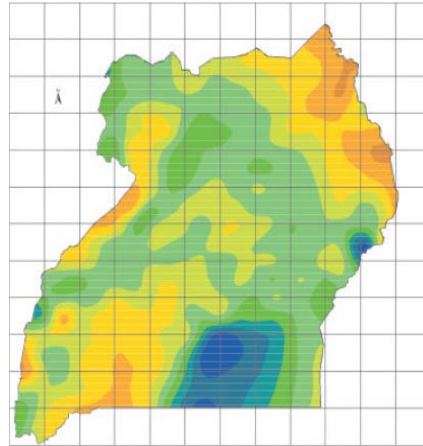


Climate Change in Uganda: Understanding the implications and appraising the response



Scoping Mission for DFID Uganda

July 2008



LTS International

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Executive summary

1. Uganda's climate is naturally variable and susceptible to flood and drought events which have had negative socio-economic impacts in the past. Human induced climate change is likely to increase average temperatures in Uganda by up to 1.5 °C in the next 20 years and by up to 4.3 °C by the 2080s. Such rates of increase are unprecedented. Changes in rainfall patterns and total annual rainfall amounts are also expected but these are less certain than changes in temperature. The climate of Uganda may become wetter on average and the increase in rainfall may be unevenly distributed and occur as more extreme or more frequent periods of intense rainfall. Regardless of changes in rainfall, changes in temperature are likely to have significant implications for water resources, food security, natural resource management, human health, settlements and infrastructure. In Uganda, as for the rest of the world, there are likely to be changes in the frequency or severity of extreme climate events, such as heat waves, droughts, floods and storms.
2. Uganda is highly vulnerable to climate change and variability – its economy and the wellbeing of its people are tightly bound to climate. Human induced climate change in the coming century has the potential to halt or reverse the country's development trajectory. In particular, climate change is likely to mean increased food insecurity; shifts in the spread of diseases like malaria; soil erosion and land degradation; flood damage to infrastructure and settlements and shifts in the productivity of agricultural and natural resources. It will be the poor and vulnerable who feel these impacts the hardest, though climate change has serious implications for the nation's economy, with for example, a shift in the viability of coffee growing areas potentially wiping out US \$ 265.8 million or 40% of export revenue. Exacerbating poverty and triggering migration as well as heightened competition over strategic water resources, climate change could lead to regional insecurity.
3. The level of Lake Victoria is highly sensitive to changes in climate. However, recent claims that the drop in lake level is due to climate change should be viewed with scepticism. Approximately half of the drop in level between 2000 and 2006 can be explained by excess releases at the outflow of the lake made in order to meet power generation demands, whilst the other half appears to be due to climatic factors¹. It is not yet possible to conclude that climate change is affecting lake levels - Lake Victoria has a long history of high variability in lake levels in response to natural climate variability. Instead it appears that lake levels are returning to the lower levels experienced before the unusually high levels of the 1960s and 70s. There is uncertainty as to whether lake levels in the future will be lower or higher on average than at present but it is likely that variability in levels will continue and may become more extreme. Fluctuations in lake level will continue to have an impact upon the generating capacity of Uganda's hydroelectric facilities and on infrastructure around the lake such as domestic water supply, irrigation and transport infrastructure. The effect of lake level fluctuations and increased temperatures due to climate change on the fishery and ecosystem of the lake is less well known. The resilience of the Lake Victoria ecosystem to climate change can be increased by reducing the impact of other stresses such as over-fishing, soil erosion and pollution.
4. Early adaptation to climate change can moderate impacts and even secure benefits. New international finance and political attention on climate change also has the

¹ See Sutcliffe and Petersen (2007)

potential to strengthen weak institutions and to reduce the social vulnerability and inequity which has long been a target of development assistance. However, although pockets of excellent technical expertise and disparate activities on climate change are emerging, in part through response to the UNFCCC, action by government to date falls well short of what is needed to climate-proof Uganda's development. Alongside explicit capacity constraints in terms of resources and personnel, there are less obvious constraints to effective action such as confused mandates, dysfunctional arrangements for inter-agency working, and weak institutional and professional incentives for pro-active action. As well as adding to the challenges of developing an effective response, these issues undermine existing institutional performance which in turn heightens Uganda's vulnerability. Strong leadership with the power to influence across the sectors, and determination to tackle these constraints will be required to respond effectively to climate change. At the moment that leadership is lacking.

5. Strong leadership is also urgently needed within the development partners. Despite the development of a Joint Assistance Strategy, donor action on climate change has to date been disparate and uncoordinated and has bypassed coordination mechanisms such as sectoral working groups, which themselves have yet to develop a collaborative response on climate change issues. Uncoordinated action threatens to stifle the existing capacity on climate change in Uganda and to produce damaging parallel initiatives. Nevertheless, positive action is underway, most notably by the Danish who are leading with several packages of support to establish a National Climate Change Unit; to mainstream climate change into planning and develop a national strategy for adaptation. Whilst the Danish support is clearly needed, it is largely process focused and there is little financial commitment by donors to support adaptation on the ground at the moment.
6. Climate change mitigation through the Clean Development Mechanism and Voluntary Carbon Markets has had a limited impact in Uganda, although it is thought there is potential for Uganda to benefit from these in the future. Constraints such as high transaction costs and limited indigenous capacity are being tackled through a number of initiatives, but the situation should be monitored closely to ensure that Uganda reaps real benefits from these mechanisms.
7. Civil society with support from international NGO's has the potential to play an important role in supporting an effective response to climate change in Uganda and activity there is already vibrant. Advocacy and research is one area they can support on and there is an urgent need to identify the priority issues which require investigation to support an effective response within Uganda.
8. Uganda is in the process of planning how to progress its development goals over the next 5-6 years, a valuable opportunity to ensure that the implications of climate change are considered. However, the current mechanisms for consideration of climate change in the planning process for the National Development Plan are flawed and conspire against the sophisticated level of multi-sectoral deliberation which is required.
9. There is a strong case and demand from donors, government and civil society for DFID Uganda to engage on climate change issues. It is recommended that DFID Uganda respond to the challenges with a programme of support which combines technical assistance, strategic advice and coordination with a watching brief to monitor progress and changing needs in the dynamic institutional environment around climate change. This should be supported with adequate funding to resource the meeting of

priority needs as they emerge, to support civil-society's research and advocacy role and to contribute to the costs of adaptation actions on the ground.

10. There is an opportunity to provide exactly this kind of support through collaboration with the UK Environment Agency's International Programme. The Agency possess a bank of appropriate and well tested expertise in environmental governance, water resource management, emergency planning and crucially, in brokering multi-stakeholder collaboration for responding to climate change. Their international programme has been shown to be effective and good value for money in East Africa and there is an existing working relationship between the Agency and their Uganda counterparts. There is significant demand from within Uganda to build this relationship and to share the Agency's experience, but to date there has been a lack of significant funding to replicate the success of the DFID funded REMAK programme in Kenya.
11. Such a programme fits well with wider DFID and UK-HMG policy and objectives around climate change. DFID should also undertake to screen their country portfolio to assess potential for integrated action on climate change issues and to ensure that it isn't inadvertently contributing to increased vulnerability. It should also look to galvanise political leadership at a senior level within Uganda, consider the efficacy of donor coordination processes on the issue and support a research prioritisation exercise to focus international research effort to supporting Uganda's needs. Careful collaboration with donor partners and government will be needed to align DFID engagement with existing initiatives. Based on discussions during the scoping mission, DFID engagement on the issue would be universally welcomed.

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List of Abbreviations

AfDB	African Development Bank
ASPS	Agricultural Sector Programme Support
CDM	Clean Development Mechanism
CDMR	Commission of Disaster Management & Refugees
CHOGM	Commonwealth Heads of Government Meeting
DoM	Department of Meteorology
DWD	Directorate of Water Development
DWRM	Directorate of Water Resources Management
EIA	Environmental Impacts Assessments
GCM	Global Circulation Models
GEF	Global Environment Facility
GHG	Greenhouse Gases
GIS	Geographical Information System
GoU	Government of Uganda
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resource Management
JAF	Joint Assessment Framework
JAS	Joint Assistance Strategy
JWSSPS	Joint Water and Sanitation Sector Programme Support
LDC	Least Developed Countries
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MDG	Millennium Development Goals
MoFPED	Ministry of Finance, Planning & Economic Development
MWE	Ministry of Water and Environment
NAPA	National Adaptation Programmes of Action
NARO	National Agricultural Research Organization
NEMA	National Environment Management Authority
NFA	National Forest Authority
NDP	National Development Plan
NPA	National Planning Authority
NGO	Non-Governmental Organization
OPM	Office of Prime Minister
PEAP	Poverty Eradication Action Plan
PMA	Plan of Modernization of Agriculture
PRA	Participatory Rural Appraisal
PRSP	Poverty Reduction Strategy Paper
UBOS	Uganda Bureau of Statistics
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
WCRP	World Climate Research Programme
WSPS	Water Sector Programme Support

1. Introduction

The UK government has prioritised an international response to climate change which supports growth and poverty reduction in developing countries. Since DFID, in its 2006 White Paper declared it to be ‘the most serious long term threat to development and attainment of the Millennium Development Goal’s’, climate change has expanded as a key strand of its work with increasing resources assigned to it.

To reflect the priority given to an effective response, to better understand the specific challenges climate change brings to Uganda and to explore the need for intervention by DFID Uganda, a scoping mission and literature review was conducted by LTS International Ltd in July 2008. This report is the outcome of that work and provides an overview of country-specific information on climate change characteristics; national priorities; current and planned initiatives, and considers whether intervention is appropriate and the forms it could usefully take. This information informs a forthcoming review of country support, and will enable DFID Uganda to respond more effectively to the challenges brought by a changing climate and to engage fully with national and international stakeholders on climate related issues.

To support organisational learning within DFID, all literature relevant to this study, together with a summary presentation of its findings is provided on a CD-ROM. In addition, contact details of the key informants and organisations visited are appended.

This series of questions posed by DFID Uganda guided the work:

1. To what extent is climate change integrated into national policy and strategy development and in particular, to what extent are climate change considerations being taken into account by the drafters of the forthcoming National Development Plan?
2. Do Uganda’s donor partners have a coordinated response to climate change?
3. What range of climate change knowledge is available to, and utilised by Government of Uganda bodies that are mandated to address climate change adaptation?
4. To what extent is Uganda active in regional or international discussions on climate change, adaptation and mitigation?
5. What existing mechanisms do people in Uganda use to adapt to climate extremes and humanitarian shocks? What lessons are being learned from these and can they be extrapolated to deal with anticipated long term climate change?
6. What measures are stakeholders taking in order to manage climate change risk with respect to infrastructure and commercial investments, export-related fishing and agriculture, social sectors and transport infrastructure?
7. How and why are carbon markets and the Clean Development Mechanism working in Uganda, and what potential exists for pursuing development via carbon funding alongside conventional funding?

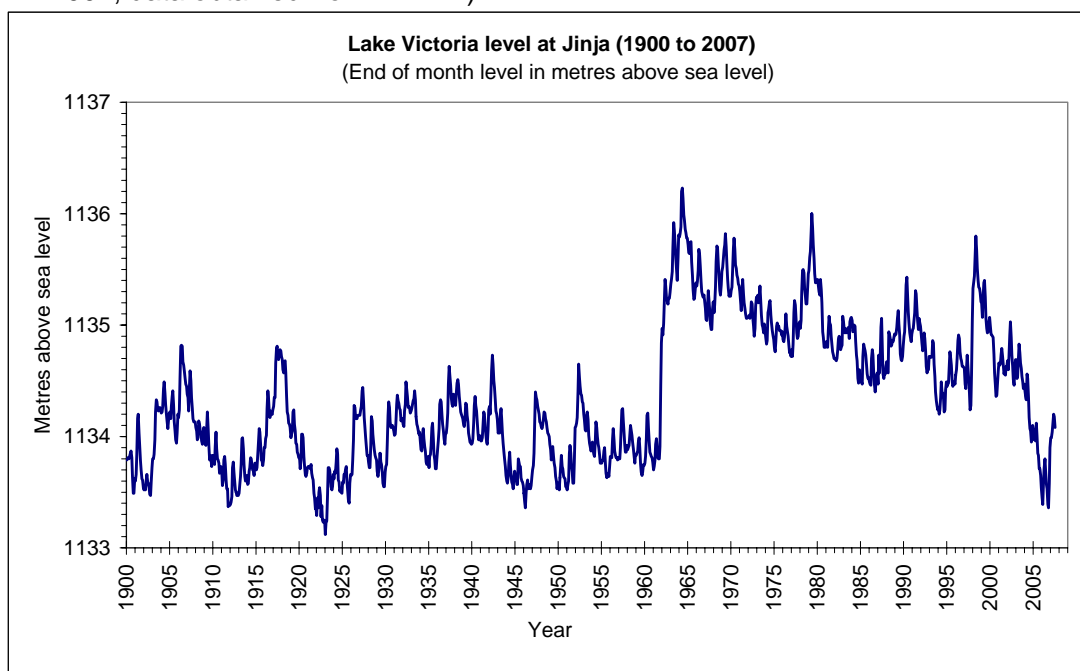
As directed by these research questions, the study considers both adaptation and mitigation. This report begins with a review of understanding about how climate might change, a summary of likely impacts and an appraisal of Uganda’s vulnerability. At DfID’s request specific attention is given to the strategic implications for Lake Victoria. The responses to climate change by communities, government, development partners and civil society are reviewed and Uganda’s role in mitigating climate change and representation in international negotiations are considered. Conclusions and recommendations are presented for consideration by DFID Uganda.

2. Uganda's changing climate²

2.1 Variability

East Africa's climate is naturally dynamic with high temporal and spatial rainfall variability, some of which can be explained by large scale oscillations in atmospheric and ocean circulation (including El-Nino Southern Oscillation and less well known events such as the Indian Ocean Dipole reversal). This high historical variability and the occurrence of extreme events, such as heavy rainfall in 1961/62 and 1997/98, are reflected by the record of Lake Victoria water levels during the 20th Century presented in figure 1. Analysis of earlier lake levels suggest that the fluctuations and extremes seen in the last 100 years, including the apparently low levels before the 1960's and high levels post 1960 are not unprecedented in history. The rise in lake levels in the early 1960s can be explained by exceptionally high rainfall over the lake and in the lake catchment between 1961 and 1964 followed by a sustained high rainfall over the lake in the following decades. The declining trend in lake levels from the mid 1960s to the present suggests a slow return to pre 1960 levels. The accelerated decline between 2004 and 2007, which can be seen on the far right hand side of Figure 1, has been the subject of much concern and debate in the region. From a number of studies it appears that both climatic and non-climatic causes have contributed to declining water levels during this period. Approximately half of the drop in level between 2000 and 2006 can be explained by excess releases at the outflow of the lake made in order to meet power generation demands since the completion of the extension to the Owen Falls dam in 2000, whilst the other half appears to be due to climatic factors (Sutcliffe and Peterson 2007).

Figure 1. Water levels of Lake Victoria 1900 – 2007 (from Goulden 2006, updated 2007, data obtained from DWRM)



² The data used in this section is based largely on information provided by Dr Marisa Goulden of the Overseas Development Group and Tyndall Centre at the University of East Anglia, UK. Dr Goulden's PhD research and subsequent work collates the outputs of available modelling exercises and provides a rigorous contemporary understanding of future climate trends in Uganda.

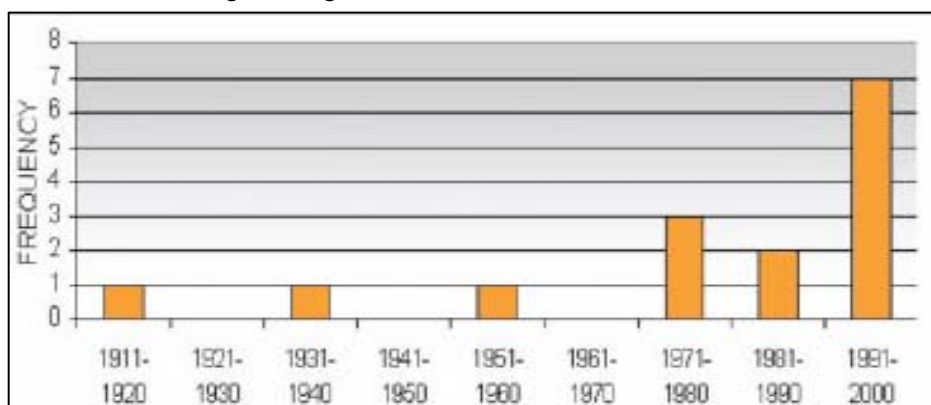
Climate variability, floods, droughts and changes in seasonal rainfall have had significant socio-economic impacts in Uganda in the past. Floods in 1961/62, 97/98 and in 2007 saw widespread infrastructure damage, displacement and destruction of livelihood assets. Droughts have also taken a significant toll with for example, 1.8 million people affected through increased malnutrition, poverty, illness, asset loss and migration in the 93/94 event.

Changes in rainfall reliability, onset and cessation can cause crop failure and hunger and this can be exacerbated by other stresses such as land degradation or insecurity. Rainfall variability and changing lake levels also have implications for natural resource use: low lake levels since 2005 have led to power shortages, disruption to water supplies to urban settlements around the lake, transportation and infrastructure and is thought to have negatively affected the productivity of Lake Victoria's fishery, (see Box 2).

2.2 Trends and future scenarios

East Africa has seen a warming trend of about 0.5 °C and has become wetter on average by around 10-20% over the past 100 years. The exceptionally wet years at the beginning of the 1960s are largely responsible for this increase and these changes cannot be attributed to human induced global warming with any certainty. Uganda's NAPA, published in 2007, suggests a trend of increasing frequency of drought events (Figure 2) and also increased rainfall variability in recent years, linking them to climate change. However, care must be taken in assessing trends where data are incomplete or are only available for a few years. There is not enough data presented in the NAPA report to assess the reliability of these claims and there is very little published literature on recent trends in Uganda or East Africa³.

Figure 2: Chart appearing in Uganda's NAPA suggesting a steep increase in the occurrence of drought in Uganda. source: MWE 2007



³ Great care should be taken when interpreting recent climate trends as climate change. There is insufficient information presented in the NAPA to allow judgement on the quality of the data, nor is the source revealed. Important questions include the criteria used to describe drought; the geographical extent affected and duration; and whether data are based on verbal reports or meteorological observation? Long time series rainfall data are lacking or contain gaps for many locations in Uganda and the graph could reflect this skewed availability of data or recall bias, if based on testimony. Dr Goulden found no clear change in the frequency of droughts up to 2004, but found that droughts occurred fairly regularly. Research has linked rainfall variability in East Africa to ENSO and sea surface temperature variations in the Indian and Atlantic oceans, with cycles of approx 2.3, 3.5 and 5 years, though there is very little published literature on recent trends in Uganda or East Africa. Neither are data showing increased rainfall variability convincing with NAPA graphs showing only 3 years of data-not enough to establish a trend, though this is stated as fact in the NAPA on page 22 (2nd para).

Future climate scenarios have been developed based on the results of modelling exercises. Different studies and climate models generally give variable results for future rainfall trends but there is more certainty in the picture they provide of future temperature. A review by Goulden (2006) of modelling outputs for East Africa under a range of plausible CO₂ emission scenarios created by the IPCC⁴ reveals that there is consensus around:

- an increase in mean annual temperature of between 0.7 °C and 1.5 °C by the 2020's and of between 1.3 °C and 4.3 °C by the 2080's. If global greenhouse gas emissions remain high then we are more likely to see temperatures in the top end of this range.
- a significant increase in mean annual rainfall beyond 2060 with the highest percentage increase in December, January and February. For a medium high emissions scenario and taking the average (median) of different model results, annual rainfall increases have been estimated as up to 7% by 2080 with December to February rainfall increases of 13% by 2080.
- changes in the severity and frequency of extreme events (floods, droughts, heatwaves, storms), although little is known about the nature of these changes (some models suggested that we would see a 20-30% increase in extreme wet seasons at a medium CO₂ emission scenario).

These results are consistent with those published in the IPCC's Fourth Assessment Report in 2007. The figures quoted are averaged across a number of different models and individual models can give considerably higher (or lower) estimates of change. Rainfall results are quoted for a medium high emissions scenario, however, recent research suggests that emissions have been growing at a faster rate since 2000 than the highest of the IPCC emissions scenarios (Raupach et al 2007), therefore these estimates may be conservative.

The seasonality of rainfall is also likely to change in the future. The highest percentage increase in rainfall is projected for December, January and February, which is historically the driest season for many parts of Uganda. This indicates that the current wet season from March to May (known as the "long rains" in Southern and Central Uganda) may shift forwards in time or the September to November rains, known as the "short rains" may extend longer. It must be emphasized that there is already considerable variability in seasonal rainfall totals, much of which is linked to ENSO.

It is understood that climate change impacts will be felt through changes in variability rather than the long term shift in average conditions so the uncertainty around changes in variability brings some uncertainty in the extent of impacts. That said, we can be fairly certain that annual mean temperatures will rise at a rate which has been unprecedented over the last 10,000 years. **In summary, temperatures are likely to increase in Uganda by up to 1.5 °C in the next 20 years and by up to 4.3 °C by the 2080s. Changes in rainfall patterns and**

⁴ Four out of five of the studies reviewed use emissions scenarios calculated by Working Group III of the Intergovernmental Panel on Climate Change (IPCC) in their Special Report on Emissions Scenarios (SRES) to represent future emissions of CO₂ (and other greenhouse gases) arising from different plausible world futures (Nakicenovic 2000). These scenarios, known as the SRES scenarios, are clustered into 'families' according to the type of social, economic and technological changes which might take place in societies in the future. In general, the cumulative total carbon dioxide emissions by 2100, and consequently the projected changes in climate variables, are of greatest magnitude for scenario A1F1 (high), followed by the scenario 'families' A2 (medium high), B2 (medium low) and B1 (low).

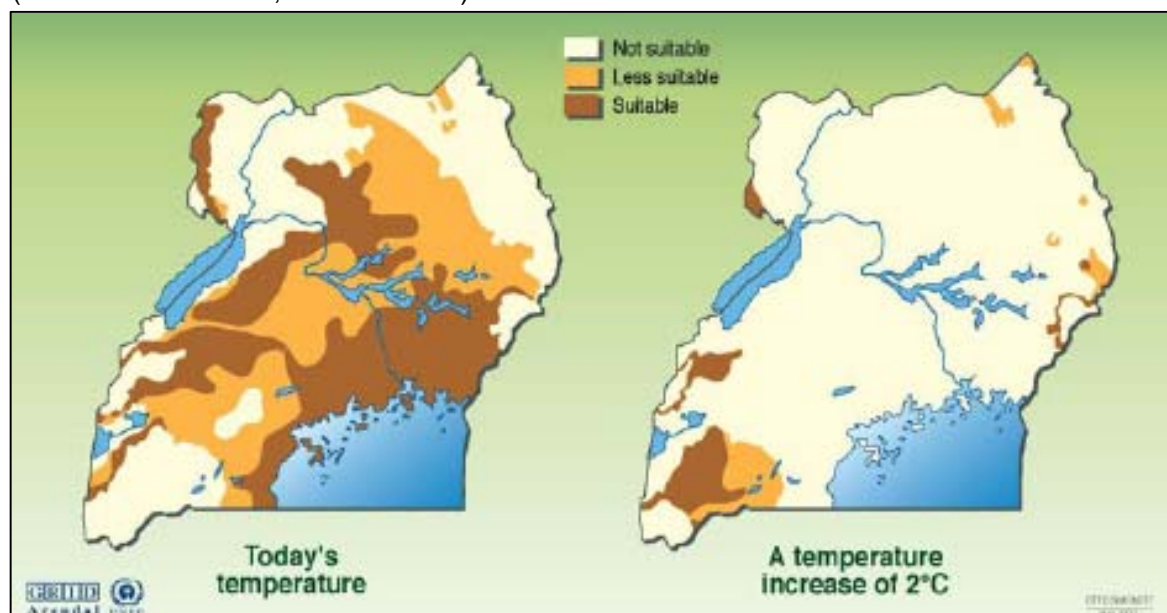
total annual rainfall amounts are also expected but these are less certain than changes in temperature. Regardless of changes in rainfall, changes in temperature are likely to have significant implications for water resources, food security, natural resource management, human health, settlements and infrastructure.

2.3 Impacts

Climate change is likely to have a wide range of interrelated impacts for the environment and economy of Uganda and the well-being of its people. The impacts and mechanisms identified in existing literature are collated in Box 1. Whilst many of these are negative, there may also be potentially beneficial outcomes such as increased grazing area for livestock in the cattle corridor with increased rainfall or opportunities to grow more profitable crops. Climate change impacts are also likely to exacerbate some existing stresses, for example land degradation. The headline impacts however are likely to be:

- Increased food insecurity;
- Shifts in areas affected and increased incidence in some areas of diseases, such as dengue fever, malaria and water borne diseases associated with floods;
- Elevated rates of erosion and land degradation because of increased mean rainfall or higher intensity events;
- Greater risks of flood damage to infrastructure, property and settlements;
- Shifts in the viable area for coffee cultivation with increased temperature;
- Reduced output of the maize crop;
- Reduction in grazing potential within the cattle corridor;
- Biodiversity loss and extinctions as niches are closed out by temperature increases and pressure on natural resources;
- Implications for Lake Victoria levels and Nile flows - considered specifically in Box 2.

Figure 3. The impact of a 2°C temperature rise on robusta coffee in Uganda (source: UNEP 2002, in MWE 2007)



Box 1: Impacts of climate change in Uganda

collated from the literature (Orindi and Eriksen 2005, Orindi and Murray 2005, Goulden 2008, MWE 2007)

Impact		Mechanism
Water	Change in river flow regimes	Higher temperatures and melting of Rwenzori glaciers temporarily increasing and then reducing flows in the Semiliki river downstream
	Water scarcity	Higher temperatures, evaporation and recurrent drought leading to stress, higher demands for water, conflict, and biodiversity loss. Partially implemented water resource regulation system hands legal access to water to the powerful
	Flooding	Higher mean and increased intensity rainfall, coupled with land degradation and encroachment raises risks of loss of life and property and damage to infrastructure via flooding
Health	Malaria	Extension into higher or once cooler areas with temperature increase where resistance may be low
	Water Bourne Disease	Flooding is associated with diarrheal disease including cholera epidemics, particularly where sanitation is poor and in slum areas
	Respiratory disease	Associated with prolonged dry spells
	Malnutrition and famine	Associated with lower food production and insecurity, particularly with widespread damage brought by floods and droughts
Agriculture and food security	Seasonal rainfall change	Erratic onset and cessation of the rainfall seasons. Shorter rains. Crop failure or lower yields of staple foods like beans, cassava, maize and matoke; reduction in traditional varieties; and more crop disease Additional agricultural workloads – particularly women.
	Higher average rainfall, high intensity events	Crop damage and soil erosion
	Pastoralists	Increase in rainfall in semi-arid areas could be beneficial, given mobile to take advantage of the rains. Droughts reduce viability of cattle corridor and precipitate conflict Lower milk production
	Fisheries	Changes in nutrient cycling and loss of spawning brought by temperature and water level change reduce productivity
	Land degradation and deforestation	Higher forest fire risk in dry periods; pressure on forests when other livelihood assets collapse; salination and soil erosion
Environment	Species extinctions	As niches are closed out by shifts in climate regime
Infrastructure	Transport links and settlements	Damage to bridges, roads, telecommunication and buildings during flood and storm events
	Energy	Changes in Lake level reducing flows available for power generation. Higher energy costs and energy poverty with knock on implications for charcoal use, deforestation and land degradation
Economy	Coffee	Uganda's primary export crop. Robusta sensitive to higher temperatures. Too much rain reduces flowering, which reduces production and also effects drying of beans. Diseases, pests and mould, hit both production and quality.
	Food prices	Increase due to pressure on internal and international production capacity
Poverty	Tourism	Potentially in decline due to degraded environment and infrastructure
	Multiple	Exacerbated. Vulnerability increased
Insecurity	Nile flows	Changes in water balance and demand heightens competition, potential for conflict.
	Migration	In response to acute or chronic climate induced stresses

Box 2: Implications of climate change for Lake Victoria and Nile flows

Lake levels, causes and impacts of past variability

Lake Victoria, shared between Uganda, Kenya and Tanzania is the largest lake in Africa and important for Uganda for its productive fishery, abundant water resources, hydropower production, biodiversity and numerous other uses. Lake Victoria is highly sensitive to climate variability, as illustrated by the fluctuations in the level of Lake Victoria in the past (see in Figure 1). Other lakes in the region show similar patterns of historical variability to Lake Victoria. Fluctuations in rainfall in the catchments of the rivers that drain into the lake have a large effect on Lake Victoria's level. Studies have linked the causes of fluctuations in level of Lake Victoria, in particular the large increases in level in 1961 and again in late 1997 and early 1998 to oscillations in sea surface temperatures and ocean circulation patterns in the Pacific (El Niño), Indian and Atlantic Oceans.

Fluctuations in lake level due to climate variability have had an impact upon the generating capacity of Uganda's hydroelectric facilities and on infrastructure around the lake such as water supplies for towns, irrigation and transport infrastructure and possibly also on fish stocks in the lake. The declining lake levels experienced since 2002, and in particular since 2004, coupled with increasing demand for electricity, led to severe power shortages and black-outs in Kampala during 2005 and 2006. Similar problems were also experienced across East Africa as other dammed lakes dropped in level. Declining lake levels also caused problems for water supplies for cities and towns around the lake. Many boat landing sites and harbours around the lake were left high and dry. Some people have suggested a link between dropping lake levels and the decline in fish catches from Lake Victoria. However, there is insufficient evidence for this and there are likely to be many other factors affecting the fishery. These include the pollution of lake water that has led to an increase in nutrients and reduction in oxygen in lake water, changes in the ecology of the fishery due to the introduction of non-native fish species and over-fishing.

The flooding events of 1961/1962 and 1997/1998 caused widespread damage to infrastructure and damage to people's homes and livelihoods around Lake Victoria and also along the shores of the many other lakes in Uganda. As well as the negative impacts of climate variability there are also some positive impacts. For example, increases in lake levels can contribute to increases in fish stocks. It is also possible that the flooding of 1997/98 led to a reduction in the problem water hyacinth weed that was clogging many of the bays in Lake Victoria and Lake Kyoga.

Likely impacts of future climate change on Lake Victoria levels

Average lake levels in the future may be reduced by higher evaporation from the lake's surface due to higher temperatures unless increases in rainfall outweigh this effect. One study using a hydrological water balance model showed that lake levels might fall on average in the early part of this century and then be higher on average than current levels in the second half of this century (Tate et al. 2004). However, the modelling of average lake levels in the future is highly sensitive to the particular climate scenarios used and hence very uncertain. In addition to changes in average temperatures and rainfall conditions, climate variability is expected to continue or increase in the future. **If the projected increase in annual rainfall is experienced as more extreme events, then we can expect more frequent and/or more extreme flooding events and sharp rises in lake level in the future.**

The impacts of climate change will act in conjunction with the impacts of other stresses on the lake and the population. Currently the impacts of over-fishing, poor land management, erosion in the catchment, sedimentation and pollution of lake water are likely to be more important than climate change impacts. However, the impact of climate change will increase in the future and may worsen these other problems. There is a danger that increasing awareness of climate change will mean that it is used as a scape-goat for problems facing the lake. For example the recent dramatic drop in Lake Victoria's level has been blamed on climate change and yet there are other factors that are far more likely to have made a significant contribution.

Likely impacts for hydro-electric power

Changes in average lake levels will affect the availability of water for hydro-electric power production. The extension of the Owen Falls Dam, opened in 2000, appears to have been designed to operate with the conditions of high average lake levels seen between 1960 and 1990, judging from the inability to operate the power plant at full capacity during the recently experienced low levels of the lake. This illustrates the vulnerability of hydropower production to climate change should it cause lowering of lake levels in the future. **The combination of increasing demand for electricity and the possibility of lower lake levels in the future due to climate change mean that it is extremely important to study climate change scenarios and their impacts on future lake levels and to consider them in the design of all new hydropower facilities and electricity supply plans.**

Likely impacts for commercial fisheries

Freshwater lake fisheries are important in Uganda for their contribution to the economy through foreign export earnings as well as a source of protein for the population and livelihoods for lake-shore populations. Lake Victoria has been the most productive fishery for Uganda since the late 1980s. **The impacts of climate change on commercial fishing in Lake Victoria is uncertain. Any reductions in water level and the impacts of extreme climate events resulting from climate change may have significant negative effects on the shallow lake fisheries of the African Great Lakes, including Lake Victoria and Lake Kyoga.** Higher temperatures may also have an impact on fisheries productivity and the ecology and species composition in the lake ecosystem, either directly or as a result of changes in mixing of different layers in the water column, or due to changes to oxygen levels and nutrient availability. However, little research exists on the effects of temperature changes on shallow lakes in the tropics, although some research on the much deeper Lake Tanganyika has linked declining fish catches to rising temperatures. Any increase in frequency or severity of flooding events will also cause damage to fishing infrastructure on landing sites. Research by Goulden (2006) showed how other stresses on the fishery such as over-fishing, pollution and reduction in the biodiversity may lead to a reduced resilience of lake ecosystems to the impacts of climate variability and climate change and may increase the potential of a collapse in the fishery.

Likely impacts for livelihoods of poor lakeside communities

Local livelihoods depend heavily on fishing, and the processing and trading of fish. **Therefore any negative impacts of climate change on the Lake Victoria fishery will also have an impact on local livelihoods and will exacerbate poverty.** People will have varying resilience to these impacts due to differences in their abilities to adapt. Evidence from a study of people's responses to climate variability suggests that any variability or declines in fish catches due to climate change are likely to prompt people to diversify their livelihoods away from fishing or to increase their mobility and migrate to other lakes (Goulden 2006).

Increased extreme events and trends in lake temperature and levels associated with climate change will also have impacts on domestic water supply intakes, water availability for lakeside irrigation, transportation and infrastructure. For example, temperature increases and increased pollution of lake water may increase the abundance of dangerous toxin releasing bacteria that occur where there are 'blue-green' algae in the water. This will present a threat to domestic water supply as well as to the ecology of the lake and its fishery. These bacteria have already been detected in some bays of Lake Victoria.

Likely impacts on Nile flows and hydro-politics of the Nile basin

Changes in the level and outflow of Lake Victoria have international implications because the lake is shared by Tanzania, Kenya and Uganda and then flows into the White Nile, shared with Sudan and then Egypt. However, only 14% of the annual Nile flow at the Aswan High Dam in Egypt comes from the White Nile. The potential impact of climate change on rainfall and runoff in the Ethiopian highlands and Blue Nile flows is more critical to the downstream countries of Sudan and Egypt than what happens in Lake Victoria and the White Nile basin. Since the Lake Victoria basin is shared by six countries (Uganda, Kenya, Tanzania, Rwanda, Burundi and Democratic Republic of Congo), any water resource developments in these countries may reduce the amount of water in the lake, whether they are adaptations to climate change or not and will have international implications. Historically there have been tensions between upstream and downstream countries that share the Nile over the use of Nile waters. Egypt, the downstream country most dependent on River Nile waters, does not encourage

consumption of Nile River water in the upstream countries. As Nile Basin countries consider potential adaptation options to climate variability and climate change and how to meet the increased demand for water from their growing populations, competition between Nile basin countries is likely to increase. **There is the potential for possible future increases in Nile flows to alleviate competition amongst Nile Basin countries for Nile water, but this will depend if increased flows are sufficient to outweigh the substantial increase in demand for water of many of the Nile basin countries as their populations grow and their economies develop.** The Nile Basin Initiative (NBI) is a major donor-supported programme started in 1999, which brings all ten Nile Basin countries together with the aim of increasing cooperation over the Nile and promoting its sustainable and equitable use. The NBI has already been successful at increasing technical cooperation amongst Nile Basin countries and has the potential to contribute to climate change adaptation, although climate change does not yet widely incorporated in the programme. Similarly, the East African Community has recently established the Lake Victoria Basin Commission (LVBC) and this also has the potential to facilitate coordinated climate change adaptation.

Potential adaptation interventions in response to these impacts

The populations around Lake Victoria are likely to make some adaptations to climate change without any intervention from outside. People are likely to try and diversify their livelihoods, fishers may move between different lakes and landing sites and people will make use of their networks of friends, relatives and acquaintances at times of crisis. **These local adaptation measures should be facilitated rather than hindered by any interventions. The resilience of lake shore populations could also be strengthened through improved education, health care and better transport infrastructure as well as measures to reduce poverty. Interventions should also be aimed at strengthening the resilience of the lake's ecology by increasing efforts at soil conservation and wetland protection. Interdisciplinary scientific studies should also be conducted to improve the knowledge of the lake and its potential response to climate change.**

Some adaptations have the potential to be harmful for some groups of people or sectors. For example, developments in the catchment of Lake Victoria, such as the building of valley dams for flood risk reduction and irrigation infrastructure built in response to variable or less reliable rainfall may reduce levels in Lake Victoria and the quantity of flows in the White Nile. The expansion of aquaculture has been suggested as an adaptation to the potential negative impacts of climate change on fisheries (as well as to the increasing demand for fish and the impact of overfishing). However, little research has been conducted on the vulnerability of aquaculture to climate change, especially to increased extreme events: floods are likely to destroy ponds and prolonged droughts to dry them out resulting in loss of investments.

There is a need for strengthening the capacity on climate change impacts modelling, understanding and communication of uncertainty, and possible adaptation measures within regional institutions and programmes such as the NBI and the LVBC as well as national institutions. **Climate change planning needs to be incorporated more widely into existing NBI and LVBC programmes.**

Whilst the impacts of climate change are potentially very significant for the future development trajectory of Uganda, there have been few exercises to quantify the implications or to assess the impact of past variability on the country's economy⁵. As seen elsewhere, evaluating the potential fiscal implications of climate change can help position adaptation appropriately in terms of political priorities.

Given the implications of an increased mean annual temperature for the Ugandan Robusta coffee crop illustrated in UNEP's widely replicated map (Figure 3), it can be extrapolated that almost the entire value of Uganda's coffee exports, the nation's leading export commodity

⁵ The El Nino related floods of 1997/98 are estimated to have killed 1000 people, displaced 150 000 and caused damage to infrastructure costing around \$400 million (Orindi and Eriksen 2005)

could be lost within 30 to 70 years as production areas are displaced by a changed climate regime. Coffee exports were valued at US \$265.8 million in 2007, accounting for about 40% of export revenue, 3% of GDP, and a figure in excess of the country's entire health budget and greater than its annual military spending⁶. Similarly, although there is a need to improve understanding about how lake fisheries are affected, climate change, through disturbing habitats, nutrient cycling and indirectly increasing domestic demand poses risks to the second largest export earner, fish, which brought in a revenue of US\$124.7 million in 2007. The political value of such examples are in emphasising that such pessimistic scenarios are not certain outcomes, given that adaptation options are available. Modification of resource management, introduction of new varieties and changes in husbandry techniques may sustain the crops and industries dependent on them, but such adaptations need to be explored and planned for.

There was wide agreement that an assessment of the costs to the country of the 2007 floods would be a very valuable exercise that there was capacity within Uganda to conduct. More rigorous analysis of the implications of climate change for Uganda's economic and social development will help identify strategic priorities for adaptation and help to focus the attention of decision makers.

2.4 Vulnerability

A recent International Climate Risk Report labels Uganda as one of the most unprepared and most vulnerable countries in the world (CIGI 2007). Vulnerability, the potential to be adversely affected by an event or change is a key concept for appraising effective interventions and responses to climate change. On the basis of macro level indicators, Uganda can be considered to be highly vulnerable given its dependence on primary production and natural resource use, weak institutional capacity, limited infrastructure, limited capacity and equipment for disaster management, limited financial resources and low income per capita and heavy reliance on rain fed agriculture (MWE 2002). An exercise mapping vulnerability to climate across Africa by International Livestock Research Institute for DFID also finds Uganda to be highly vulnerable with only Rwanda, Burundi and parts of Sudan, Chad and Niger more so (see Thornton et al 2006).

Resilience, the ability to cope and recover is low within Uganda, illustrated tragically by a recent call for food aid to prevent famine in those areas affected by floods of 2007, almost a year after they occurred. Adaptation to climate change is defined as adjustments to actual or expected climatic stimuli to moderate harm or exploit benefits. Ability to adapt at country, community or household level is characterised as adaptive capacity and is related to the assets that one has access to (financial, natural resource, human and social capital) and how well these are used

Poverty, low diversity of income and livelihoods, HIV/Aids, insecurity and weak institutions are key factors in heightening Uganda's vulnerability to climate change, lowering its resilience and adaptive capacity. Therefore in planning interventions around climate change it is vital to understand and consider these underlying issues and their often unequal distribution as well as direct sectoral impacts.

⁶ Figures used in this section are drawn from Uganda Exports Online www.ugandaexportsonline.com, and the UNDP's Human Development Report 2007/8.

3. Adaptation

3.1. Community responses

In order to improve long-term livelihood security, adaptation interventions may usefully attempt to strengthen opportunities for effective coping strategies. Coping refers to the actions taken by households to survive when confronted with unanticipated livelihood failure (Ellis 2000). Knowledge about how people have responded to past climate shocks such as floods and droughts is therefore useful in understanding how to approach vulnerability reduction or in understanding where adaptation support should be prioritised. Existing knowledge in this respect in Uganda was reviewed.

Amongst the donor, government and civil society informants consulted, none were collating or analysing this kind of information on a systematic basis. The academic literature does provide examples of strategies which households and communities have responded with in the past (see Orindi and Eriksen 2005). These include the collection of wild fruits and wild foods; reliance on remittances; switching to non-farming activities; migration and sale of assets

Such information on past adaptations flags key issues for maintaining resilience, such as the importance of supporting the mobility of pastoralists and fisherfolk; maintenance of mixed cropping regimes; irrigation extension; ensuring access by the poor to natural resource management institutions; gender equitable access to income generation and in the provision of insurance.

Goulden (2008) found that many of the actions that households take to adapt to the impacts of climate variability depend on diversifying their livelihoods - taking up different activities to earn income and obtain food - whilst others depended on social bonds. This ability to diversify livelihoods can be limited by households having insufficient financial or physical capital (money or tools), insufficient human capital (few active, healthy and skilled household members and many dependents), insufficient natural capital (internally displaced people or migrants who do not have access to land) and insufficient social capital (households that have few sources of social support because of civil conflict or AIDS). However, a diverse mix of livelihood activities may not, on its own, be enough to provide a household with resilience to climatic stresses. This is in part because the majority of alternative livelihood activities are dependent on natural resources either directly (cultivation, livestock, forestry, fisheries) or indirectly (trading and service activities) which are also heavily influenced by climate.

Therefore it is important not to assume that livelihood diversification makes people resilient to climate impacts. Social bonds between people and community-based groups such as credit groups or committees, or other households can support opportunities for adaptation, providing households with routes of assistance. This means that any interventions at community level should take care not to destroy or weaken the existing social bonds. Households that tend to be the least resilient are often the poorest households, as well as households that consist of the elderly, those in poor health or households with many dependents. Households with several members who have received higher levels of education tend to be more resilient.

This type of understanding is absolutely crucial in divining an appropriate response to climate change, in that it underlines the central role to be played by ongoing development effort which seeks to reduce social vulnerability and support sustainable livelihoods. It makes it clear that reducing vulnerability is a key adaptation strategy which does not have to wait for expensive and often uncertain downscaled climate models to guide interventions. At the same time it helps to highlight the limits of the social vulnerability approach, where climate shocks may

push communities beyond their adaptive capacity. It is therefore in reinforcing efforts to reduce social vulnerability and hastening 'good' development, and understanding where additional strategic adaptation support is required that interventions around climate change may be most useful.

Case studies of what effective adaptation and climate risk reduction 'look like' at community level and elsewhere are vital. Whilst research and dissemination efforts to provide this type of knowledge are ongoing globally (including for example the study summarised in Box 3, Climate Risk Management in Africa: Learning from Practice), there is consensus in Uganda that good quality country specific research and dissemination is needed. Capacity to deliver that work is evident in Uganda, particularly within the NGO and academic community, however, as will be discussed; the identification of country specific research priorities and identification of funding to resource their exploration is an outstanding exercise.

Box 3. Climate Risk Management in Africa: some lessons from practice...

- Climate information is most effective when integrated into decision making frameworks
- Reducing climate related risk requires multi-stakeholder co-ordination and collaboration.
- Climate information must be credible if it is to be used in decision making
- Reinforcing and sustaining climate observation networks is essential if the full potential of climate information for decision making is to be realised.
- Information and communications technologies, the media and extension services are vital components of improved information systems
- Innovations for managing climate related risks are being developed and deployed
- Economic analysis of the value of climate services is lacking
- Countries can benefit from sharing experience

Recommendations

- Recast climate as a development issue
- Encourage institutional innovation
- Orient meteorological services towards achieving development outcomes
- Strengthen research in support of climate risk management
- Promote systematic knowledge sharing

Conclusions and recommendations of a DFID funded multi-country study by Hellmuth et al. (2007), Climate Risk Management in Africa: Learning from Practice, International Research Institute for Climate and Society (IRI), Columbia University, New York, USA.

3.2. Government response

Amongst representatives of government ministries and agencies, there is a perception that climate change is a 'hot topic' having forced itself onto the agenda through recent events such as the floods of 2007, repeated drought and problems with hydro-electric power generation. Despite a reasonable awareness of the issues and pockets of expertise and disparate adaptation initiatives, strong and effective leadership, coordination and communication within government is yet to emerge. Of particular concern, it appears that provisions for orienting the country towards effective adaptation in a meaningful way within the forthcoming National Development Plan fall short, despite the issue of climate change being flagged as an emergent development challenge within the PEAP revision process document. Furthermore, institutions governing natural resources, environmental health and disaster risk management, the effectiveness of which are key determinants of vulnerability to climate change, are found to be weak.

Opinions about climate change at the highest political levels in Uganda remain unknown with any certainty, although some stakeholders thought carbon finance was seen as a key opportunity, and that emission reduction was seen as a threat to economic development. The Minister of Water Environment was said to be very keen to see a robust Ugandan response to climate change. That President Museveni is Chair of the Commonwealth until November 2009 and that CHOGM's Lake Victoria Declaration on Climate Change was issued in Uganda provides a potential window of opportunity to galvanise the required level of senior political leadership to respond effectively. A conference on ground water and climate held in Uganda in June 2008 was well supported by government, with the active participation of Ministers, MPs and journalists as well as scientists and addressed by the Minister of the Presidency on behalf of the President.

3.2.1 The UNFCCC Focal Point and Uganda's National Adaptation Programme of Action

A useful measure of the priority afforded climate change and the adequacy of the Government response is provided by the track record of the Department of Meteorology within the Ministry of Water and Environment. The Department coordinates climate change activity for the MWE in its capacity as the National Focal Point for Climate Change under the UNFCCC. Whilst the depth of technical understanding and professional capability of the responsible individuals are very clearly second to none, the Department is massively overstretched, lacking both the personnel and political 'clout' required to direct an effective response. Physical resources and investment in monitoring and observation networks is also insufficient. Responsibility for co-ordinating both mitigation and adaptation responses; representation at international negotiations; servicing the needs of the convention and the demands of multiple donors and NGO's keen to act on climate change in Uganda was said to fall to two officers, who shouldered that workload in addition to existing duties. This overstretch is reflected by:

- DoM's inability to spend US\$ 110 K of GEF money allocated for 'enabling activities' in 2004-05 and failure to submit any proposal to draw down funds from GEF's Resource Allocation Framework which could have provided \$3 M to Uganda for adaptation.
- Officials in the MoPFED perceive the DoM to be financially 'crippled' and 'overlooked' by the rest of government.
- Officials from other Ministries and Agencies perceive that the DoM are 'hoarding' funding for climate change work, and were unwilling to proactively provide information when the reality is a lack of human resource to do either.

- The Sectoral Committee on Natural Resources recent expression of concern about lack of action on climate change and their suggestion that the responsibility for national coordination be switched to NEMA.

Uganda's National Adaptation Programmes of Action developed under the lead of the MoD and the First National Communication before it in 2002, (both GEF funded) are useful starting points for understanding the impacts of climate change on Uganda. They have been produced to a high standard when compared to comparative documents in the region. The proposed implementation arrangements for NAPA see a list of 9 priority projects costed at US \$39.8 M, to be implemented through establishment of NAPA villages in collaboration with civil society groups but supervised by line institutions under the coordination of a multi-sectoral National Climate Change Steering Committee. However, opinion on the NAPA in terms of its adequacy to guide an appropriate adaptive response in Uganda was split. Criticism ranges on the lack of detail around how projects were costed, technical rigour in prioritisation, integrated thinking in project design, low levels of commitment from line ministries during plan development and the low profile of the steering committee. Whilst the production and government endorsement of the NAPA is politically significant, those closest to it suggest that it is something of an emergency response to the demands of the convention, and falls short of comprehensively addressing the difficult challenges facing Uganda. That funding to implement the NAPA does not seem to be forthcoming suggests that this view is shared by others including donors.

The wider roles of the Ministry of Environment's Department of Meteorology should be considered within attempts to strengthen Uganda's response to climate change. Much of their core work on forecasting, climate data processing, maintaining the meteorological observation network, training, research and data provision to other users, is relevant to responses to climate variability and climate change.

3.2.2 Responses of relevant Ministries

The consideration and priority afforded climate change adaptation within key line ministries and directorates is variable. It ranges from lying apparently 'off the radar' for the Ministry of Health and Ministry of Finance, Planning and Economic Development to receiving explicit focus and resources within the water sector. Of concern regarding the MoPFED is that the processes for disbursement of treasury funding to line ministries and mechanisms of monitoring and evaluation do not and are unlikely to include requirements for evidence of 'climate proofing' sectoral expenditure. Despite the potential for such checks and balances for mainstreaming consideration of climate change throughout government planning, (particularly relevant for large investments in infrastructure), according to desk officers liaising with key sectors, that type of quality assurance role falls entirely upon the line ministries themselves.

Responsibility for coordinating an effective response to climate induced disasters such as droughts and floods lies with the Commission on Disaster Management & Refugees (CDMR) under the Office of the Prime Minister. Their efficacy and reach, certainly in terms of disaster risk reduction and preparedness is limited as demonstrated by the devastation wrought by the 2007 floods in north-eastern Uganda⁷. The Commission is however developing vulnerability

⁷That said, the scale of this extreme event, the largest floods in 40 years in the region affected meant that mounting a response was very challenging. Accessibility was a major issue with many bridges and roads destroyed or threatened.

assessments and is working on the development of an early warning centre with donor partner support. Their work will be central to an effective response to climate change and extreme events in the future. However, flagged here in relation to the Commission's work in discussions with other ministries was the very low level of inter-departmental communication, coordination and cooperation which seems to preclude effective responses to cross-sectoral issues like climate induced disasters. This was a recurrent theme within many of the mission's discussions and is considered further later.

Although the mission was unfortunately not able to meet with a representative of the Ministry of Agriculture, Animal Industry and Fisheries, a reasonable level of understanding of their activities in relation to climate change was available through discussions with the Chair of the Development Partner Group providing sector support. The dominant initiative within the sector is the Plan for Modernisation of Agriculture which receives support from donors through Agricultural Sector Programme Support II (2004-2009). The PMA focuses on enhancement of agricultural production, increasing land and labour productivity, competitiveness and private sector participation. Despite its relevance to adaptation through the potential to reduce vulnerability in the sector, and its own vulnerability, where shifts in climate risk deliverables or undermine positive outcomes, there is no explicit focus on climate change within the PMA. Without proper strategic consideration of likely shifts in climate and associated implications for water use, pest and disease prevalence, crop production and husbandry there is a risk that sector interventions may actually add to the vulnerability of local communities through, for example encouraging shifts to new farming systems which may be inappropriate in a changed climate, or promoting specialisation of farmers in climate sensitive crops at the expense of diversification and risk reduction.

Given the risks, it is timely that support to the Agriculture sector is being overhauled through the Development Strategy and Investment Plan (DSIP). Currently being devised, the plan will explicitly integrate climate change issues (both in terms of adaptation, mitigation and biofuels issues) and specific technical assistance has been earmarked to support this by development partners. In terms of adapting to climate change the National Agricultural Advisory Service (NAADS), will be a crucial two way communication mechanism and several key informants raised serious questions about the adequacy of this institution at the moment.

The Directorates of Water Resources Management and Directorates of Water Development within the Ministry of Water and Environment appear to be taking something of a lead in terms of their consideration of vulnerability and adaptation responses. The Joint Water Sector review of 2007 established a specific undertaking for the sector to develop a national strategy for adaptation to climate change from a water resources perspective and although progress against the undertaking is behind schedule, Terms of Reference have been prepared for a consultant to conduct a vulnerability assessment of water resources with funding from DANIDA.

The basket funded JWSSPS with a total commitment of US\$ 150 M over five years is poised to deliver significant benefits for the people of Uganda and should contribute to a reduction in vulnerability to climate change. That said, there are concerns from within the Ministry and outside that with the bulk of this expenditure being allocated to water development interventions, investment in an effective system of water resource management may lose out to the politically more popular and visible delivery of taps and toilets. There are also concerns that the investments in water infrastructure are not keeping up with growing demand due to the high population growth rate and fast growth of urban centres in Uganda.

The JWSSPS itself plans for an allocation of 9% of these total funds to water resource management, though the Directorate of Water Resource Management expect their actual

budgets to receive as little as 3%, both of which are likely to be insufficient to role out water resource law. By their own estimates, about 75% of water abstractors who require a water use permit⁸, are operating without one and only 25% of those discharging waste water have a licence to do so, with less than 1% of those activities actually compliant. This shortfall in regulatory reach becomes significant when considering climate change because it is generally the wealthier and politically savvy water users who are aware of the law, recognise the value of a water use permit and proactively apply to the ministry for one. Poor water users find it more difficult to access the system even if they are aware that it exists. Where climate change and increased demand bring competition, it will be those without legal permissions protecting their access to water - the poor and vulnerable - who will tend to lose out.

A working system of water resources regulation is also critical to effective drought and flood risk management and operational responses to those events. Only where abstractions are regulated can use be systematically scaled back to protect priority uses (health, livelihood and environment maintenance) during time of drought. There is some hope that these functionalities may come with role out of the JWSSPS, particularly through the decentralisation of water resource management to zonal levels, however, to support an effective response to climate change effective water resource management needs to be considered a priority and supported accordingly. Regional sectoral support programmes like the Nile Basin Initiative (NBI) (funded by DFID, World Bank and other donors) and the Lake Victoria Environmental Management Programme (LVEMP) (World Bank support) currently have no specific focus on climate change, although the need to address climate change has recently been raised within working groups of the NBI and several of the NBI programmes have the potential to contribute to climate change adaptation. The Lake Victoria Basin Commission, established in 2005 as an institution of the East African Community (comprised of Kenya, Tanzania, Uganda, Burundi and Rwanda) and implementer of the planned second phase of LVEMP, propose to have a sub-programme on climate change, although initial proposals lack any details (EAC 2007)

In a similar way, the existing institutional arrangements for environmental governance and regulation by mandated organisations like NEMA require significant strengthening in order to reduce vulnerability. One example is in the determination of Environmental Impact Assessments and the enforcement of development conditions, a process which is regarded by many as being weak. Without rigorous analysis of potential developmental impacts against medium term climate change scenarios and the effective enforcement of conditions which conserve the natural resource assets that can 'buffer' climate impacts (i.e. wetlands/forest/freshwater resources) Uganda invites enhanced vulnerability. Again overlapping mandates and responsibilities need to be clarified and strong leadership is required to address both the explicit capacity issues linked to resources and more tacit, or political barriers to effective natural resource and environmental management.

Informants from several ministries and donors set their hopes on the process of developing the next National Development Plan as beginning an integrated and appropriate response to climate change in Uganda. Box 4 below considers climate change and the NDP.

⁸ Water use permits set down the conditions under which water abstractions can take place based on an understanding of needs downstream, against which use is monitored and regulated. Together with issuance of waste discharge consents, which similarly set the legal conditions, quality and quantities of waste water flows into the environment, they form the basis of effective water resource regulation regimes.

Box 4. To what extent are climate change considerations being integrated into the forthcoming National Development Plan 2008 -2012?

The next five year National Development Plan replaces the Poverty Eradication Action Plan and will guide the formulation of government policy and implementation of programs in the medium term. The revision process is led by the National Planning Authority in conjunction with the Ministry of Finance, Planning and Economic Development and Office of the Prime Minister. Numerous informants suggested that how the plan dealt with climate change would be critical to the adequacy of the governments' response.

Promisingly, explicit reference is made to climate change as a key development challenge in the concept note for the revision process. Parcelled with natural resources and environment, it features as one of ten major themes on which working papers will be produced in order to provide analytical information and a consensus based overview of how 'the sector' will contribute to national development goals. The lead institution for the development of the working paper on Natural Resources, Environment and Climate Change, is NEMA.

Although this explicit attention to climate change is positive, there are doubts about how effectively climate change can be integrated into the planning process in other sectors because:

- Climate change is bundled into the environment sector working paper under a sub-heading with meteorology which suggests that the only input on climate change into the NDP will be based on the response of the MWE, rather than on consideration of climate change implications by other key Ministries and incorporation of adaptation responses within their own plans.
- The guidelines provided by the National Planning Authority to the other sectors to guide development of their input and responses to the NDP contains no reference to climate change.
- It is the NPA's role to provide guidance and develop the ability of planners at a local level to input and develop district level plans, but neither have the understanding nor capacity to incorporate considerations of climate. The NPA were not aware of Uganda's NAPA or its contents.
- NPA claim that data on climate change is difficult to come by and that it is not shared by those who have it.
- The process of NDP development is set for completion by June 2009 and whilst donors such as DANIDA and UNEP are supporting or planning to support integration of climate change in the process, key aspects are underway already which see the issue being dealt with in isolation, within its sectoral 'silo'.

So it appears that whilst CC integration into the NDP is being muted, the processes underway and the sequencing of support to them will conspire against an appropriate level of consideration of climate change by other sectors. Whilst some informants suggested that the NDP was not the 'only show in town' for development planning and action, the absence of climate change considerations in a multi-sectoral five-year planning process would be a missed opportunity during a potentially critical period in gearing an adaptive response in Uganda.

Indicative of demand for stronger integration, there were explicit requests for technical assistance, collaboration and support for mainstreaming climate change within the NDP process by the NPA, NEMA, line Ministries, development partners and local and international NGO's.

Evident throughout discussions with government is a low level of coordination and inter-agency collaboration and communication on climate change and an absence of pro-active initiatives to counter this. For example, NEMA who's operational mandate is heavily intertwined with climate change and who possess capacity to act positively were waiting to be 'coordinated' on the issue by the DoM, whilst openly acknowledging that the DoM lacked capacity to do so. They pointed to the need for mandate clarity whilst others spoke of pet politics, empire building and jostling for access to funding streams. Lack of leadership and an apparent poor appetite for inter-agency working, openly acknowledged within government requires redress for an effective response to climate change and is perhaps an area where lessons gained from HIV/Aids and gender mainstreaming may be useful.

Although district governments were involved in the NAPA study, as is the case elsewhere in East Africa, there are many challenges for decentralised government institutions in Uganda. These are mainly related to poor capacity, poor facilities, lack of finance, and in their relationships with central government. A meaningful appraisal of climate change responses at a district level fell beyond the scope of this study, however the critical role to be played in linking central government to communities for effective adaptation to climate change needs to be stressed.

That these challenges are recognised within government is positive. They are also recognised by the donor community and as discussed, Danish support has been agreed to establish a Climate Change Unit within the MWE, primarily to support implementation of the UNFCCC and the Kyoto Protocol but which may also resolve some of these issues.

4. Mitigation

4.1. The Clean Development Mechanism⁹

The Clean Development Mechanism was established by the Kyoto Protocol with the double objective of assisting developing countries in achieving sustainable development, and assisting industrialised countries to meet emission reduction commitments. Under CDM, projects that reduce greenhouse gas emissions and contribute to sustainable development can generate Certified Emission Reductions (CERs), a tradable commodity in international carbon markets. The overall value of the emissions trading markets in 2007 was US\$ 64 billion; the value of the primary CDM market was about 12% of that. China, India and Brazil in particular have benefited so far.

Africa has been slow to reap the benefits of CDM owing to lack of capacity to develop projects, limited number of attractive large-scale projects, as well as to a generally poor investment climate. At the Twelfth Conference of the Parties to the UNFCCC (COP12/MOP2) in Nairobi 2006, a decision on equitable distribution of CDM project activities in Africa was adopted, referred to as the Nairobi Framework. Under this framework, developed country parties agreed to support bilateral and multi-lateral agencies in their efforts to enhance the capacity to develop and process CDM activities in Africa.¹⁰ Part of the UK's response has been to launch the Africa Springboard, announced by Hilary Benn in Bali in December 2007¹¹

⁹ Sources for this section: Tynjälä and Annies, 2008; World Bank: State and Trends of the Carbon Market 2008

¹⁰ More information can be found at http://cdm.unfccc.int/Nairobi_Framework/index.html

¹¹ <http://www.defra.gov.uk/news/2007/071212a.htm>

This public private partnership aims to boost carbon market investment in Africa and to establish CDM in 3 pilot countries in Africa by working alongside governments and other agencies to establish and resource a Designated National Authority. It will also seek to establish CDM methodologies that are more applicable and appropriate to local circumstances and provide funding to help bring a number of demonstration projects to the project registration stage.

To date, Uganda has not benefited from CDM on any meaningful scale. The Designated National Authority for coordinating CDM under the UNFCCC is the Minister for Environment and Water, supported by a steering committee and a one person secretariat. Activity has been limited by a lack of funds to operate, competing existing commitments of officers and insufficient staff to discharge the functions required. In part reflecting this, only one project has been established under CDM, the West Nile Nyagak Mini Hydropower project, which attracted about US\$4 M. Other projects are under development with donor support such as the Kakira Cogeneration Project and landfill gas recovery initiatives under development within nine municipalities with planned extension into a further nine shortly. Interestingly these projects are being implemented by NEMA which provides for potential conflicts of interests given their regulatory role.

The potential for Uganda to benefit from CDM is significant. The Uganda Investment Authority which markets opportunities for CDM and carbon market investment has identified thirty sites suitable for mini-hydro power investment which could generate between 10 -20 MW each and parcels of land of between 500 and 16000 hectares available for afforestation on 49-99 year leases. Some of the hydro sites are currently only marginally viable because of the level of infrastructure investment - grid extension to their isolated locations - required, and would require a subsidy to make them viable. Such assistance was lined up by the World Bank under the Rural Electrification Project but was backtracked for unknown reasons - unfortunate given Uganda's grinding level of energy poverty.

There is a universally held view that high transaction costs limit investment in CDM in Uganda and that the overly bureaucratic process of registration is not only difficult and expensive for project developers, but that it requires skills (for baseline surveys, production of a Project Idea Note and Project Design Document) which were difficult to find in Uganda. There is agreement that generating the capacity and expertise within Uganda to conduct this type of work and the appointment of local verifiers will reduce the costs and facilitate greater uptake.

Specific donor support for CDM in Uganda is ongoing or in the pipeline from Austria, Sweden, Norway and Belgium. The new National Climate Change Secretariat with Danish support will strengthen the institutional framework and is designed to address the bottlenecks for CDM and other climate change related investment.

4.2 Voluntary Carbon Markets

Besides CDM, voluntary carbon markets are relevant to countries like Uganda. This is especially true for land-use, land-use change and forestry (LULUCF) projects where voluntary carbon market methodologies are less demanding. The volumes transacted in the voluntary markets tripled between 2006 and 2007 with the total value of the voluntary carbon markets in 2007 at US\$ 331 million.¹²

¹² Sources for this section: Ecosystem Marketplace & New Carbon Finance. Forging a Frontier: State of the Voluntary Carbon Markets 2008.

The prices in the voluntary carbon market vary significantly. The average volume-weighted price in 2007 voluntary markets was US\$ 6.10 per tonne of CO₂. The quality of voluntary emission reductions is an important issue. In response to concern over quality and stories of 'carbon cowboys', suppliers have embraced a range of tools to prove the legitimacy of credits. These include the Voluntary Carbon Standard, CDM, CCX, VER+ and Gold Standard and others, usefully reviewed by Kollmuss et al. 2008 in a piece of work for WWF.

While Africa should be an attractive place for voluntary carbon project developers, only 2% of voluntary credits in 2007 came from Africa. It seems that the voluntary market is experiencing the same fate as the CDM market, with little investment into the continent, investors and project developers preferring less problematic locations.

That said, Uganda has a more extensive track record with the Voluntary Carbon Market than with the CDM, with reforestation projects associated with carbon offsets operating as early as the mid 1990's, through the work of the FACE foundation. Examples of successful entry into international carbon markets is evident through schemes like Plan Vivo (see Box 5) however, quantification of actual or potential benefits for Uganda has not been carried out recently.

Views on the value and potential contribution of carbon markets to sustainable development are split in Uganda. Some see enormous potential and significant demand from buyers whilst others doubt benefits for the poor and complain that prices for carbon are too low. All agree that key barriers included a lack of start up funding, low levels of indigenous technical capacity and experience, bureaucratic processes and high transaction costs and consider that future developments around REDD would be significant for Uganda.

Box 5: Plan Vivo in Uganda – Trees for Global Benefit

Plan Vivo, developed with DFID support is seen as one of the more vibrant and successful carbon projects working with low income communities. In Uganda it is managed by Ecotrust under their Trees for Global Benefit, widely regarded as a solid organisation with good leadership.

Ecotrust work with communities to plan afforestation and reforestation projects enabling them to access voluntary carbon market through the Plan Vivo system. They are currently working with around 300 farmers, selling about 75 tonnes of CO₂ a year with a target of 100 T a year. Around 400 farmers are on a waiting list for Ecotrust support, which is popular because of the access to finance it gives, the flexibility of its technical specifications to match local context, the technical assistance it provides and the fact that they can start small. Other benefits are the low risk nature of the contracts, careful controls against leakage and to ensure permanency and the trickling out of carbon revenue paid ex-ante over ten years to farmers through a co-operative.

There has been a steady build of buyers for the carbon produced and outlook is good now that resalers are buying the credits. Ecotrust are planning to expand the project beyond the three districts in which it operates and are seeking donor support to build additional benefits for the farmers and the economy by developing supply chains to the private sector for forestry products such as cashew nuts and gum Arabic. Given sufficient growth, the process and administration of Plan Vivo can be self sustaining.

Alongside Ecotrust there are several credible and capable organisations working on development of carbon markets for sustainable development. Most notable amongst these are the Ugandan Carbon Bureau and the Katoomba Group who together are launching a Ecosystem Services Incubator with support from multiple donors (including DFID) via Forest Trends. The incubator initiative should tackle some of the existing barriers to carbon investment in Uganda through its goals to:

- Increase benefits to communities from ecosystem services markets by increasing the supply of good projects
- Leverage new investment flows, demonstrating that community ecosystem services projects can provide attractive investment returns
- Catalyze innovation and methodological development, including a focus on REDD, water markets, and bundled services
- Strengthen regional institutional capacity to access markets and develop viable projects
- Build an aggregation model to efficiently support a range of small-scale producers

The Ugandan Carbon Bureau who are also very active in generating political awareness around climate change issues consider funding for the incubator to be insufficient and suggested that additional support was required from DFID Uganda to achieve these goals.

Box 6: Reducing Emissions from Deforestation and Degradation (REDD)

Deforestation, mainly conversion of forests to agricultural land, continues at an alarming rate of approximately 13 million hectares per year (for the period 1990–2005, FAO). Deforestation results in immediate release of the carbon originally stored in trees as CO₂ emissions (with small amounts of CO and CH₄), particularly if the trees are burned. Deforestation is the cause of some 20% of the greenhouse gas emissions globally. Therefore Reducing Emissions from Deforestation and Forest Degradation (REDD) is an important building block in the negotiations for the future climate regime beyond 2012. Following discussions at COP11 in 2005, there was agreement on the importance of the issue in the context of climate change mitigation. The COP established a contact group on this item which is initiating a process to address the issue of reducing emissions from deforestation.

The World Bank has launched a facility called Forest Carbon Partnership Facility (FCPF) to assist developing countries in their efforts to reduce emissions from deforestation and degradation by providing value to standing forests. FCPF is designed to set the stage for a large-scale system of incentives for reducing emissions from deforestation and forest degradation, providing a fresh source of financing for the sustainable use of forest resources and biodiversity conservation, and for the more than 1.2 billion people who depend to varying degrees on forests for their livelihoods. FCPF will build the capacity of developing countries in tropical and subtropical regions to reduce emissions from deforestation and forest degradation and to tap into any future system of positive incentives for REDD. In some of these countries, the FCPF will also help reduce the rate of deforestation and forest degradation by providing an incentive per ton of carbon dioxide of emissions reduced through specific Emission Reductions Programs targeting the drivers of deforestation and forest degradation.

It is unclear if Uganda has an interest in FCPF or whether it has submitted to the World Bank to be included among the pilot countries in the readiness mechanism. REDD may evolve in the future into a carbon trading mechanism similar to CDM, or deforestation may be included in CDM itself. It will be important for Uganda to closely follow international developments.

4.3 Biofuels

There is significant and well justified concern regarding biofuels in East Africa. The UK government's Gallagher report and a separate piece by Oxfam GB¹³ implicates biofuels in food insecurity for 100 million people globally, biodiversity loss, a 30% increase in food prices and suggests they have negligible benefits or dis-benefits in terms of carbon emissions¹⁴. There are no biofuel plantations at the moment in Uganda, at least not officially; however there is investor interest and land has been licensed. There was also much discussion about the intended end use of outputs of recent large scale and controversial investments in sugar cane, palm and sunflower plantations which were originally planned to supply edible oils and sugars but which have the potential to be diverted to fuel production.

Uganda has no policy or technical guidance on bio-fuels and it is suggested that these are required as a priority. Controlling the potentially negative impacts of investment in biofuels will require robust environmental regulation by NEMA and its partners at local government level. Improved rigour in the review and approval of Environmental Impact Assessments and the monitoring and enforcement of operating conditions are also a priority, the latter universally seen as an aspiration rather than reality at the moment in Uganda. NEMA and others requested support to strengthen this aspect of environmental governance.

5. International Negotiations

Uganda has actively participated in international fora on climate change, including as Vice President of the COP Bureau and as a member of the CDM Executive Board. Negotiations are led by the Department of Meteorology where technical understanding is strong but workload exceeds resource allocation. They complain of underrepresentation at international negotiations, where sometimes one or two representative from Uganda compare to nearly one hundred equivalent delegates from the UK or US. They also suggest that the Ministry of Foreign Affairs, with expert negotiation skills should lead Ugandan representation with the DoM in a technical advisory role, but that funds weren't available to support such an arrangement.

The major issue upon which the Uganda negotiators require a stronger hand is in pushing for much more meaningful commitments around emission reductions. Alliances exist to push for this with Small Island Developing States and a pan-African grouping but the latter is weakened by the influence of oil producers. A need for support to strengthen Uganda and less developed countries voices at the negotiating table was expressed and DFID invited to support a proposal for meeting that need which has already been submitted to UNITA (NB. Not available at the time of writing but being sought out). Supporting Uganda in negotiations is an explicit focus of Danish support.

¹³ Another inconvenient truth: how biofuel policy is deepening poverty and accelerating climate change, Oxfam Briefing Paper 114, June 2008

¹⁴ The Guardian, Thursday June 19, 2008

6. Other stakeholders

6.1. Non-Governmental Organisations

Amongst both international and local development and environment NGO's climate change is emergent as a key issue, with programmes coming on line or imminent. Of the international NGO's Oxfam have established a leadership role through a piece of research, publication and video '*Turning Up the Heat: Climate Change and Poverty in Uganda*', a powerful advocacy tool for focusing political attention on the issues. They are also attempting to form a coalition of civil society organisations in Uganda to enable a strong united voice.

IUCN are also well placed to act on climate change, a new thematic area of focus for them with programmes on the issues under development to begin in 2009. They have been involved in the development of Climate Change Risk Assessment Tool with Stockholm Environment Institute but this has not yet been applied in Uganda.

Local NGO's, most notably Environmental Alert, Uganda Coalition for Sustainable Development, UWASANET, Nature Uganda, National Association for Professional Environmentalists (NAPE) and Ecotrust possess an impressive level of technical and political understanding of climate change in Uganda and responses to it. Their track records reveal ability and there is willingness, given funding to take on key roles in supporting an effective response to climate change challenges. In particular they can conduct research to develop evidence based advocacy, can identify and pilot adaptation responses, can communicate with citizens and other civil society groups and begin to hold government to account for the efficacy of its response. Civil society has not been invited yet to participate in the PEAP revision process, an oversight, not least given the capabilities around climate change issues they can bring.

6.2 Research bodies

Although there are pockets of research and development on climate change issues there was universal agreement from stakeholders that a much stronger role for research around a nationally mediated and prioritised research agenda was needed.

DFID recently sponsored a well regarded conference on Climate Change and Groundwater in Uganda, held in June 2008 and well attended by national government (the Ministers of Water and Environment, several Members of Parliament and many Ministry of Water and Environment employees), donors, NGOs and national and international academics. Other ongoing or planned activities include the hosting of an Africa Climate Change Initiative Story by Makerere University. The challenge however is to ensure that the research needs to enable Uganda to respond effectively are identified, prioritised and resourced, rather than Ugandan research capacity being drawn down to collaborate on, often disparate, foreign lead research which lacks rigorous dissemination in Uganda and answers externally set research agenda's. The National Agricultural Research Organisation, the Ministry of Water and Environment and senior representatives at Makerere stressed an urgent need for a research prioritisation exercise to take stock of current understanding and identify gaps in knowledge.

In terms of engaging Ugandan policy makers the Uganda National Academy of Sciences are working on a promising scheme to pair MP's with scientists, modelled on a UK scheme with

support from UK Parliamentary Office of Science & Technology and Royal Society. This could form an effective part of engaging policy makers in climate issues.

6.3 Private Sector

The only private sector initiative linked to climate change in Uganda is a Public-Private Partnership between producer organisations, Cafédirect and German Technical Cooperation (GTZ) to support adaptation for smallholder coffee producers. This dynamic collaboration is part of a 3 year, seven country initiative which works with smallholder coffee producers to identify examples of effective coping and to increase their access to financial and technical support to do so. Interestingly for DFID and given the sensitivity of the coffee crop in Uganda, this work aims to identify measures which can be taken by smallholders themselves or which need to be undertaken or funded by others, perhaps at a macro scale in order to enhance the resilience of the coffee supply chain to climate change.

No other examples of planning for climate change adaptation were forthcoming during the scoping mission and no coordinated action within the business community was evident, despite engagement of the private sector being widely acknowledged as a key aspect of effective adaptation and mitigation.

7. Development Partner support

Climate change is emerging as a priority for many donors, either because of the political imperative to be seen to be acting on the issue or in response to in-country demands. Although some donors are already channelling significant sums into climate change, coordinated action is not yet evident.

Uganda's Joint Assistance Strategy, launched in 2006 represents a significant step toward meeting the aspirations of the Paris Declaration on harmonisation of aid. It provides for rational partnership and coordination between 12 of the largest bilateral donors to Uganda and more efficient and effective interaction with the Government. Although the UJAS is concerned primarily with the processes of development assistance, it provides thematic focus on cross cutting issues facing Uganda. Climate change is absent from these, but given the growing calls for individual donor countries to respond to climate change, there is an evident emerging need for stronger collaboration between partners to avoid the well documented pitfalls of earlier, disparate development support. Responding to this need elsewhere, for example, in Tanzania, donors are developing new processes and systems to coordinate support on climate change which is something which Uganda could learn from.

One of the mechanisms supporting the UJAS is the formation of Development Partner /Sectoral Working Groups which are intended to facilitate joined up donor thinking and support to specific sectors. Representatives of the donor partner and sector working groups for Environment and Natural Resources acknowledged that no clear leadership had emerged within or by the group on climate change and that this was something which was needed. The DPG on Water and Sanitation had begun to develop activity around climate change, in the form of support to a thematic team on the issue but nothing tangible has emerged yet. There are plans afoot to merge these two sector working groups in the future, which may precipitate the strength of leadership and coordination required. Notwithstanding that, there will be a requirement to reach into other sectoral groups to support an effective response -

although there was an assumption that this would be facilitated by the National Development Plan.

Examples of development partner activity in relation to climate change include:

The World Bank: Responding to climate change is an emerging priority for the Bank and they expressed a willingness to lead on the issue within the donor community in Uganda. They are recruiting a full-time officer into Uganda to work on environment and climate change and they will be backed up with facilities and resources.

The World Bank have recently partnered with the African Development Bank to conduct consultations during May and June 2008 with stakeholders including national policy makers in Africa on its Concept and Issues Paper "Making Development Climate Resilient: A World Bank Strategy for Sub-Saharan Africa".

The bank are also supporting a major initiative on Sustainable Land Management which has strong linkages with climate change and have been supporting activities around CDM, in particular an 18 district initiative with NEMA to capture emissions from decomposition of municipal waste.

African Development Bank: In Partnership with the World Bank they have been conducting consultations in African in 2008 on their own strategy paper: "Climate Adaptation Strategy: Approach Paper".

UNDP: Climate change is emerging as a major corporate issue for UNDP and a new position is being established in the country office on environment which it is hoped will strengthen their voice on climate change issues. They are also supporting a US\$ 3.6 M programme around Sustainable Land Management in the Cattle Corridor - whilst not specifically an adaptation initiative, should deliver significant benefits in terms of reducing vulnerability to climate shocks.

UNDP have also been supporting the Office of the Prime Minister on disaster risk reduction and management. A policy on the issue has been proposed to cabinet, which includes provision for improving the national response to climate related disasters.

UNEP: is supporting the Ministry of Agriculture to develop its Early Warning Unit, with US \$50 K over 6 months through its Climate Change and Development – Adapting by Reducing Vulnerability Programme (CC-DARE) and a similar amount has been allocated to support integration of climate change into the Agricultural Sector Investment Plan.

UNEP are also supporting the Katoomba Group to develop initiatives around REDD, and providing support through the Poverty Environment Initiative to NEMA to integrate climate change into the NDP and will be looking to expand their personnel base on climate change to make a fuller contribution to the Donor Partner Group.

The Royal Danish Embassy: The Danish Embassy have initiated several avenues of support and are the most active of the donors in supporting Uganda on the issue of climate change. Specifically this includes:

- Support provided via the JWSSPS where they are funding work on the vulnerability of water resources to climate change
- A package of around US\$ 1.5 M over 4 years to support the establishment and operations of a National Climate Change Secretariat within the Ministry of Water and

Environment. This unit will comprise a team of 3 professional officers and a Director, reporting to a new multi-sectoral Climate Change Policy Committee to be chaired by the Permanent Secretary. The body will be “responsible for the coordination of all climate change efforts in the country and will improve the country’s ability to tap the opportunities presented by the climate change problem”. Its functions will be:

- To raise awareness on climate change at policy level and in Uganda generally
 - To prepare adaptation and mitigation plans for climate change
 - Liaise with the UNFCCC secretariat and advise government
 - Act as the Focal Point for UNFCCC, coordinating implementation of UNFCCC and the Kyoto Protocol including development of policy
 - To provide assistance to line ministries and sectors in the preparation of strategies to address the climate change challenge
 - To identify capacity building needs and to mobilise resources to address such needs
 - To coordinate and implement CDM projects; negotiate purchase agreements on CDM projects; to approve CDM projects; develop CDM operational guidelines and approval procedures; technical assistance to CDM project developers; maintain a register of CDM and keep track of certified emission reduction units
- A further US\$ 2 million which is earmarked for the development of a national strategy on Climate Change; to support consideration of climate change within the National Development Plan and to support Uganda in its international negotiation efforts, in particular to see that it is better prepared for COP 15 (the design of this package is ongoing).

Norwegian Embassy: Climate change is emerging as a major priority for the Norwegian government which has committed to becoming Carbon Neutral by 2030. Their support so far has mainly focused on mitigation with support to the Forestry sector, including a 4 year programme supporting the Sawlog Production Grant Scheme. They are also supporting efforts on CDM within Uganda which has involved missions and workshops, although they see problems in generating capacity and understanding on the supply side and navigating the difficult bureaucratic processes. They also mentioned a significant commitment of funds at Bali for large forestry projects and REDD initiatives, half of which they will be channelling through national programmes.

Belgian Embassy: Has been active on climate change and has been supporting the Department of Meteorology directly although details aren’t clear of the nature and scale of this support.

All development partners expressed a need for stronger leadership and better coordination on climate change issues and some expressed concern that maintaining the status quo – in terms of the response by both GoU and donors - was dangerous. Already there are signs that disparate donor supported activities on climate change are risking perverse outcomes, both in terms of overloading the limited expertise on climate change within government and initiating a new and potentially damaging circus of workshop culture on the issue¹⁵. Informants

¹⁵ Several workshops covering similar issues, inviting similar delegates but funded by different donors were mentioned. Workshop culture is recognisable to all working in development in sub-Saharan Africa. Because they offer often lucrative attendance and travel allowances, workshops tend to be sought by government officers and others as a means of supplementing low public sector salaries. Research has linked workshop culture to low workplace motivation and creativity (Hepworth, unpublished). There is a danger that the cross-cutting nature of climate change will mean that the

believed that initiative within the donor community could instigate political leadership within the government of Uganda. The engagement of DFID in climate change issues was universally welcomed, with specific reference made to its credibility and influence as a donor partner in Uganda and its reputation as a leader in harmonisation of donor support.

8. Climate change screening

Bilateral and multilateral development agencies, including other DFID country offices have in recent years begun a process of portfolio screening on climate change. Such exercises involve systematic examination of an agency's activities, policies, programmes or projects to ascertain:

- The risks which climate change poses to the desired outcomes and deliverables of projects and programmes and how to contain such risks;
- The vulnerability to climate change of the communities, ecosystems or other beneficiaries of aid;
- The possible effects of programmes and deliverables on the vulnerability of communities or ecosystems to climate change – that is, do programmes unintentionally push recipients into a more vulnerable state?
- The extent to which existing development initiatives already consider climate risks or address vulnerability to climate variability and change;
- To identify opportunities for incorporating climate change explicitly into future projects and programmes.

Some have also examined activities from a mitigation perspective, to identify where contributions to green house gas emissions are made either directly or indirectly and how these can be reduced.

Such screening exercises were recommended by the Commission for Africa Report and urged within the G8 Gleneagles Plan of Action. A range of tools and approaches have been developed to support systematic assessment of the relevance of climate change to ongoing and planned interventions – to climate-proof development co-operation¹⁶. Klein et al. (2007) at the Tyndall Centre review screening activities to date and note that they are useful for developing a more sophisticated understanding of the complex relationships that determine vulnerability and the adequacy of adaptation responses. They suggest some of the factors which contribute to effective screening and these include that screening should:

- be considered a process rather than a product;
- use lessons from earlier screenings and experiences of using tools such as Environmental Impact Assessments, Strategic Environment Appraisal, Integrated Assessment Techniques

multi-sectoral workshop is the location of choice for addressing the issue – and an associated risk that resources will be drained away from effective action.

¹⁶ such risk screening methodologies include the DFID Environmental Screening Note (ESN); EIA Directive – guidance for t screening; World Bank – EIA and Adaptation screening tools, ADAPT; ORCHID – Climate change adaptation methodology; Danida Climate Change Screening; UKCIP/AEA - Climate change adaptation methodology; Tear Fund/ IADB– Disaster risk assessment; Community Risk Screening Tool – Adaptation and Livelihoods CRISTAL

- learn from attempts to mainstream other cross-cutting issues such as gender;
- utilise the experience of responses to past climate variability;
- be coordinated with ongoing processes
- integrate medium and long term needs as well as immediate priorities.

Screening DFID Uganda's portfolio is beyond the scope of this piece of work; however it is recommended that the country office conduct such an exercise, perhaps in the process of reviewing the country strategy. Learning from the experiences of DFID Kenya, where screening techniques were piloted and outputs of more recent work provide a progressive platform for addressing climate change, may be useful.

9. Conclusions and recommendations

This scoping mission confirms that Uganda is highly vulnerability to climate change and climate variability. Recent floods and droughts have demonstrated how tightly bound Uganda's economy, the wellbeing of its people and climate are. As existing high levels of climate variability continue and conditions become warmer and possibly wetter because of human induced climate change there are risks of catastrophic impacts on infrastructure, agriculture, the environment and ecosystems. In conjunction with increasing pressure on natural resources, these threaten to halt or reverse Uganda's development over the coming century. It will undoubtedly be the poor who feel these impacts the hardest.

Climate change in Uganda has implications for health, water, infrastructure, environment, agriculture, fisheries, industry, tourism and the economy and as such requires a concerted and coordinated adaptation response. Although climate change is rapidly gaining importance on national agendas and disparate activities on climate change are emerging, in part through response to the international agenda and the UNFCCC, action by government to date falls short of what is needed to climate-proof Uganda's development trajectory. The uncertainty of climate change impacts is often seen as a barrier to adapting to climate change and institutions in Uganda, such as the Ministry of Water and Environment, often do not have the capacity to assess or respond to this uncertainty. There is a need for capacity building on climate change issues in general but also specifically on impacts modelling and how to deal with uncertainty to achieve successful adaptation. This will differ by sector but is likely to include mechanisms such as maintaining flexibility and the ability to respond to surprises, assessing robust adaptation decisions (that are robust to a variety of climate change futures) and building the resilience of social and ecological systems.

Pockets of technical excellence exist, but alongside explicit capacity constraints in terms of resources and personnel, there are less obvious but equally restricting tacit constraints to effective action such as confused mandates, dysfunctional arrangements for inter-agency working, poor institutional incentives, competing policy-making priorities, and a workplace culture which rewards passive workshop attendance over pro-active action. As well as adding to the challenges of developing an effective response to climate change, these issues contribute to weak institutions, such as those for environmental governance which in turn heighten Uganda's vulnerability to climate change. Strong leadership with the power to influence across the sectors, and determination to tackle these constraints will be required to respond effectively to climate change and at the moment that leadership is lacking.

Strong leadership is also needed within the development partners on climate change. Donors are beginning or gearing up to support climate change initiatives, in part to service political

imperatives in the north rather than articulated demand in Uganda (although during the course of the meetings for this study demand for donor, specifically DfID support was expressed). Despite the development of a Joint Assistance Strategy, donor action on climate change has to date been disparate and uncoordinated and has bypassed coordination mechanisms such as sectoral working groups, which themselves have yet to develop a collaborative response on climate change issues. Uncoordinated action threatens to stifle the existing capacity on climate change in Uganda and to produce damaging parallel initiatives which may add to the challenges rather than ease them. Nevertheless, positive action is underway, most notably by the Danish who are leading with several initiatives, in particular a package of around US\$ 1.5 million over four years to establish a National Climate Change Secretariat or Climate Change Unit in the Ministry of Water and Environment and a proposed US\$ 2 million to mainstream climate change into planning and develop a national strategy. Whilst the Danish support is clearly needed, it is largely process focused and there is little financial commitment by donors to support adaptation on the ground at the moment.

Climate change mitigation through the Clean Development Mechanism and Voluntary Carbon Markets has had a limited impact in Uganda, although it is thought there is potential for Uganda to benefit from these in the future. Constraints such as high transaction costs and limited indigenous capacity are being tackled through a number of initiatives, but the situation should be monitored closely to ensure that Uganda reaps real benefits from these mechanisms.

Civil society with support from international NGO's has the potential to play an important role in supporting an effective response to climate change in Uganda. With increased support from donors activity within civil society could be vibrant and productive, particularly through constructive scrutiny of the adequacy of the government's response and development of adaptation and mitigation case studies. There is an urgent need to identify national priority issues for investigation to support an effective response within Uganda and such research and knowledge generation is an area that civil society, given funds, can support on.

That Uganda is in the process of planning how to progress its development goals over the next 5-6 years, is a valuable opportunity to ensure that the implications of climate change are considered early and adaptations are made to moderate damage and to exploit potential benefits. Given the relatively rapid timescales of significant climate changes, such as a potential rise of 1.5°C in mean temperature over the next 12 to 22 years, the rate at which adaptation responses are planned and implemented becomes imperative. However, the current mechanisms for consideration of climate change in the planning process for the National Development Plan are flawed and conspire against the sophisticated level of multi-sectoral deliberation which is required. Furthermore, all those organisations involved in the preparation of the national development plan and those observing the process requested technical assistance to support integration of climate change, in part because it is a new issue for Uganda and no experience exists of how best to approach the challenge.

In summary, to strengthen Uganda's response to climate change the scoping study identified the following needs:

Research and knowledge:

Quantification of future climate change impacts in Uganda and assessment of uncertainty to galvanise political action and clarify adaptation responses. This will require increased capacity in terms of financial, physical and human resources in the following areas:

- i) the production, assessment and interpretation of regional climate change scenarios relevant for Uganda
- ii) modelling of climate change impacts and integrated assessment
- iii) clear communication of climate change impacts and uncertainty in those impacts to a diverse user community. The UK Climate Impacts Programme (UKCIP) provides a good model of a programme that addresses these areas.

Research needs assessment and gap analysis to identify prioritised research agenda supporting Ugandan response to climate change.

Resources for research and action in Uganda by civil society and others, including academic institutions, exploring adaptation responses and providing evidence based advocacy to drive institutional incentives

Leadership and coordination:

Support for strong political leadership and a coordinating mechanism with sufficient capacity, authority and reach across government including regional institutions such as NBI and LVBC.

Development of leadership and coordination mechanisms within the development partner community

Technical assistance:

On multi-sectoral planning for adaptation, robust responses to climate change uncertainty, effective inter-agency working, emergency planning and improved environmental governance and water resource regulation

On incorporation of climate risk screening into budget allocation by treasury

For development of a robust policy and regulatory response on biofuels

Monitoring:

Of developments in CDM and carbon markets to ensure that they begin to deliver real benefit for Uganda, and receive the support that is needed

Of donor efforts to support an effective response to climate change within the Government of Uganda, to identify risks of parallel initiatives and to ensure that adequate resources and technical assistance are available when needed

Resources and finance:

To enable Uganda to strengthen its voice at international negotiations on climate change

To fund effective adaptation on the ground and effective operation of a national coordination process

Although other donors are already attempting to meet some of these needs, most notably Danida, there is a strong case and a keenly articulated demand for DFID intervention. The most appropriate way of meeting this demand would be to initiate the following mechanisms:

1. Funding support to civil society and research organisations to generate an evidence base for effective adaptation, pro-poor mitigation and to hold government and donors to account for the adequacy of responses to climate change.
2. Development of a fund to 'grease the wheels' of an effective response, which can be drawn down to meet reactive needs as they become evident, including a contribution to resourcing the new National Climate Change Secretariat.
3. Provision of a technically competent and informed 'watching brief' to perform a multiple role of technical assistance, facilitation of donor and government coordination, and monitoring and evaluation of the response to climate change to highlight when additional intervention is necessary.
4. Engagement at a senior government level to facilitate political leadership and Ugandan ownership/buy in to the above mechanisms.
5. A screening exercise of DFID's wider portfolio

Such a range of mechanisms fit well with DFID's international policy response to climate change and the Africa Division Action Plan on Climate Change launched earlier this year. The objectives of that plan are to mobilise additional resources to tackle climate change; accelerate adoption of cost effective adaptation responses; encourage appropriate low carbon development/mitigation measures; develop a better and more accessible knowledge base and to ensure a much stronger African voice in international debates.

In order to deliver these mechanisms, DFID Uganda could also exploit promising opportunities for collaboration across UK government. An integrated response could engage the British Council, the Foreign and Commonwealth Office and DEFRA.

There is a specific opportunity to collaborate with DEFRA through its Environment Agency. The Environment Agency is the environmental regulator of England and Wales, Europe's largest, responsible for environmental governance, water resource management, risk reduction and management of climate related disasters and for coordinating inter-agency, multi-stakeholder responses to climate change. Since 2001 the Environment Agency's International Programme has sought to share its experience with sister agency's in developing countries. Notably this has included through the DFID supported REMAK programme in Kenya which resulted in effective operationalisation of environmental regulation there for the first time. There is a real opportunity to draw down Agency expertise to support a robust response to climate change in Uganda. The Agency themselves have prioritised support to East Africa and on climate change and have a strong existing relationship with NEMA in Uganda. A recent independent review of the Agency's international programme, which has included three short term capacity building placements from NEMA into the Environment Agency concluded that the nature of the support they provide is highly effective in mobilising action, long term institutional change and good value for money when compared to other modes of technical assistance. There is an existing and unmet demand from within Uganda to collaborate with the UK Environment Agency – the Agency's international programme depends on external funding from organisations like DFID and this has not been available to date to scale up a partnership with Uganda.

DFID Uganda should explore the opportunity of supporting the long terms deployment of at least two appropriately experienced Agency officers into Uganda at the invitation of the Ugandan Government. Agency staff have led inter-agency efforts around climate change

adaptation in the UK for several years and have the relevant skills and experience to support multi-stakeholder collaboration on climate change, in particular, its integration into the National Development Plan. A second officer should be deployed into NEMA to support enhanced environmental governance across government, in particular in the areas of water resource regulation, environmental impact assessment, emergency planning and compliance and enforcement of environmental law.

Whilst providing vital technical assistance and fast tracking integration of climate change into the National Development Plan, such a personnel resource could also represent UK government within relevant sector working groups and provide the eyes and ears of DFID, gauging the efficacy of the climate change response and signalling when additional interventions or resources are required. Although careful collaboration with donor partners and government would be needed to ensure that this assistance is complimentary to existing initiatives. Based on discussions during the scoping mission, DfID engagement will be universally welcomed.

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Appendices

Scoping Mission: DFID Engagement in Climate Change Uganda

Terms of Reference

Objective

The objective of this mission is to provide DFID Uganda with an overview of climate change characteristics, identifying national priorities, providing a summary of current and planned initiatives and providing information to the review of DFID support to Uganda (scheduled for the third quarter of 2008).

Recipient

DFID Uganda is the primary recipient, and will benefit from both the processes and outputs of the mission. This mission will provide DFID Uganda's Head of Office and senior management with a summary of country-specific information on climate change. This can be used (if necessary) to develop a prioritised list of intervention options for possible inclusion in future DFID programming following the review of DFID support in Uganda and within subsequent delivery plans. It will also enable DFID to respond more fully internal requests for climate change information (especially questions from ministers), set the framework for future assessments of the DFID programmes climate change adaptation strategy and enable DFID to interact more confidently with national stakeholders on climate related issues.

Method and Approach

The assignment will comprise a literature search, an in-country visit (including wrap-up presentation) and time to complete a short summary of findings and recommendations. The literature search and the report writing will take place at the home base of the consultant, and the in-country visit will be co-ordinated (and attended by) DFID Uganda Growth Adviser. The in-country visit will include meetings with DFID managers and programme staff, meetings with national stakeholders (government officials, private sector stakeholders, civil society representatives, development partners, projects and programmes). In order to frame the options and inform the recommendations, a number of questions may be posed during all phases of the assignment as below:

- To what extent is climate change adaptation integrated into national policy and strategy development including planning processes?
- Do Uganda's donor partners have a coordinated response to climate change?
- To what extent are climate change considerations being taken into account by the drafters of the forthcoming National Development Plan?

- What range of climate change knowledge is available to (and utilised by) GOU bodies that are mandated to address climate change adaptation?
- To what extent is Uganda active in regional or international discussions on climate change, adaptation and mitigation?
- What existing mechanisms do people in Uganda, (particularly the vulnerable) use to adapt to current climate extremes (floods, droughts etc.) and humanitarian shocks (e.g conflict in the North)? What lessons (published or anecdotal) are being learned from these adaptive approaches to short-term events, and how can these be extrapolated to deal with anticipated long term climate related changes in the future?
- What measures are stakeholders (government as well as formal private sector players) taking in order to manage risk of climate change and adaptation with respect to infrastructure and commercial investments (for example dams and hydropower), export-related fishing and agriculture, social sectors (health and education), and physical transport infrastructure, etc.
- How and why are carbon markets (voluntary carbon offset markets, clean development mechanism, BioCarbon fund and the Community Development Carbon Fund) working in Uganda, and what potential exists for pursuing development via carbon funding alongside conventional funding?

Outputs

A short presentation of initial findings to senior DFID management (before leaving Uganda) and a short report containing the findings and recommendations within two weeks of the in-country visit.

Timing

The assignment, including in-country visit and submission of the report should be complete before the beginning of August 2008.

Inputs

One consultant, spending [six] days in Uganda, plus two days literature review and two days to write the final report. Logistical support (arranging meetings, etc.) will be provided by DFID Uganda.

Co-ordination and DFID contact

The Growth Adviser (who has responsibility for climate change) will be the primary DFID contact point and will represent DFID Uganda for the assignment. It is likely that he will be available during the in-country phase of the assignment and will accompany the consultant where possible.

Background

DFID, along with other bilateral and multilateral donors, currently jointly supports the Government of Uganda's implementation of the Poverty Eradication Action Plan

(PEAP). DFID Uganda is reviewing its country plan. Climate change one of four ministerial priorities, and our country plan must include an appropriate response to the challenges of climate change.

Preliminary discussions suggest that there is little understanding of the importance of climate change by the Government of Uganda, and little planned activity by development partners.

The Government of Uganda itself is currently preparing a five-year National Development Plan (NDP), which will succeed the third PEAP, and continue addressing systematically the capacity constraints that stand in the way of faster and better results in many areas. This revision is expected to be complete by the end of 2008. It is hoped that the results of this scoping mission can help to influence the contents of the NDP, and development partners' response to it.

Supporting Documents

A number of key documents are available online:

- 5-year National Development Plan for Uganda: PEAP Revision Process 2007/8
www.finance.go.ug/peap/docs/revision_process.pdf
- Uganda Joint Assistance Strategy:
www.Dfid.gov.uk/pubs/files/joint-assistance-strat-uganda.pdf
- Uganda National Adaptation Programmes of Action:
<http://unfccc.int/resource/docs/napa/uga01.pdf>
- Initial National Communication of Uganda to the Conference of the Parties to the United Nations Framework Convention on Climate Change
unfccc.int/resource/docs/natc/uganc1.pdf

DFID Uganda's Performance Framework and Deliver Plan (2006/07 – 2008/09) is included as appendix A.

A short investigative paper written by DFID Uganda's previous growth advisor (Adrian Stone) in March 2008 is included as appendix B.

List of persons met

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