

## 4. BACKGROUND: RESEARCH ON ENVIRONMENTAL CHANGE

### Why should DFID invest in research on environmental change?

Poor people and poor countries depend on environmental resources to support livelihoods, health, and economic growth opportunities. A study in Cambodia found that fuelwood, fishing and other resources provided by mangroves contributed 20% to 58% of household incomes, with heavier reliance among poorer households. In Ghana, agriculture provides about 36% of GDP, 40% of export earnings and 60% of total employment. Forestry makes up 5% of GDP and 10% of export earnings<sup>1</sup>.

Poor people are often vulnerable to environmental hazards and degradation, because of where they live, or because they have few resources for mitigation or recovery. Bangladesh suffered eight major floods between 1974 and 2004, the 1998 flood alone affecting 30 million people and inflicting losses of US\$3 billion (8% of GDP). Malawi's 1991-1992 drought cut real income by 8% and water scarcity in Africa is expected to double by 2025.

Poor countries and poor people are especially vulnerable to the multiple impacts of climate change. Forecasts predict that rainfall will become less predictable over time – particularly in parts of Asia, sub-Saharan Africa and Latin America.

Environmental management including management of water resources will be essential to meet the MDGs and to deal with the effects of climate change. Research will need to be done, accessed and used to improve the resilience and livelihoods of poor people.

Environmental assets and services are global public goods – human life on earth could not be sustained without, for example, clean air and water, pollination of crops and fertile soils. And yet, because they are often seen as “free”, have poorly defined property rights associated with them, and are often not commercially traded, few private research foundations have invested in research into environmental goods and services to date. This niche vacancy would be ideally filled by DFID, as the benefits of environmental research would be skewed towards the poor, who are most dependent on environmental goods and services.

### What have we learned from the past?

DFID has invested in environment research, mainly energy and water and sanitation related over two decades, the majority of which has been carried out in the now closed Engineering and Knowledge and Research programme (EngKaR). The EngKaR review carried out in 2004 concluded that infrastructure was an important area of DFID research activity but would need to focus on getting innovation to impact and hence assisting the acceleration towards the MDG target on water and sanitation. It also highlighted gaps in understanding the ecosystem functions and the contribution of ecosystems to providing and sustaining water and energy resources.

DFID's Renewable Natural Resources Research Strategy (1995-2006) also had several programmes which included environmental research components. The Natural Resources Systems Programme highlighted the following research gaps:

- The dynamics of politics and power are crucial in policy processes, but are often overlooked in research on natural resources management;
- Support for good natural resources management is particularly important in policy affecting peri-urban livelihoods. Agriculture remains a significant activity in peri-urban environments, even though the land available for it may be reducing;

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<sup>1</sup> C. Corson (2004), 'Environmental or Natural Resource Inputs to Economic Growth in SSA.

- People do not necessarily move cleanly from farm to non-farm activities in response to urbanisation. The role of farming and trading in facilitating the transition from rural to urban livelihoods needs to be better understood;
- A new research strategy is needed to provide focused, scientific and external support, and should respond flexibly to new challenges. Themes of the new strategy should focus on strengthening livelihoods through technologies, institutions, and strategies for natural resources management, as well as diversification of livelihoods strategies;
- Climate change adaptation research should be linked to other research and policy activities.

Building on this, DFID's current environmental change programme aims to convert the investments of the past and present to accelerate the provision of energy and water and sanitation services, to improve understanding and management of ecosystem services for poverty reduction, and to enhance adaptive capacity to climate change in Africa.

## **Overview of our current portfolio**

DFID invested around £8 million in environmental change research area in 2006/7, equivalent to over 6% of the central research budget.

DFID's portfolio of environmental change research has been developed to address in particular climate change and how poor people may adapt to the inevitable changes that will occur. This was one of the four priority areas identified in the previous consultation and subsequent funders' framework and an umbrella for the different strands of environment research. Linked with this is the management of resources and the appropriate sourcing and delivery of energy.

### **Water and sanitation**

The current strategy on water and sanitation links the areas of environment research and emphasises measures to enable the access to and the use of existing research outputs,. It recognises the huge task of reducing by half the proportion of poor people without access to safe water supply and basic sanitation by 2015 will be made all the more challenging by the increased variability and change in the climate. Key topics of the strategy include:

- Governance and management of water & sanitation services including reforms of public sector utilities;
- Technological innovation to improve poor peoples' access to clean water and sanitation;
- Combating degradation of water resources including improved assessment, development, management and protection of water resources and aquatic eco-systems.

The Ripple programme (Research-inspired Policy and Practice Learning in Ethiopia and the Nile Region) aims to advance evidence-based learning on water supply and sanitation, focusing specifically on issues of financing, delivery and sustainability. Working in three regions of Ethiopia, RiPPLE will develop a new body of high quality policy and practice-relevant knowledge through the establishment of Learning and Practice Alliances at different levels. In parallel RiPPLE will build outward linkages to networks and partnerships within other Nile region countries.

DFID is looking at how to support south-south learning to help public utilities share ideas and learn from one another. Public water utilities are an important part of the picture. They provide much of the piped water people receive in developing countries and they can help reach the poorest people without connections by providing water to intermediaries. DFID will support south-south workshops to help water utilities learn from one another to deliver the best services possible to poor people. Outputs from these workshops will help define whether research is needed to assess what public utility reforms have worked best and what new knowledge is required to increase the equity of access for the poor to water and sanitation services.

Central Research has a central objective getting research into use. Evaluation of DFID's previous research on water and sanitation and a scoping exercise in 2005 concluded that investment in a research into use programme is a priority. There has been a wealth of technological research on water and sanitation provision. The potential of the outputs from these programmes (whether funded by DFID or others) that have as yet not achieved wide adoption needs realised. The research into use section below pursues this theme.

Central Research recognises the need to harmonise research effort, outputs and implementation across multi-lateral and bi-lateral research funding agencies. In an effort to accomplish this DFID has taken the initiative to act as the co-ordinator of a network of EU member states agencies that fund water and sanitation research for developing countries. The EC has awarded Central Research £3m euros to coordinate the network. It is expected that the network will lead to the identification of potential and plans for future joint programmes.

DFID has also won funding from the EC to co-ordinate a network of member states that fund water research for development. The work includes co-ordinating existing programmes with an objective of future joint programmes in agreed priority areas such as research into use.

## **Energy**

The equitable access to energy is a core component of DFID's energy research. Millions still rely on bioenergy in the form of wood for basic energy services, often with environmental and health impacts. Biofuels have the potential to reduce emission levels, but the benefits may not reach the poor; in addition the poor may be deprived of land and water used to grow energy crops rather than food crops. Tradeoffs are therefore inevitable for an increase in bioenergy provision and need to be understood and appropriately regulated and incentivised in policy if the promise of bioenergy is to be realised in meeting the energy security needs of the poor, without compromising their already limited access to water and food security.

DFID has commissioned a Research Programme Consortium to identify and evaluate environmental, social, and economic impacts associated with bioenergy production and use at different scales, and to present this information for inclusion in policy and decision making on energy choices. It will focus on bioenergy, and investigate related issues of water, food and security, as well as researching the appropriateness of technologies, the upscaling of proven technologies, and the effectiveness of policies to promote service delivery.

A scoping study is also underway to identify how research can contribute to optimising the main driving forces behind energy policy formation.

Energy production and use is very much a part of climate change and the links, policy and technological innovations will be explored in planned programmes.

## **Ecosystem services**

The third White Paper on International Development notes that the poorest are the most reliant on environmental resources for their livelihoods, and that resources which are already under pressure are likely to be degraded further by climate change. The Millennium Ecosystem Assessment showed that the loss of services from ecosystems is a significant barrier to reducing poverty, hunger and disease.

DFID is working in collaboration with the Natural Environment Research Council and the Economic and Social Research Council on a research programme on Ecosystem Services and Poverty Alleviation. The purpose of the programme is the generation and uptake of knowledge

to achieve sustainably managed ecosystems. This requires (a) environmental science to understand why ecosystems are becoming degraded and how to reverse this, (b) ecological economics to better value ecosystem services, and (c) political economy to ascertain what institutional changes are needed so improvements in ecosystem management allow equitable distribution of costs and benefits to the poor.

The programme addresses four major regional ecosystem services challenges that constrain poverty reduction measures. Some of these have been identified as: adapting to monsoon variability in South Asia; equitable delivery of ecosystems services in China; reducing environmental vulnerability in semi-arid areas of Africa; and, securing biostability in Amazonia and the Andes. Key drivers of these regional challenges are population and economic growth associated with large-scale land-use changes and climate change.

The regional projects will be carried out by consortia of regional and international scientists. Prioritisation of research themes will be done in each region in consultation with national governments.

## **Climate Change Adaptation**

In 2004 DFID identified climate change as one of its four main research areas. This was followed up in 2005 by a series of consultations in Africa and South Asia. These established how research and capacity development could best contribute to alleviating the impacts of climate change on the poor. They also showed that Africa has least capacity and greatest need to deal with unavoidable climate change impacts.

A recent study on positioning DFID research<sup>2</sup> has highlighted that DFID is one of only two international donors to focus explicitly on the impact of climate change on poverty and we are keen to develop this area of comparative advantage, building on UK commitments at the G8 and in response to the Stern Review.

A five year research programme is underway, led by the Canadian International Development Research Centre. The goal is to contribute to the poor across Africa becoming resilient to the impacts of climate change. This will be achieved by significantly improving the capacity of African countries to adapt to climate change in ways that benefit the most vulnerable. Adaptation, may for example include, strategies for income diversification, changes in the timing, frequency or combinations of crops, shifting grazing or fishing areas, preventative measures against climate related diseases or even strategic migration to less susceptible areas.

The programme will:

- Commission research to reduce uncertainty about the likely extent and effects of climate change;
- Commission research on ways to adapt to climate change;
- Strengthen African countries' capacity to carry out and to use research;
- Enable poor people to make better informed choices in adapting to climate change using the best available evidence;
- Reduce the social and economic costs incurred by the poor in adapting to climate change.

Following the G8 commitment to an Africa Climate Observing System, DFID is supporting ClimDev Africa, a programme which will strengthen the contribution of climate information services in addressing various climate susceptible sectors including food security and health.

## **Priorities for the future**

In terms of **investigational research** future priorities could include:

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<sup>2</sup> Situating DFID's research funding policy and practice in an international comparative perspective, ODI April 2007

- Investigating linkages between ecosystem change and human health, including implications for health research and health services delivery;
- Exploring linkages between natural resources, governance, and growth and improving understanding of power and politics in natural resources management;
- Researching impacts of climate change on migration, urban-rural dynamics, economic growth, governance of resources, and disaster risk reduction and disaster management;

In terms of **operational research** future priorities are likely to include:

- Further research on public utility reform and policies that will enable coverage and quality of existing systems to be improved and new models adapted, including at community level.
- Further work on sustainable management of ecosystems to promote livelihoods and service preservation, and research into improving international environmental governance mechanisms for poverty reduction and environmental sustainability

In terms of **translational research** future priorities are likely to include:

- Researching methods for integrating environment as a cross-cutting issue into development and sectoral policies, planning frameworks, and budgets;
- Further substantial investment in research into use programmes including investments in joint programmes with member states on water and sanitation.

In terms of **scientific innovation** future priorities are likely to include:

- Data collection and management for climate change prediction in Africa;
- Design and testing of early warning systems to assist with adaptation to climate change impacts;
- Support for technological innovation to improve energy access to the poor using low-carbon sources;
- Support for technological innovation to support livelihood diversification as a means of adapting to climate change

Additionally, we see

- DFID support for climate change adaptation research to Asia and Latin America, in conjunction with other research funders;
- Scoping the potential for research into sustainable urbanisation, both from a social science perspective and in relation to driver of growth.
- Programmes that seek to get water and sanitation research outputs into standard practice, including through more joint work with the World Bank.
- Research on more sustainable energy provision that is equitable and less damaging to the environment.
- DFID support for capacity building and more local led programmes, particularly capacity building for environmental monitoring and assessment, including identifying appropriate indicators to monitor ecosystem health for poverty reduction, improved health and provision of water, sanitation and energy services.