technologies that will contribute to poverty reduction and the achievement of the Millennium Development Goals'. The strategy has been developed from a review of DFID research investments,<sup>2</sup> which concluded that many of the Department's research programmes were having a positive impact. This Framework's stated aims are to build on the success of these programmes.

We acknowledge the considerable and positive response from DFID resulting from recent concerns raised by the science community. DFID is clearly taking these concerns seriously.

The Royal Society welcomes the £100m funding allocated for research. A commitment to spend highlights the Department's recognition of the value of investing in science. A strong research programme within the development effort will make UK assistance stand out as a strategic relationship of lasting value, not simply a source of immediate emergency relief. A long-term strategic programme cannot be effectively delivered without substantial research support to back it up and lend technical direction.

Science should be a fundamental component of development work and must be integral within DFID culture to ensure that its aims of meeting the Millennium Development Goals are realised.

This response will first outline general areas where we consider the Framework could be strengthened. This is followed with more specific comments on the process of managing research, UK collaboration and the major research themes (with comments on the content of these themes in Annex 1). This response concludes with comment on capacity building and international collaboration. Annex 2 lists contributors to the Royal Society submission.

## 2 Strengthening the research strategy

The RFF is an encouraging, if limited, start towards developing a long-term research strategy, with the introduction of a range of commendable new policies. However, as it is recognised within the RFF document, there is still substantial additional work to be done and detail to be included before the production of a complete research strategy. Below are three general areas that we believe could be strengthened in this or subsequent versions of a research strategy.

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<sup>1</sup> DFID (2004). Research Funding Framework 2005-7 (Draft)

[http://www.dfid.gov.uk/PolicyAndPriorities/knowledge/research\\_strategy.doc](http://www.dfid.gov.uk/PolicyAndPriorities/knowledge/research_strategy.doc)

<sup>2</sup> Surr M, et al (2002). Research for poverty reduction: DFID Research Policy Paper. Department For International Development

### 2.1 *Production of the Framework*

First, as outlined in Paragraph 24 of the RFF, the current process for identifying research topics is and has been inadequate, with too little consultation with developing countries and research users. The criticism also applies to the production of the RFF as a whole. The document draws on the recommendations of the Surr report *Research for poverty reduction*, and as such replicates the weaknesses in the Surr report's production. As a result, the consultation process by which this Framework has emerged has been arbitrary and incomplete. The document provides little transparency and insufficient evidence on the balance of expertise involved in the Framework's production.

We welcome the steps that the Department is now undertaking to consult stakeholders, the Review on how DFID can access scientific advice and this inquiry on the draft framework are illustrative examples. We consider that the new framework would have benefited from emerging after evaluations of the renewable natural resources research (RNRR) and engineering programmes.

### 2.2 *Strategic outlook*

We welcome the organisational restructuring and policy movement to focus on key researchable themes within the framework; however the document does not propose a long-term strategic plan for research in terms of reorganisation of funds in a strategic way. In short, further development and consultation needs to be done if the Framework is to engender broad support and involvement from the scientific community. We strongly welcome the proposal to undertake horizon scanning exercises in its future work to develop a truly visionary research strategy and approach problems from a long-term perspective. We suggest this process should look as much as 20-30 years ahead to be useful and to reflect time scales of the proposed research (eg climate change, agricultural development).

The recently announced introduction of a Chief Scientific Adviser (CSA) into DFID is welcome. One of the priorities of this position must be to develop this Funding Framework into a comprehensive research strategy.

### 2.3 *Detailed proposals*

Whilst introducing a number of extremely worthy goals and policies, there is insufficient information within the Framework on the substance of the proposals, pertinent details, methods of executing ideas and by whom these will be undertaken. £100m is a substantial investment and research must be well conceived, commissioned, executed and monitored.

In particular, there is no information on how the rightly recognised value and benefits of undertaking long-term projects for developing countries will be compatible with the annual spend. For example will new projects be generated each year? Will these be funded on 3-5 year cycles?

Aside from the proposed International Development Funders Forum, of which there is little detail, the document does not develop any explicit mechanisms on international priority setting, how links will be strengthened with UK Research Councils, with other funders in the UK, nor internationally. The document also makes no mention of collaboration at the European level. There is obviously still substantial work identifying the detail in this area, which will require dedicated DFID personnel.

By focusing research on specific issues in the Framework (see section 5), a number of key research areas pertinent to development are omitted, such as; environmental change (including energy, water usage and pollution), issues with mega-cities and small-scale entrepreneurship. It is not clear how, by whom or when these further issues will be addressed.

### 3 Research management

In a previous response<sup>3</sup> to the House of Commons Science & Technology committee inquiry<sup>4</sup> into the Use of science in international development policy, the Royal Society recommended that DFID increase in-house expertise so that external advice can be properly accessed and reliably evaluated. We consider that actively managing more of its research in-house would build up expertise, enhance quality control mechanisms and develop an ethos where research becomes more highly valued throughout the organisation.

The Framework provides limited detail on the organisational structure of how the majority of the £100m budget will be administered to ensure peer review, monitoring and evaluation. We are concerned that in the short term the funding may not be spent effectively in achieving high quality research. DFID should carefully scrutinise whether internal mechanisms and capacity are currently adequate to identify, manage and review this research effectively. It is hard to see, within its current framework, how DFID is going to be able to spend the research budget without some significant science management infrastructure. An example of where good practice is already occurring within DFID is the RNRRS Programmes which have specialised Programme Managers, plus support staff and independent review panels, which manage a substantially smaller research budget of £20 million.

While this science management capacity is being developed within DFID, it is essential that the Department seek support from experienced funders of research such as the Research Councils. Strengthening internal mechanisms to manage this research, led by the recently announced Chief Scientific Adviser would be a suitable objective.

Further responsibilities for a CSA in managing research need to include:

- Implementing mechanisms to assess the marginal benefit of competing research proposals
- Overseeing expenditure to multilateral research institutions and programmes (see section 7.4)
- Strengthening research links between DFID, the research community and DFID country offices to ensure scientific excellence is routinely incorporated across the full breadth of DFID research funding.
- Proposals for where the CSA can influence country offices are:
  - Providing a route to science advice
  - Setting standards of action
  - Developing initiatives across country offices

One possible model, amongst others, of managing research would be to develop the office of the CSA into a Development Science Research Council. This would strengthen links with the UK science base and enable the development of a more cohesive research strategy.

### 4 British collaboration

#### 4.1 *Scientific excellence and comparative advantage*

DFID need to capture the elite from UK science. As the Department has recognised over the last few years there has been a decreasing dialogue with some sections of the scientific community and a reduction in in-house scientific expertise. Accessing and collaborating with the best of UK science, many of whom have

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<sup>3</sup> Royal Society (2003). The use of science in UK international development policy. (Policy document 02/04)

<http://www.royalsoc.ac.uk/templates/statements/StatementDetails.cfm?statementid=242>

<sup>4</sup> [http://www.parliament.uk/parliamentary\\_committees/science\\_and\\_technology\\_committee/sci210703a.cfm](http://www.parliament.uk/parliamentary_committees/science_and_technology_committee/sci210703a.cfm)

independently established excellent contacts in developing countries, will provide a link to the wider global scientific community and provide a higher service to the developing countries DFID serves.

The Framework gives no indication of how or where the UK science has comparative advantage. Substantial benefits to both international research for poverty elimination and the future development of UK science for international development could be gained from an understanding of what the UK can offer in areas of top international expertise. The Framework also should provide details of areas, and how these can be exploited, where DFID holds comparative advantage over other international funding agencies.

This is a further area where the introduction of a CSA would be able to:

- Develop closer links with the wider science community
- Foster a stronger scientific ethos throughout DFID
- Initiate a review to identify the areas where the UK holds comparative advantage and outline mechanisms to link these with the work of DFID.

The Society considers it essential that the post of CSA is introduced at the level of at least Grade 2 and preferably 1, comparable to positions in other Government Departments such as DEFRA and the MoD. This level of post is necessary if the post holder is to have a significant impact within DFID and the necessary status to link with the external science community and across Whitehall.

#### *4.2 Joining-up and strategic overview*

The 'joining up' of UK support for research across the UK Government is an important development. DFID should also consider its role in 'joining up' research and science being undertaken by all UK institutions in relation to international development. The proposed International Development Funders Forum is an excellent initial step. We recommend that the Funders Forum has a wide membership and includes CSA's from other Government Departments such as DEFRA.

Alongside the Funders Forum, further positive drivers to increase interaction and commitment, such as shared budgets, would be beneficial. Attending conferences, undertaking research and academic sabbaticals are some additional positive ways DFID personnel can further strengthen the relationship with the national and international science community.

It is important to ensure continued collaboration between DFID and higher education institutes. Researchers need recognition by funders for undertaking international development research.

There are many advantages for the UK itself in linking UK research with developing countries, such as research access to genetic resources, comparative genomics of crop plants and sharing information on the detection and management of globally dispersing human, animal and plant diseases.

## **5 Key researchable problems**

The Research Funding Framework proposes to focus two-thirds of research funding towards four key researchable problems: agricultural productivity in Africa, killer diseases, states that work in the interests of the poor and climate change. In this section we have restricted our comments to the process of undertaking these themes. Please see Annex 1 for the further response regarding the content of the key researchable themes.

Focusing on key themes is a positive development and is an important way to achieve research responses that approach the scale and complexity of the problems facing development. Implicit in this approach should be the recognition that research within themes will also be applicable across themes. Agricultural productivity and climate change are clear examples.

### 5.1 *Interdisciplinary research*

The Royal Society recognises that each one of the themes requires both good disciplinary, interdisciplinary and policy research. It is fundamentally important that the recognition of a need for inter-disciplinarity does not deter or erode the quality and benefits of the problem-orientated approach of the single disciplines. Successful interdisciplinary research highlights the importance of encouraging a real collaboration of natural and social scientists from the outset of a project. The Rural Economy and Land Use (RELU) initiative<sup>5</sup> between the ESRC, BBSRC, NERC and DEFRA is a good UK example.

This is an area where DFID could really make its mark as a funder, especially when research is coupled with collaboration and enhanced research capacity in southern institutions. Clearly, the scope and recommendations of the forthcoming RNRR and engineering evaluations need to build on the problem-solving focus advocated by the RFF.

### 5.2 *Fund allocation*

The Framework allocates two thirds of the research funding towards the key researchable problems, however there is no detail on the distribution of these funds between the four issues, which clearly require substantially different research budgets. For example the type of research required within the theme on states that work in the interests of the poor would need considerably less funding than the other researchable problems.

### 5.3 *Research programme*

More detail is needed to develop the researchable themes into a demand-driven, evidence based research strategy. A number of questions are left unanswered by the Framework.

- How will empirical evidence be used to determine the research agenda within the researchable themes?
  - How will research topics within the researchable themes be generated?
  - Are there short, mid and long range objectives within each of these?
- How will developing a research agenda reflect the importance of taking a holistic picture on an international, national and regional level? This is especially pertinent for agricultural productivity in Africa and climate change.
- How will the research be demand driven? It is important to ensure the development of a research agenda involving research users and developing countries in an iterative process with scientists to develop appropriate and effective research.
- How will funding be distributed between the four chosen themes to reflect the differences in potential scale of research?
- What research is suitable to be undertaken within the proposed 2 year timescale?
  - How will continuity be assured after the 2 year Framework?
  - What are the timeframes for research/solutions and the complexity of social/technical responses?

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<sup>5</sup> <http://www.esrc.ac.uk/relu/default.asp>

## 6 Responsive funding

We consider a responsive-mode funding component to be essential. These projects can inject truly novel thinking into the research strategy, provide a mechanism to fund research outside the main strategy and help define the future direction. Funders such as DEFRA and the Research Councils work very successfully with projects of this size within their main programmes. Optimal use of these funds would be developed by closer collaboration and potential partnerships with the appropriate Research Councils and other UK research funders. We would recommend more support and resources for this type of funding.

DFID needs to produce clearer mechanisms for researchers both in the UK and overseas to access funding. For example there are no details in the Framework on how to access responsive funding.

## 7 Capacity building and international collaboration

### 7.1 *Capacity building*

The Royal Society fully supports moves to strengthen research capacity in developing countries.

Successful programmes will need to contain a strong element of continuity and sustainability in terms of personnel and links between organisations. Consideration should be given to long-project lifetimes to ensure funding provides capacity benefits.

Joint participation in the identification of demand driven research needs is already working well within a number of the RNRR programmes. Active partnerships between institutions can also help develop south-south partnerships and leverage funding from other international agencies.

One strength of the present system in which much of the research for DFID programmes is contracted from UK universities/research institutes (working in partnership with developing country institutions) is that the coordination with research paid for by other UK research funders happens at the level of individual researchers and research groups, who often receive funding from a wide range of sources. This ensures that the research provided to DFID is of a high standard and helps to bring partners into contact with a broad research base. Schemes such as visiting fellowships and academic exchanges should be encouraged more explicitly as part of funded research project.

### 7.2 *Education/Training*

Training developing country scientists, who remain in country, is a vital issue and essential for long term, sustainable, scientific projects. Training is an effective tool for capacity building that DFID does not exploit sufficiently despite a history of links and split-PhD programmes. The international Global Change System for Analysis, Research and Training programme (START) initiative is a cost effective example of building research capacity by on-the-job training.

There needs to be a long term commitment to identifying and training individuals. Enabling postgraduates or participants of collaborative programmes in the UK to return to their country of origin can be accomplished if suitable 'road maps' are in place to foster their career development. An example of where the Royal Society is trying to move this forward is with the newly introduced fellowships with the New Research Foundation (South Africa's national agency responsible for promoting and supporting basic and applied research as well as innovation).

Identifying capable researchers is not always straightforward. A good example of how this problem is being approached is the International Mathematical Union (IMU), which is constructing a database of such researchers, using initially the records of the International Centre for Theoretical Physics (ICTP) in Trieste.

### *7.3 Getting research to users*

All DFID research should follow rigorous methods of external peer review, of both proposals and final reports to ensure its credibility and worth. In terms of capacity building, funders could provide assistance to scientists in developing countries in getting their work published in national and international journals. It is important that an emphasis on dissemination of research does not result in a dilution of research quality.

The review of the RNRRS may well highlight effective mechanisms for ensuring this balance. Similarly, input from other UK research bodies may be appropriate.

### *7.4 International collaboration*

The problems of developing countries are so large that no one country can solve them. Therefore a key way of helping is to support international programmes that are working well. However, there is also a need to analyse and identify those areas of need where international cooperation is not working well and to assess the optimum strategy to get the cooperation working.

There is currently no outlined strategy between the money given to international institutions and the Funding Framework. DFID must consider whether its funding 'strategy' should take responsibility for the direction of all investments towards its outlined objectives.

The Royal Society has some concerns that expanding multilateral international funding may be efficient but not always the most beneficial use of resources. International funding can result in a loss of accountability to DFID objectives, a dilution of the partnership impact between specific institutions, and it may not effectively support research quality.

For example it is important that DFID participate in international research with other OECD countries such as through the Core Funding CGIAR laboratories and facilities. This contribution may be weakened by handing over all research funding, without ensuring links to UK expertise or sufficient science oversight or strategy of how the funding is spent. However, this should be carefully balanced with ensuring that funding is not restricted to development 'fashions' that would detract from the international organisation's core commitments.

A clear area where DFID could provide a significant contribution is to encourage actively collaboration between UK centres of excellence and international organisations such as CGIAR to help link the UK science and these international systems more effectively. The Competitive Research Facility (Holdback Facility) is a good example of collaboration that was actively encouraged between UK institutions and CGIAR centres.

A key role of the CSA therefore should be to ensure that expenditure of UK government funding by multilateral international research programmes is of high scientific quality, consistent with a DFID research strategy, and made appropriate use of the UK scientific community, particularly where the UK has unique global expertise.

*Please send any comments or enquires about this submission to:*

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# Annex 1: Key researchable themes

In section 5 the Royal Society commented on delivering the key researchable themes effectively. This annex provides further comments on the content of the themes and the 12 ‘other researchable issues’ identified in the RFF for funding allocation.

## **Agricultural productivity in Africa**

The emphasis on agricultural production in Africa is admirable and the fall in yields per hectare is a worrying trend that requires a co-ordinated and substantial effort to reverse.

The “technology” aspect of agriculture raised in section (ii) of paragraph 26 of the RFF only talks of high yielding and pest/disease tolerant varieties for crops that people grow. These problems are only part of the picture – (nutritional) quality issues, crop protection and resilience all need to be addressed. Increased productivity should not come at the expense of resilience, which is an area that also needs further investigation, particularly in the context of the risks from climate change.

An interdisciplinary approach should address the complete picture. For example Africa lacks sufficient infrastructure in weather forecasting which is compounded by an inadequate link between the agricultural sector and the national meteorological services. A research and development programme to improve high-impact weather forecasts for the benefit of the society and economy of Africa as well as other developing countries is vital. There is a strong opportunity here for DFID in terms of capacity building – particularly in the areas of satellite monitoring and seasonal forecasting.

Section (ii) would also benefit from a more positive statement on biotechnology. The view of the Royal Society<sup>6</sup> is that, whilst taking full account of the environmental considerations, foods can be produced through the use of GM technology that are more nutritious, stable in storage, and in principle, health promoting that can bring benefits to consumers in both industrialised and developing nations.

Implicit in the Framework is the assumption that technology is available, or can be developed to solve African health and agricultural problems, and thereby reduce poverty. However, the lesson from the past is that this is not sufficient. The RFF refers to the success of the Green Revolution as the major hopeful sign for agriculture. The Green Revolution has been available to Africa since the 1980s, where no less than six CGIAR centres have had the opportunity to adapt its technology and role it out. Failure is due not only to technological, but also to institutional factors.

Farmers, extension workers, and even politicians may have access to research and innovations, but reject some technologies such as new seeds because they are not profitable, too risky, or too costly to deliver on time to the right standard. A good example relevant to Kenya is maize hybrids that outperform traditional varieties in good or average years, but grossly under perform them if the rains are a few weeks late. Therefore it is not always a case of farmers not being aware of technological advances.

An obvious point that is often neglected is that research formulations that include the words ‘for Africa’ encourage a common misunderstanding that Africa is different, has a more variable and/or fragile climate or

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<sup>6</sup> Royal Society (2000). Transgenic plants and world agriculture

agro-ecology than that of 'Asia' or 'India'. Neither research methods, nor the nature of research findings, are systematically different in Africa. Many aspects of agricultural production are generic. It may be more appropriate to focus a funding theme on Agricultural Productivity in the Developing World, with a Focus on Africa.

With an increasing global attention on agricultural issues, such as the International Assessment of Agricultural Science and Technology for Development (IAASTD)<sup>7</sup>, and the recent InterAcademy Council report on Realizing the promise and potential of African agriculture<sup>8</sup>, it is important that DFID develop strong international collaboration on this theme.

### **Killer diseases**

Further research in these areas is vital in order to meet the Millennium Development Goals. However, as there is already a concerted international effort into HIV and AIDS research, DFID may have a greater impact by investing its limited funds into research with the greatest marginal benefits of return.

### **States that work in the interests of the poor**

The research agenda for this problem focuses on a social science research. There are number of issues relating to this problem that would also require high quality research in the natural sciences.

### **Climate change**

The UK has particularly clear comparative advantage in multidisciplinary research on environmental change and the link in this area with Research Councils is particularly strong. Collaboration of with developing countries would be a two way process, with expertise and training flowing one way and data and valuable case studies flowing the other. The EU funded PROMISE<sup>9</sup> programme is a good example of this collaborative work.

Preparing for climate change, requires building capacity in the analysis of predictions of the local impacts of climate change, including the vulnerabilities and resiliencies of communities, regions and states. An Issue which would inform development of DFID policy responses, concerns the dynamics, links and costs and benefits for different sections of society between climate change mitigation and adaptation.

Climate change research appropriate for the poor provides an excellent example of the interaction of research at the international, national, regional and local levels. For example at a national level, DFID could participate in enabling technologies for cleaner energy production.

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<sup>7</sup> <http://www.agassessment.org>

<sup>8</sup> InterAcademy Council (2004). Realizing the promise and potential of African agriculture  
[www.interacademycouncil.net/africareport](http://www.interacademycouncil.net/africareport)

<sup>9</sup> <http://www.ugamp.nerc.ac.uk/promise/>

It would be worthwhile for DFID to focus funds on basic and blue skies research that would have applications and advantages for developing countries. Examples include research on changing monsoon intensities or El Niño and the Southern Oscillation patterns which need to be more fully understood.

By broadening this theme to 'environmental change', development problems such as pollution, overuse of water resources and deforestation would become central to a research strategy. Currently there is limited detail on how these core issues will be addressed.

A critical area is to empower developing countries to play a full part in international climate change negotiations.

### **Other researchable issues**

DFID have recently produced a *Water Action Plan* (2004) which makes few recommendations on how DFID will undertake bilateral research in this area. The Research Funding Framework should make detailed proposals on water and at the very least recognise the importance of sanitation, irrigation and hydropower to many aspects of development. More work is also needed to understand the interdependency of water issues across regional and local levels that include global weather cycles. In a similar vein, the future use of energy is central to development. It is surprising that these key issues have not been included in the Framework.

## Annex 2: List of respondents

|                                  |                                                                                                                       |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Professor Howard Atkinson        | Centre for Plant Sciences, University of Leeds                                                                        |
| Professor John Ball FRS          | Mathematical Institute, University of Oxford                                                                          |
| Professor Geoff Boxshall FRS     | Crustacea Research Group, Natural History Museum                                                                      |
| Professor Katrina Brown          | School of Development Studies, University of East Anglia                                                              |
| Professor Peter Carpenter        | Division of Civil and Mechanical Engineering, University of Warwick<br>(on behalf of the UK IUTAM Panel)              |
| Professor Lorna Casselton FRS    | Department of Plant Sciences, University of Oxford                                                                    |
| Professor Richard Frackowiak     | Institute of Neurology, UCL                                                                                           |
| Professor Michael Gale FRS       | John Innes Centre, University of East Anglia                                                                          |
| Dr John Gash                     | Centre for Ecology and Hydrology, Wallingford<br>(on behalf of the IGBP National Committee)                           |
| Dr David Grimes                  | Department of Meteorology, University of Reading                                                                      |
| Professor Judith Howard CBE FRS  | Chemistry Department, University of Durham                                                                            |
| Lord Hunt of Chesterton CB FRS   | Department of Space and Climate Physics, University College<br>London                                                 |
| Stephen James                    | Rothamsted International                                                                                              |
| Professor Peter Killworth        | James Rennell Division for Ocean Circulation and Climate,<br>Southampton Oceanography Centre                          |
| Professor Chris Leaver FRS FRSE  | Department of Plant Sciences, University of Oxford                                                                    |
| Professor Michael Lipton         | Poverty Research Unit, University of Sussex                                                                           |
| Dr Anson Mackay                  | Environmental Change Research Centre, University of London                                                            |
| Dr John Mumford                  | Department of Environmental Science and Technology<br>Imperial College                                                |
| Professor Richard Nelmes OBE FRS | Centre for Science at Extreme Conditions, College of Science and<br>Engineering, University of Edinburgh              |
| Professor Paul O' Brien          | Department of Chemistry, University of Manchester                                                                     |
| Professor Jack Pearce            | Department of Food Science, Queen's University Belfast<br>(on behalf of the Institute of Food Science and Technology) |
| Professor John Pickett CBE FRS   | Biological Chemistry Division, Rothamsted Research                                                                    |
| Professor Toni Slabas            | School of Biological and Biomedical Sciences, University of Durham                                                    |
| Sir David Smith FRS FRSE         |                                                                                                                       |
| Professor John Snape             | John Innes Centre, University of East Anglia                                                                          |
| Professor Steve Sparks FRS       | Department of Earth Sciences, University of Bristol                                                                   |
| Professor Jeff Waage             | Department of Agricultural Sciences, Imperial College                                                                 |
| Professor Alan Thorpe            | Department of Meteorology, University of Reading                                                                      |
| Professor Martin Wiseman         | on behalf of the Nutrition Society                                                                                    |