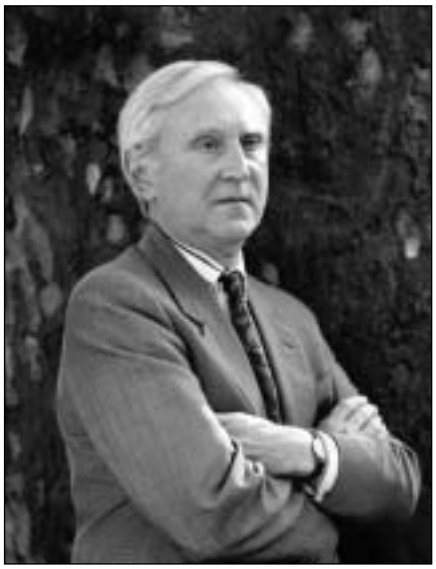
THE IMPORTANCE OF SCIENCE, ENGINEERING AND TECHNOLOGY TO A SUSTAINABLE ECONOMY ON THE AFRICAN CONTINENT

MEETING OF THE PARLIAMENTARY AND SCIENTIFIC COMMITTEE ON MONDAY 12TH DECEMBER 2005

Africa has the shortest average human lifespan for any continent, partly attributable to the incidence of HIV/AIDS and Malaria in Sub Saharan Africa. These conditions are aggravated by a generally weak economy and fragile environment that will be further challenged by future climatic and demographic changes. According to the United Nations Economic Commission for Africa (UNECA) these will combine to reduce the average water resources to less than 1700m^3 per person, per year, throughout most of the continent by 2025. Current aspirations for the elimination of poverty in Africa are therefore unlikely to be achieved unless underlying factors such as current and predicted water scarcity are addressed now. The combined deployment of Science, Engineering and Technology with Development Aid would therefore appear to be a very high priority if the structural causes of poverty in Africa are to be identified and rectified. Is this on the donors' agenda?

The Importance of Science, Engineering and Technology to a Sustainable Economy on the African Continent



Sir Crispin Tickell GCMG KCVO

The human species may have arisen in Africa, but Africa was – and is – no garden of Eden. It has a wide variety of environments, but probably remains more vulnerable to environmental change than any other continent. The special position of Africa has now been widely recognised, notably in its place on the agenda of the G8 countries at their meeting at Gleneagles in July. While living standards have recently increased in many countries, both GDP per capita and wealth per capita in Africa have actually declined between 1970 and 2000.

We live at a time when the world we are used to is anyway changing quicker than ever. It has changed more in the last 200 years than in the preceding 2000, and it has changed more in the last 20 years than in the previous 200. The problems are of course global. They date mostly from the industrial revolution which began around 250 years ago. The main global problems are:

Human multiplication at an extraordinary rate: when I was born in 1930 there were around 2 billion people, but now there are more like 6.3 billion, and the number could rise to between 8 and 9 billion by the middle of the century. At present there are 80 million more people every year.

There has been extensive land degradation through deforestation and over-cultivation. We have depleted mineral and other resources, and accumulated a rising volume of wastes.

Climate is changing as a result of human activities, with consequent variations in hot and cold, rain and drought, more extreme events, and rising sea levels. Melting ice in the Arctic and Antarctic, and the hurricanes Katrina and Wilma are good illustrations of what is happening. Coping with the problem (principally by drastically reducing carbon dioxide emissions) carries big implications for energy policy. Kyoto and plans for post-Kyoto are only modest steps forward.

Water, both fresh and salt, has been polluted world-wide, and there are growing freshwater shortages, described by the UN Environment Programme as the biggest problem of the twentieth century, and a possible source of conflict.

There has been a reduction in the diversity of living organisms, and thus of the global ecosystem of which humans are a part. In this area we are ignorant of our own ignorance.

New risks have arisen from the development of technology, whether in the nuclear or chemical fields, in nano-technology, in genetics, or elsewhere.

All these problems are closely connected. I commend the September edition of the *Scientific American* which, under the headline **Crossroads for Planet Earth** examines each of the main issues, including agriculture and food security, deterioration of land quality, and public health.

Nowhere do these global problems have more effect than in Africa.

The African population is likely to triple between now and 2050. Estimates suggest that it will increase by 63% in North Africa, 122% in West Africa, 175% in middle Africa, 136% in East Africa and 4% in South Africa. This will lead to increasing numbers of refugees, both within and between countries, and major social and economic instability.

Climate change is a particular hazard and has long been such. Throughout the Holocene there have been big variations with such factors as the El Nino/La Nina phenomenon in the Pacific (with global implications) to be taken into account. The conventional wisdom is that the droughts of the last 40 years, particularly in the Sahel and East Africa, arise at least in part from over-population, poor land management and deforestation. But recent evidence suggest that at least some of the problems arise from changes in the monsoon, due to rising temperatures in the Indian Ocean, in turn due to global warming caused by the rising volume of greenhouse gases. This is scarcely an African responsibility. Sealevel rise contains many hazards for coastal cities where increasing numbers of Africans now live.

Damage to soils and a steady increase in desertification are also forecast for Africa.

Shortages of fresh water are likely to increase dramatically throughout Africa by 2025. In 2000 about 300 million Africans were living in a water-scarce environment, but by 2025 this figure could triple. Sanitation is another major problem.

With water shortages is likely to come substantial changes in both terrestrial and aquatic ecosystems, with effects now hard to estimate. Distribution and productivity of plant and animal species will change with big effects on food security and human health. We are as vulnerable to change as any other species. Humans take 20 years to reproduce while bacteria can do the job in 20 minutes. The spread of such old diseases as malaria and dysentery and of such new ones as HIV/Aids and the Ebola virus can be devastating in a weakened population.

Misapplication of technology, particularly in agriculture, is another major problem. Well-meaning efforts to change traditional crops, or increase crop yields, have often led to disaster, for example in Ethiopia.

So far efforts to cope with this alarming range of interconnected problems have had little success. They tend to be associated with problems of government, governance generally, poor infrastructure, local conflicts and corruption. Capacity building is always a long and difficult process, and has hardly started in Africa. Others will talk about the progress now being made, and the role of DFID.

It is good that the African Union and NEPAD (the New Partnership for Africa's Development) have been working together. Progress was made at the second African ministerial conference on science and technology in Senegal in September when a consolidated plan of action with twelve flagship programmes was agreed. These programmes include projects in biotechnology, water, information technology, and use of raw materials. In South Africa new scientific networks across the continent are being promoted through the National Astrophysics and Space Science Programme and a new African Institute for Mathematical Sciences.

How quickly science and technology can contribute to producing a more sustainable economy in Africa is anyone's guess. The first step to wisdom is recognition of the problems, but what to do about them runs up against cultural and other barriers, for example in coping with population increase and land use. The devil lies in the detailed application. As an example I looked at the particular problems of one of the poorest African states, Burkino Faso. Here a charity, Tree Aid, has found that one of the most serious problems is the gap between understanding of the issues at the top of the social hierarchy, and willingness to tackle the problems lower down. While some farmers have been willing to innovate, and in particular to restore tree cover where possible, they have had little support from either colleagues or local government officials.

The most useful contribution which anyone from outside can make is to help Africans to help themselves in their unique geographical and ecological circumstances, and to assist them in their efforts to create balance between population, resources and environment. This involves a wide range of issues, including trade. What industrial countries do globally greatly affects Africa, and what the African countries do locally greatly affects the rest of the world. We have an enormous common responsibility.

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What Can Water Science and Technology do for Africa?

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The Role Water Plays in Africa's Challenges

At any given time, close to half the population in the developing world is suffering from one or more diseases associated with inadequate provision of water and sanitation services[1]. Diarrhoeal diseases form the bulk of the health risk. There are an estimated 1.2 billion cases of diarrhoea in Sub-Saharan Africa every year that lead to the deaths of 769,000 children under 5. This places an average health burden on every African of 21.7 years of ill health. Diarrhoea kills more Africans every year than HIV/Aids.

Water is also closely linked with hunger and poverty. Some seventy per cent of the 600 million "$-poor" and the 200 million malnourished people in Africa live in rural areas, with agriculture as their sole or primary source of food and income. Agriculture is their only way out of poverty. Soil nutrient loss and lack of access to safe and reliable water are the chief biophysical factors limiting small farm production and therefore critical to any poverty reduction strategy for the rural poor.

State of Water and Land Management in Africa

If water plays such a key role in Africa's challenges, then why has it not been addressed already? Water resources development projects in Africa, particularly irrigation projects, have a reputation for being several times more expensive than Asian projects and for not delivering results. Have we learned from the past and do we know where to invest in the future, or is there a task for research, for science and technology, to develop such solutions? Jeffrey Sachs's proposal is clear: we have the answers and the key is increased investments. Others, such as Lomborg, question whether there are good investment opportunities where the benefits to society clearly outweigh the investment costs.

For water, however, both camps came to the same conclusion: (1) for water supply and sanitation we have excellent investment opportunities; and (2) for increasing water productivity in agriculture, developing innovative solutions through research is a good investment opportunity.

There are clear, simple solutions that are credible and widely supported for effective provision of safe and affordable water and sanitation services. These focus on community-managed, low-cost water supply (often standpipes) and sanitation (latrines in rural areas and low-cost, small-bore sewerage in some urban areas), combined with hygiene education (hand washing). For Africa to meet the 2015 MDG water and sanitation target, however, it will be necessary to increase the speed at which people are provided with safe and affordable water threefold and with sanitation fourfold. The key question is how to mobilise additional investment resources.

For irrigated agriculture there is a widespread belief that enough – possibly too much – has been invested. In the twentieth century there has indeed been massive investment. The governments of the United States and Australia, for example, constructed some five thousand cubic meters of water storage per capita. In Africa, however, very little water infrastructure has been built. South Africa has most (700), while Ethiopia has only 40 cubic meters. For all of Africa, only 3% of its hydropower potential has been exploited and less than 4% of its arable land is irrigated.

Rainfall in Africa is characterised by extreme variability. There is a very high correlation between rainfall and national economic growth, suggesting that economic growth could be stabilised if water infrastructure could even out water shortages. Africa is the only region in the world where per capita food production has fallen over the last forty years. In other regions agriculture has "intensified"; increased production has come from higher production per unit area. In Africa, however, it has come almost completely from expanding agricultural area, at the cost of the

environment. A key question for science and technology is how agriculture in Africa can be intensified, or how water and land productivity can be increased.

A comprehensive recent study by IWMI and partners shows that, surprisingly, irrigation projects in Africa are not very much more expensive than in Asia. Small projects are more expensive than large projects, however, and there have been many more small projects in Africa than in Asia. Projects with a 10% increase in irrigated area have a 7% lower unit cost and a 3% increase in economic returns. Key conclusions are:

1. Farmers ***are*** the private sector.
2. Large has a place: Large dams ***can*** be good and small dams ***can*** be bad.
3. ***Farmer participation*** in irrigation O&M makes for better projects.
4. Success depends highly on ***other sectors***: fertilizer, roads, markets, output prices.
5. ***High-value crops*** (vegetables, primarily) outperform staple foods by a considerable factor.
6. Have ***multiple-use*** projects: domestic ***and*** productive use (crops, fish, livestock, trees and environmental services).

The Role Science and Technology Can Play

In my opinion, two key opportunities for water science and technology in Africa are:

1. making an asset out of wastewater; and
2. increasing water and land productivity at the basin or landscape scale.

Making an asset out of wastewater

There are an estimated 20 million urban and peri-urban farmers in Africa that produce some 70-90% of the perishable vegetables consumed in African cities. Virtually all these farmers use un-treated, or very partially treated, urban wastewater. And virtually all these farmers are ignored by government because their use of wastewater is against official regulations and because their farming is informal and the farmers are illegal (squatters).

Nevertheless, wastewater irrigation is a reality in the urban fringes of virtually all cities in Africa and Asia. Re-use of wastewater has many advantages for farmers:

- it conserves nutrients and reduces the need for chemical fertilizers;
- it increases crop yields; and
- it is a very reliable water supply.

It also has considerable environmental benefits:

- it provides low-cost sanitary disposal of municipal wastewater;
- it conserves water; and
- it reduces pollution of rivers, canals and other surface water.

Re-use of polluted, unsafe water also does carry serious health risks, for producers and consumers, as well as environmental risks, however. The challenge for science and technology is to develop "safe" approaches for re-use of wastewater. This could make sanitation affordable for African slum dwellers, with major health benefits, while generating sustainable livelihoods for (peri-)urban farmers. The opportunity is to carry out action research in several African cities and demonstrate how sustainable (eco-) sanitation can be linked with sustainable agriculture.

Increasing basin scale water productivity

The official data on irrigation severely under-report informal irrigation undertaken by small farmers. For Ghana, for example, the official numbers report 9 thousand hectares while some 5 thousand hectares are actually irrigated. An IWMI survey in central Ghana shows there is at least some 45 thousand hectares of informal, small scale irrigation, however.

Another IWMI study of so-called "bright spots"[2] demonstrated that there are a range of technologies available that are used successfully by smallholder farmers to increase water and land productivity. These range from rainwater harvesting, to small-scale irrigation, to the integration of livelihoods opportunities (crops, livestock, fish, agro-forestry, ecosystem services). There is evidence that water can deliver a considerably higher value than what is currently produced. The challenge for science and technology is to integrate and scale up these successful technologies to the riverbasin and landscape scale. This approach focuses on small farmers, as private sector investors.

Conclusions

Poor access to safe and affordable water, both for domestic use and sanitation as well as to grow food and provide livelihoods, places an enormous burden on the health of poor Africans and is a major constraint to their escape from hunger and poverty.

To address this, there are excellent investment opportunities that focus on known and proven technologies. The key question is how to mobilise additional investment resources. An innovative solution, and a challenge for water science and technology, is to make an asset out of wastewater and turn the sanitation challenge into a food and livelihoods opportunity.

Increased investments in water resources development, ie water infrastructure, are a priority for Africa. Successful irrigation projects are not significantly more expensive in Africa than in Asia.
Opportunities for increasing water productivity at the basin or landscape scale exist. The challenge for water science and technology is scaling up these technologies with a focus on multiple use systems that optimise water productivity across domestic use as well as crop growth, animal husbandry, fisheries and aquaculture, agro-forestry and ecosystem services.

Footnotes:

[1] Diarrhoea, ascaris, dracunculiasis (guinea worm), hookworm, schistosomiasis (bilharzias, or snail fever) and trachoma.

[2] Bright Spots are areas in which communities are siginificantly more successfulin managing their natural resources than in neighbouring communities where resources are often severely degraded. IWMI analysed 286 Bright Spots in 57 countries, involving 12 million farmers

References are available from the author at f.rijsberman@cgiar.org, www.imwi.org

What the Dickens can Science and Technology offer Africa? A Tale of Two Villages in East Africa…

Richard C Carter, Professor of International Water Development, Institute of Water and Environment, Cranfield University

Context

Misheg is a highland farming village of a few hundred households in Central Tigray, Northern Ethiopia. Kisibo is a similar-sized rural community on the Uganda/Rwanda border. In both places crops are grown primarily for local subsistence – markets are distant and small – and the raising of livestock forms an important part of the farming system. Both communities experience seasonal water shortages and droughts, extremely high infant mortality (estimated at 300 per 1000 live births in Misheg), high levels of infectious disease, poor nutrition, and many other well-known aspects of chronic rural poverty which are endemic in sub-Saharan Africa.

Such poverty is not a static condition. Pressures from within – rapid population growth, leading to land fragmentation and degradation – combine with external pressures such as global climate instability and weaknesses in democratic processes and governance, to reinforce and exacerbate chronic poverty. If the pressure becomes too intense, disaster follows, in the form of silent suffering or better-publicised famine, with or without the controversial benefits of food aid.

Questioning the role of science and technology

So what can science and technology offer to Misheg and Kisibo, and the one million other villages in sub-Saharan Africa? Are these communities destined to remain poor, until their respective national governments become more democratic, educational provision becomes truly universal, and their national economies grow substantially? Or can science and technology transform rural African poverty from within? And if so, whose science and what sort of technology? Can science and technology provide strategic and long-term solutions in place of short-term development interventions or even shorter-term emergency relief efforts?

Technology, people and policies

In Misheg and Kisibo, and the many other similar African villages, technologies introduced from outside can have an impact which is disproportionate to their apparent level of sophistication. Cement rainwater tanks constructed by women's groups in Uganda are not only freeing up time and energy formerly devoted to water-hauling, but vastly enhancing self-esteem and the respect with which women are held in the community. Dry sanitation technologies which produce valuable compost from human excreta can start to reverse processes of soil nutrient degradation, while at the same time reducing groundwater and surface water pollution from human waste. In almost every case though, patient and careful efforts need to be made by external agents of change to bring about uptake of technology or new ways of doing things. These processes are time-consuming, and rely heavily on the commitment and motivation of external agencies, and the level of trust which can be established with communities. Science and technology in the narrow sense need social science and promotion of behaviour change to become effective.

What has often been ignored however, is that a community which moves from subsistence and almost total self-dependence into the technological age (using artefacts of cement, metals, and plastics, and requiring fossil fuels in their manufacture or maintenance) actually becomes more dependent on markets, suppliers and external agencies than hitherto. External support is needed for the forseeable future, to maintain technical or social infrastructure, and this support may have to come from Government, private sector, non-Government organisations, or some combination of the three. Technology may bring benefits to users, but it also places heavy demands on organisations which provide technical and management backstopping to communities.

"Appropriate" technology for these rural African contexts does not necessarily need to be of the "bamboo-and-bailer-twine" variety. The mobile telephone is proving to be a major contributor to democratisation, empowerment and corresponding development in sub-Saharan Africa. In Uganda, private sector competition and correspondingly low charges make the technology highly accessible. In contrast Ethiopia still retains a Government monopoly, and as a consequence there are only around one tenth as many mobile phones per head of population as in Uganda. Uganda is one of several African countries which are now offering market intelligence to rural farmers via SMS messaging – with potentially very significant impact on producer prices and rural incomes.

The need for integration

For a villager in Misheg or Kisibo, the day-to-day problems of poverty come as a package. A woman's day is dominated by fetching and carrying of water and firewood, farm work – weeding and hoeing, childcare, and caring for the family. A man may be more pre-occupied with providing staple crops and meat, earning income, and participating in village decision-making. Both need technologies which can free up time, save energy, provide opportunity for income-generation, and help to enhance the health, education and well-being of the family. External organisations need to be well-connected to these realities, and aware of their scope and detail, even if their specific interventions only address specific elements of the poverty and vulnerability of households and communities.

Local science, foreign science

The poorest subsistence communities in sub-Saharan Africa know far more than any foreign organisation (be it Government, research institution, development organisation, or donor) about their own environment and its vagaries. But that is not to say that foreign science is irrelevant. On the contrary, as internal and external pressures on poor communities continue to grow, the need for a stronger three-way partnership between communities and their indigenous knowledge, local research and development organisations, and foreign science and technology organisations becomes increasingly imperative. In some cases, foreign technology which attempts to control nature may be entirely ill-suited, while local knowledge which is better adapted to nature's uncertainties may be the only solution. In other cases, foreign technologies such as satellite remote sensing and other means of environmental monitoring may find a constructive synergy with local knowledge. The important point is to always assume that local science exists and has much to offer. Too often it has been ignored in the rush to "modernise".

Broadening the view of science

The specialised western educational curriculum, adopted in most African countries, puts artificial walls between natural science and social science, technology and its utilisation. If science and technology are to offer anything of value to villages such as Misheg and Kisibo, they must expand to embrace all relevant aspects of knowledge and its application. The science of "how things happen now" and the technology of "how things might be" requires scientists and agents of change who are willing to tackle the full breadth of the problems posed by poverty, and find solutions which will involve conventional and unconventional technologies and human behaviour change.

So what is to be done?

International science and technology support to African development needs to be re-oriented to focus increasingly (a) on home-grown solutions to individual countries' local poverty issues, and (b) on global issues such as climate change, renewable energy and communications technologies, and health issues such as malaria and HIV/AIDS which may benefit from solutions developed internationally.

If Misheg and Kisibo are going to emerge from quarter-dollar a day poverty, this will be through the efforts of Ethiopian and Ugandan institutions which facilitate problem-solving within those communities. Such national organisations in turn need long-term, predictable and reliable partnerships with international donors and expertise. They need strong encouragement to question, to observe, to experiment, to make mistakes, to learn, and to document experience – in other words to do applied science, to develop solutions to real poverty-related problems, and to share those solutions with others who are engaged in the same endeavour.

But at the same time they need the support provided by international problem-solving applied to global poverty issues. Global climate instability has probably been affecting impoverished rural communities in Africa for several decades already, and the prospect is for this to get worse. The energy needs of households and communities can only increase, against a background of increasing pressure on natural resources and land. Communications technologies have already started to show their potential to redistribute wealth to primary producers. Preventable diseases, or those whose worst effects can be ameliorated, contribute to Africa's high rates of infant and child mortality, and high mortality and morbidity in older age groups. Evidence-based policies, and corresponding spending decisions, can translate science and technology which is focused on global environmental and poverty issues into local outcomes.

Misheg, Kisibo, and a million other African villages can benefit from science and technology which is owned by national institutions, grounded in local issues, not hidebound by traditional disciplinary boundaries, freed from the constraints of what is deemed to be academically respectable, internationally networked, and aware of what global science can offer. But whether the "best of times" currently enjoyed in the materially wealthy one fifth of the world can ever be experienced by the "worst of times" villages typified by Misheg and Kisibo, may require something much bigger than even the most imaginative science and technology.

DFID's Commitment to Clean Water and Adequate Sanitation for All

Sir Gordon Conway, Chief Scientific Adviser, Department for International Development

Introduction

DFID is committed to helping developing countries achieve the Millennium Development Goals including water, which is also important for most of the other targets, and is as important as education and health. We are all essentially composed of water. In this at least we are all equal. Better water supplies reduce the burden of collecting and managing water in the home and help more girls to go to school. In Bangladesh, a school sanitation and hygiene education programme increased girls' attendance rates by 11%. Women's health also benefits from reduced water carrying and enables them to earn money and to look after their families. Close proximity to home of water and latrines reduces the opportunities for rape or attack. The return on $1 investment in sanitation and hygiene in low income countries is in the range $3 to $34.

Appropriate technologies, which are affordable, sustainable, practical, low risk and participatory, play a key role throughout our programmes. A good example is the treadle pump that lifts water for irrigation and is operated by a man or a woman stepping up and down on the treadles. They are now produced very cheaply by the private sector in several Asian countries, and increasingly in Africa. They are made affordable through micro-finance schemes and, because they are easy to maintain, they are a highly sustainable piece of technology.

The Secretary of State, Hilary Benn, spoke on World Water Day at the Royal Geographical Society in March where he made a commitment to the provision of clean water and sanitation having frequently witnessed in many countries, poor women and girls struggling to carry water over long distances to their homes. He was also aware that at current rates of progress the water target will not be achieved in sub-Saharan Africa and the sanitation target will be missed in both Africa and Asia, by almost a billion people.

The reasons for this include:

- Water and sanitation budgets for poor people are low
- Overall responsibility for delivering water and sanitation services is fragmented
- Donors and development agencies do not co-operate well
- Targeting misses priority areas
- Sanitation must be combined with hygiene promotion for best effects

The Secretary of State committed the DFID to doubling its funding for water and sanitation in sub-Saharan Africa from £47.5 million to £95 million per year by 2007-08 and urging progress from the EU and World Bank. DFID's overall expenditure on the water sector in 2004-05 was an estimated £200 million. Of this, DFID contributed an estimated £25 million to the World Bank and £17.5 million to the European Commission for water programmes. DFID's contribution to the African Development Bank's water sector budget is expected to increase rapidly from £3.5 million in 2004-05 to £18.5 million by 2007-08. DFID also funds NGOs such as WaterAid. We are working in Bangladesh villages with WaterAid to develop community led total sanitation. This has reduced diarrhoea, increased incomes and raised self-respect by completely eliminating open defecation and is a demand-led approach which is being replicated in India, Indonesia, Uganda and Zambia, without waiting for government subsidies.

Other partnerships include international research organisations and international partnerships such as the Global Water Partnership, the Water Supply and Sanitation Collaborative Council, the Water and Sanitation Programme managed by the World Bank and the Joint Monitoring Programme which is implemented by WHO and UNICEF.

The Secretary of State pledged on 22 March that, where the water MDG target is off-track in partner countries in Africa, we would make sure that there was a core donor group working on water and sanitation (and take the lead if we need to); map what donors and the government were doing, and assess

what more needed to be done; and make water and sanitation a central focus of our discussions with the government.

In the four African countries which are most off-track, he pledged to second people to boost capacity and find quick ways of increasing spending on water and sanitation. We have already identified the next steps to improve delivery. Let me give two examples:

In Ethiopia the government has published a water and sanitation strategy with increased emphasis on this sector. DFID provides funding to the government through budget support and is a member of the core donor group on water. We have offered a consultant to support Italy as lead co-ordinator for the EU Water Initiative, and are planning to second an expert to the Ministry of Water in early 2006. If additional direct funding is required, we will provide selective support to WaterAid, the World Bank or the African Development Bank.

In Nigeria donor co-ordination has been weak but is improving, led by UNICEF and the World Bank. Nigeria allocates 10 per cent of its national budget to water but there is still a huge funding gap; debt relief and better co-ordination provide important opportunities to close the gap. More focus is also needed on sanitation. DFID provides funding and has seconded a specialist to support UNICEF as the lead donor on rural water and sanitation.

DFID also provides funding to WaterAid, a small towns project and to UNICEF's girls' education project which has a strong sanitation component. These emphasise plans drawn up by communities themselves. Since 2004, over 250,000 people in local communities have benefited from new handpump-operated boreholes and 70 boreholes in schools and 1,200 latrines have been built. The aim is that this community-led planning process will be replicated elsewhere. The EU has recently agreed to provide €40 million to widen the programme to six more states. We have similar programmes in the Democratic Republic of Congo and the Sudan, and in eight other off-track countries.

At the regional level we are putting our money through the African Development Bank's Rural Water Supply and Sanitation Initiative, which aims to increase coverage in rural areas to 66 per cent by 2010 and 80 per cent by 2015; and also through the EU Water Facility that recently approved a second stage of funding worth €250 million.

Under the UK's Presidency, G8 leaders committed to implement the G8 Africa water action plan agreed at Evian in 2003, by increasing aid in the sector. They also agreed to better co-ordinate aid to improve its impact. DFID leads the EU Water Initiative Finance Working Group providing advice to regions on financing water and sanitation projects. The Africa Water Supply and Sanitation Working Group is setting up discussions on policy and implementation in ten pilot countries each led by an EU member state. We have seconded a specialist to the European Commission to support the EU Water Initiative and will second a financial specialist to the African Water Facility later this year. We are increasing our support for the Nile Basin Initiative – an African-led example of regional co-operation and good governance of a shared water source. We are providing more specialist help, encouraging countries to share experiences and learn from each other, and making sure local community groups are involved in decisions about the use of water. Finally, we have produced an Asia Water Plan, which we will take forward with the Asian Development Bank and other partners. 60 million people across the region are at risk from water supplies polluted with arsenic. Fluoride also contaminates water in parts of India and China, and indeed in Africa.

DFID will prepare a further update on progress against the World Water Day commitments early in 2006. The update will set out how DFID will continue to make water and sanitation a priority in order to meet the challenge of achieving the water and sanitation targets in the developing world.

In discussion the following points were made:

Successful mining projects in Africa rely upon partnerships with important links to funding sources in the private sector that are, for example, supporting MSc students with a mining company in Kenya. Africa generally lacks infrastructure to manage irrigation compared with India, where hydropower generation is mainly used for pumping water to where it is needed. Dependence on expensive, imported fossil fuel should not be encouraged. The importance of solar energy is commonplace in Asia but rarely exploited in Africa. GNP is not a useful measure of success where human welfare underpinned by clean green growth is a better measure of what people actually require to help them to care for themselves. DFID provides core funds directly to governments with a donor group for each sector with support for NGOs and others in what is described as a twin-pronged approach. There are major capacity weaknesses in Africa, however, resulting in failure to deliver services where they are needed that require a partnership-based approach if they are to succeed. Development of direct contacts at the village scale is one example. The importance of the role of women was emphasised, as educators of children, especially young girls, managers of the main means of production – agriculture, as supporters of the elderly and as primarily responsible for contraception. Africa needs both high technology – vaccines, solar power, mobile phones, and low technology based on the productive use of water, which thereby releases children for education rather than as carriers of water. The overall environmental fragility of the African environment is due to the underlying granitic rocks which weather to barren silica sand grains forming a dustbowl, compared with India which is mainly underlain by basaltic lavas which weather to release essential nutrients to the soil.