Actual and Potential Weather and Climate Information Needs for Development Planning in Malawi: Results of a Future Climate for Africa Pilot Case Study

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Executive Summary

There is growing interest about how climate information can be used to better inform decision-making across a range of sectors and socio-political and environmental settings. To investigate this across sub-Saharan Africa, the Department for International Development (DFID) through the Climate and Development Knowledge Network (CDKN) commissioned four pilot case studies in different countries to elicit the current and potential future use of weather and climate information in policy and planning. This report presents the findings from the Malawi case study that focused on national level policies, policy makers and decision making processes. The study was led by Kulima Integrated Development Solutions and the University of Leeds. To ensure complementarity with ongoing country processes around mainstreaming climate–resilient development, this report focuses on three cross-cutting sectors of social protection, food security and disaster risk management.

An explanatory note on time frames used in this report

This report mentions time frames in two dimensions; time frames for decision-making and time frames for weather and climate information. Neither is precisely defined in the literature, but at the same time it is not possible to standardise meanings as to do so would go against typical thinking in the policy-making and climate science communities. Instead, to avoid confusion, we use the following:

For decision-making (policy-making and planning), short-term refers to a timeframe of less than one year, medium-term refers to 1-5 years, and long-term refers to more than 6 years.

For weather and climate information, sub-annual is used to refer to a year or less (e.g. seasons), short-term refers to 1-5 years, medium-term refers to 6-20 years and long-term refers to more than 20 years.

The report addresses the following objectives:

1. to review the medium- and long-term decision-making process and institutional framework at the national level in Malawi across social protection, food security and disaster risk management sectors;
2. to highlight the existing use of weather and climate information in Malawian policy-making;
3. to identify the potential application of weather and climate information in Malawi's national planning and decision-making, taking into account the science that is currently available, as well as a "wish list" to direct scientific development;
4. to assess how this pilot project's findings support other ongoing initiatives in Malawi, namely the National Adaptation Plan (NAP) development, and the Global Framework for Climate Services (GFCS) project to improve the quality and quantity of climate services.

The objectives were achieved through: an analysis of existing policies and institutional structures (Objective one); semi-structured interviews with both government and non-government stakeholders that explored the nature of decision-making processes and policy-making across a variety of sectors and the extent to which weather and climate information is currently utilised (Objective two); a national stakeholder workshop of government representatives from the different departments and ministries concerned with the cross-cutting themes, which was designed to identify the potential application of weather and climate information in Malawi's national planning and decision-making

(Objective three); and a discussion of how findings could link with other initiatives nationally (Objective four).

The longest current timeframe for political decision-making in Malawi is over a 10-15 year time horizon and is led by the Department of Economic Planning and Development. Sectoral planning processes currently take place on a shorter timeframe of up to five years, and are mainly concerned with the implementation of the Malawi Growth and Development Strategy. There was no evidence of ministries using existing medium- or long-term climate projections in their current decision-making, despite the availability of country-specific profiles, regionally-downscaled climate scenarios and the CMIP-5 projections from the IPCC Fifth Assessment Report (IPCC, 2013).

A number of perceived limitations of existing climate information were raised during the interviews and the workshop. These limitations include scale, accessibility, policy planning cycles and timing, which act to impede the use of climate and weather information in decision-making. Further consideration of such challenges and ways to address them is needed for more effective use of medium-long-term climate information.

Potential opportunities for more effectively using climate information are also identified in the report. Findings suggest potential uses for information at the sub-annual scale as well as for short-term information (1-5 years). Information on extreme events – especially floods and droughts but also strong winds and hail – was regarded as being very useful, as was the location of these extremes. Many ministries asked for multi-year (up to five years in advance) forecasts for a variety of parameters (e.g. temperature; intensity, amount and distribution of rainfall; drought). Additionally, all of the departments and ministries recognised that the short-term information that they identified above was also useful on a medium-term (6-20 years) timescale – e.g. temperature and rainfall projections for 10 years from now. For example, the Ministry of Irrigation and Water Development acknowledged that knowing changes in these parameters would be essential in the design and location of future dams.

Existing co-ordination structures for weather and climate information exist in Malawi, and certainly seem to function at national level between the Department of Climate Change and Meteorological Services (DCCMS) and other line ministries. However, several interviewees across a variety of ministries and departments noted the need for a better understanding about what climate change is and the risks it poses. Additionally, various departments reported limited capacity to understand weather and climate information. Additional capacity building and training on climate change, its potential impacts, and how to integrate short- to medium-term term climate information into existing policies and decision-making processes may be needed. This demonstrates that effective use of climate information needs both improved science and better communication of the science.

Findings presented in this report will inform FCFA (Future Climate For Africa) but also be of use to DFID Malawi in directing their programming, as well as to the Government of Malawi (GoM) in identifying opportunities for synergies and improved use of weather and climate information in their national policies and commitments under the United Nations Framework Convention on Climate Change (UNFCCC). Furthermore, there is further potential to link with other initiatives in Malawi and globally, for example the Global Framework for Climate Services (GFSC), a global partnership of governments and organisations that produce and use climate information and services.

Acronyms

CCA	Climate Change Adaptation
CDKN	Climate and Development Knowledge Network
CSAG	Climate Systems Analysis Group
DAES	Department of Agricultural Extension Services
DCCMS	Department of Climate Change and Meteorological Services
DFID	Development for International Aid
DoDMA	Department of Disaster Management Affairs
DRR	Disaster Risk Reduction
EAD	Environmental Affairs Department
ECHO	European Commission's Humanitarian Aid and Civil Protection department
ECRP	Enhancing Community Resilience Programme
ENR	Environment and Natural Resources
EPA	Extension Planning Area
EWS	Early Warning System
FAO	Food and Agriculture Organisation
FCFA	Future Climate For Africa
GDP	Gross Domestic Product
GFCS	Global Framework for Climate Services
GoM	Government of Malawi
IPCC	Intergovernmental Panel on Climate Change
LDCF	Least Developed Countries Fund
LUANAR	Lilongwe University of Agriculture and Natural Resources
M&E	Monitoring and Evaluation
MECCM	Ministry of Environment and Climate Change Management
MGDS	Malawi Growth and Development Strategy
MoAFS	Ministry of Agriculture and Food Security
MoEPWD	Ministry of the Elderly and People with Disabilities
MoIWD	Ministry of Irrigation and Water Development
MRCS	Malawi Red Cross Society
MTEF	Mid-Term Expenditure Framework
MVAC	Malawi Vulnerability Assessment Committee
NAP	National Adaptation Plan
NAPA	National Adaptation Programmes of Action
NCCP	National Climate Change Programme
NGO	Non-governmental organisation
PDT	Project Delivery Team
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RHVP	Regional Hunger and Vulnerability Programme
RVAC	Regional Vulnerability Analysis and Assessment Committee
SADC	Southern Africa Development Community
SWAp	Sector Wide Approach
SWG	Sector Working Group
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WB	World Bank

WFP	World Food Programme
WHO	World Health Organisation

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1. Introduction

1.1. Background

The Future Climate For Africa (FCFA) programme will build on and further the successes of the Climate Science Research Partnership by turning attention explicitly towards improving "advancing scientific knowledge, understanding and prediction of African climate variability and change on 5 to 40 year timescales, together with support for better integration of science into longer-term decision making, leading to improved climate risk management and the protection of lives and livelihoods"[1]. To provide inputs into the direction of climate science and ensure its better use in informing decision-making, understanding the varied needs and priorities of target decision-makers is critical. Recognising this, and in order to better target the nature of the FCFA programme, the Department for International Development (DFID) through the Climate and Development Knowledge Network (CDKN) commissioned four pilot case studies in different African countries to elicit the current and potential future use of weather and climate information.

The report presents the findings from one of the pilot case studies in Malawi, led by Kulima Integrated Development Solutions and the University of Leeds in 2014. It identifies climate-related information needs and decision-making priorities to inform decision-making for climate-resilient development in Malawi. Our focus is on social protection systems, food security and disaster risk management. These cross-cutting sectors meet FCFA's needs to demonstrate complementarity with existing DFID programmes and were also selected based on our assessment of the greatest opportunities in-country. Findings from this case study will both inform the FCFA programme and contribute towards addressing the already-recognised gap between the development of climate science and its effective communication for use in decision-making.

1.2. Cross-cutting sectors: social protection, food security and disaster risk management

Approaching the research across the three selected cross-cutting sectors allowed us to gain a comprehensive overview of the current landscape and to identify synergies between donor efforts in each of the areas central to our analysis. It also ensured complementarity with ongoing country processes around mainstreaming climate–resilient development, notably around climate-smart agriculture initiatives that utilise conservation agriculture (Whitfield *et al*., 2014) and in developing disaster risk reduction strategies at other scales through, for example, the development of Village and Area Adaptation Plans, and the integration of adaptation into District Development Plans (UNDP, 2014a, b). The cross-cutting sectors on which we focused are social protection, food security and disaster risk management.

1.2.1. Social protection systems

The Government of Malawi includes social cash transfers within national budgets. This is partly due to DFID-funded support dating back to the 2005-10 Regional Hunger and Vulnerability Programme (RHVP), which advocated for cash transfers as an appropriate mechanism to reduce the periodic food insecurity that Malawi has experienced in recent past (Devereux, 2002) and which remains a major

[1] Programme objectives of the Future Climate For Africa Programme, available online at http://www.nerc.ac.uk/research/funded/programmes/fcfa/

electoral and societal concern nationally (Chirwa and Matata, 2013). There is an emerging literature on the role for adaptive social protection policies, i.e. those which also consider the role that social protection plays in enabling adaptation to climate change (Vincent and Cull, 2012). These emerging theoretical debates have, however, largely been overlooked in practice, and so this project has offered an opportunity to see how social protection, such as the existing cash transfer programme, can better support climate resilience.

1.2.2. Food security

Despite the introduction of nationally-driven social protection schemes and significant agricultural investments in Malawi, food insecurity remains a reality and a key political issue (Tafirenyika, 2013; Chirwa and Matita, 2012). Currently, an input subsidy programme is in operation (with significant donor-support) for rural small-scale farmers in an attempt to support food security. Yet, for various reasons, including climate, pockets of food insecurity in Malawi remain common (Asfaw *et al*., 2014; Chinsinga *et al*., 2013). Districts that persistently experience food insecurity are those which are especially hazard-prone, suffering from droughts and floods. Particularly vulnerable districts include Chikwawa and Nsanje in the south. Food insecurity has been the case even relatively recently in 2013 and, together with rising maize prices, has led to significant concerns about enhanced poverty levels and increased vulnerability to climate variability (Simelton *et al*., 2013). The country's food security situation is assessed annually by the Southern Africa Development Programme (SADC) Regional Vulnerability Analysis and Assessment Committee (RVAC), itself an umbrella of National Vulnerability Assessment Committees, of which DFID is a key supporter. DFID has also recently established a SADC-wide programme entailing technical assistance and support for the implementation of a climate smart programme, of which food security in a changing climate is a key aim (DFID, 2014).

1.2.3. Disaster risk management

Malawi has significantly strengthened its approach to disaster risk management in recent years. Much of this has been enabled through World Bank (WB) support (under the Global Fund for Disaster Risk Reduction) and via several phases of European Union ECHO (European Commission's Humanitarian Aid and Civil Protection department) funding for disaster preparedness and response in south-eastern Africa. There is a new National Disaster Risk Management Policy in Malawi that came into being in 2013, and builds on the previous one by placing more emphasis on disaster risk reduction and preparedness. However, despite it being developed at the same time as the National Climate Change Policy, the two policies are being led by different departments (Department of Disaster Management Affairs (DoDMA) in the Ministry of Finance and Economic Planning and Development[2] for the former; Environmental Affairs in the Ministry of Natural Resources, Energy and Mining[3] in the case of the latter). Consequently, institutional factors have acted to impede collaboration and this study assessed communication channels and challenges in addressing these issues in the future.

1.2.4. Synthesis

With both the national Disaster Risk Management Policy and the National Climate Change Policy on a similar timeframe of strategy development and operationalisation, and a growing number of initiatives in DFID's other priority areas of social protection and food security, it is timely to assess climate information needs and ensure that the relevant arenas are brought together. This information will inform FCFA but also be of use to DFID Malawi in directing their programming, as well as the

[2] Until the 2014 presidential election, this was known as the Ministry of Economic Planning and Development.
[3] Until the 2014 presidential election, this was known as the Ministry of Environment and Climate Change Management.

Government of Malawi in identifying opportunities for synergies and improved use of weather and climate information in their national policies and commitments under the United Nations Framework Convention on Climate Change (UNFCCC).

1.3. Objectives and structure of the report

The objectives of this report are to:

1. review the medium- and long-term decision-making process and institutional framework at the national level in Malawi across social protection, food security and disaster risk management sectors;
2. highlight the existing use of weather and climate information in Malawian policy-making;
3. identify the potential application of weather and climate information in Malawi's national planning and decision-making, taking into account the science that is currently available, as well as a "wish list" to direct scientific development;
4. assess how this pilot project's findings support other ongoing initiatives in Malawi, namely the National Adaptation Plan (NAP) development, and the Global Framework for Climate Services (GFCS) project to improve the quality and quantity of climate services.

The objectives are met through a consultative process, based around key informant interviews with both government and non-government staff; and a stakeholder workshop of government representatives from the different departments and ministries that are variously concerned with the cross-cutting themes.

The report is structured as follows. Section 2 elaborates the methods that were employed in this consultative research. Section 3 presents the findings while Section 4 discusses the major limitations experienced during the process and outlines how they were mitigated, and section 5 draws conclusions.

An explanatory note on time frames used in this report

This report mentions time frames in two dimensions; time frames for decision-making and time frames for weather and climate information. Neither is precisely defined in the literature, but at the same time it is not possible to standardise meanings as to do so would go against typical thinking in the policy-making and climate science communities. Instead, to avoid confusion, we use the following:

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2. Methods

The first step in the process was a desktop-based policy analysis, focusing on ministry and department policies and plans as relevant to the three cross-cutting sectors (social protection, food security and

disaster risk reduction). Identifying the needs of decision-makers requires an innovative methodology as the use of weather and climate information is not well known, especially in a sub-Saharan Africa context. As a result, inquiring through interviews will be unlikely to yield useful information as you do not know what you might need in a field you may barely know exists. To overcome these issues, the study used a two-step process. Firstly, semi-structured interviews were undertaken to interrogate the nature of decision-making processes and policy-making across a variety of sectors related to social protection systems, food security and disaster risk management. The results of these interviews then informed the design of the second method – a national stakeholder workshop based around role playing and serious games, designed to reflect Malawi's decision-making processes, in an attempt to elicit needs that way. We built on our extensive network of relevant contacts across government ministries and utilised recent data gathered in reviewing climate service information (Vincent *et al*., 2014a) and data collected in earlier projects (e.g. UNDP, 2014a; Simelton *et al*., 2013; Stringer *et al*., 2010, 2012) to inform the design of a workshop and to ensure value for money.

2.1. Objective one: policy analysis by desktop review

Building on our previous analysis of Malawi's national policy statements in relation to climate change and land degradation (Stringer *et al*., 2009; 2010), we used a discourse analysis approach (Gard, 2005) to analyse major policies in which climate change adaptation is explicitly mentioned, or implicitly critical. The national policies analysed in March – April 2014 included Vision 2020; Malawi Growth and Development Strategy II (2011-16); National Climate Change Policy; National Adaptation Plan of Action; Climate Change Investment Plan; National Disaster Risk Management Policy; Agricultural Sector Wide Approach; National Water Policy 2005; National Environmental Policy 2004; and the draft National Social Protection Policy. These documentary materials were purposefully selected to provide insight into climate change adaptation planning within cross-sector policies as manifested in policy documents, plans and national programmes.

2.2. Objective two: stakeholder consultation and semi-structured interviews

Since they are the primary actors in national decision-making, the case study focussed on public sector decision makers. Previous DFID-funded research in neighbouring Mozambique demonstrates that private sector engagement in climate change adaptation and disaster risk reduction is negligible, and largely restricted to local branches of multinational corporations (Kulima Integrated Development Solutions, 2013). Although there is nascent private sector interest in the carbon market in Malawi (Stringer *et al*., 2012), and through investments in biofuels (Dyer *et al*., 2012), the current level of engagement was felt to be too insignificant to warrant widespread private sector inclusion in the research. Potential scope is currently insufficient for public-private partnerships that generate gains beyond those to the individual companies in which DFID may reasonably wish to invest. However, given the close cooperation and partnership between many donors, United Nations (UN) agencies and non-governmental organisations (NGOs) in supporting the public decision-making of government, and their insights into the nature of decision-making processes, they were also included as stakeholders alongside public decision-makers.

Identification of appropriate stakeholders to consult was undertaken based primarily on the extensive contacts of both Kulima Integrated Development Solutions and the University of Leeds arising from past work (UNDP, 2014a; Vincent *et al*., 2014; Simelton *et al*., 2013; Stringer *et al*., 2010, 2012). In-country project partners, Dr David Mkwambisi and Ms Diana Chanika, were able to supplement the preliminary stakeholder list based on their existing networks.

The preliminary stakeholder list compiled by the project team was used by the in-country partners to arrange semi-structured interviews. In general, directors were targeted for the initial semi-structured interviews. These were conducted by Professor Andy Dougill, Dr Katharine Vincent and Ms Tracy Cull during the first week of May 2014. The purpose of these interviews was threefold: firstly, to introduce the project at the appropriate level within the departments and ministries of relevance to the three cross-cutting themes; secondly, to interrogate the nature of department/ministry decision-making processes (including how these are represented in current policies and strategies) and the extent to which weather and climate information is currently utilised; and thirdly, to identify the most appropriate technical level staff to be invited to the national workshop. On the whole, these technical staff were the ones that have responsibility for some element of planning within their department or ministry; and/or are involved with existing weather and climate information communication channels. In some cases, additional stakeholders were identified through snowball sampling for semi-structured interviews. In total, 19 semi-structured interviews were held in-country in May: 12 with government staff; three with NGOs, two with United Nations (UN) agencies, and two from donors (one of whom happened to be a former director of the Meteorological Services). One with an NGO representative had to be postponed to the following week and thus took place over Skype. One additional semi-structured interview with a government representative (Department of Economic Planning and Development) took place on the cusp of the workshop in August 2014 (see Appendix A for the full list of stakeholders interviewed).

2.3. Objective three: national stakeholder workshop

A one-and a half-day workshop was held at the Golden Peacock Hotel, Lilongwe on 12-13th August 2014. From the list of appropriate participants generated during the semi-structured interviews, representatives of seven government departments/ministries were invited to the workshop: Ministry of Environment and Climate Change Management (MECCM); Ministry of Agriculture and Food Security (MoAFS); Department of Disaster Management Affairs (DoDMA); Ministry of the Elderly and People with Disabilities (MoEPWD); Ministry of Irrigation and Water Development (MoIWD); Ministry of Economic Planning and Development; Ministry of Local Government and Rural Development[4]. In most cases, more than one person was invited. Within the Ministry of Environment and Climate Change Management contingent, seven participants were invited from the DCCMS. A regional climate scientist was also invited from the Climate Systems Analysis Group (CSAG) at the University of Cape Town (to provide a regional perspective on weather and climate information that exists and/or is under development). A representative from CDKN was also invited. Actual attendees to the national stakeholder workshop are listed in Appendix B.

The process of invitations and responses to government participants followed the typical workshop protocol in Malawi as recommended by our in-country partners. Invitations were sent to the nominated people through either the Permanent Secretary or Directors for the departments. The invitations particularly mentioned the names of the nominees from the department and requested their attendance to the workshop. The nominees were also copied in on the invitation letters to ensure that they were also made aware of the dates of the workshop to fit in their work plans (just in case they did not see the invitation sent to them through their bosses and could therefore remind them). The invitation letters were both hand delivered by Ms Diana Chanika, and sent electronically together

[4] These were the names of the departments/ministries at the time of the stakeholder consultation and preparation for the workshop: many ministries were changed in August 2014 after the post-election cabinet reshuffle.

with a registration form two weeks before the workshop. Follow up calls were made in cases where the letters were not able to be hand delivered to the invited names participant to make sure that they had received the letters. Even if they had received them, however, the named participants were typically unable to confirm attendance unless their Directors or Principal Secretaries directed them to attend the workshop. By close of business the last Friday leading to the workshop, all the invited departments had confirmed that at least one or two, in some cases three, people would attend the workshop. In some cases, however, these nominated participants were not those that had been invited based on their identification in the interview process.

2.3.1. Workshop design

Although non-government staff were included in the consultation process, the decision was made that the workshop should only include public decision-makers as they are the individuals who drive the decision-making (and policy-making) process in Malawi. Analysis of the decision-making processes elicited during the stakeholder interviews showed that there are both similarities and small differences between departments and ministries. It was decided to choose and develop a role play scenario that was unfamiliar to all the participants, but had close parallels with their daily jobs, and had a similar decision-making process (Jones *et al*., 2013). The intention here was to encourage participants to consider the potential risks of climate change to different sectors, and to raise their awareness of the potential use of weather and climate information through prompts, but also to encourage them to consider additional information that would also be useful in planning decisions. Building on the role play, the next activity was a serious game based on the "Paying for Predictions" game (Mendler de Suarez *et al.*, 2012) which was designed to highlight the potential utility of forecast information and projections, whilst also highlighting levels of (un)certainty. Following on from these scaffolded activities, the intention was that participants would be able to reflect on their own decision-making processes and procedures using the insights they had gathered in order to determine what weather and climate information may assist them, and thereby generate the list of needs. The intention was that national meteorologists and climate scientists and the regional climate scientist could reflect on what is already under development (and also encourage improved linkages between producers and users for existing information), thereby reducing the long list of needs to a short list in order to inform the FCFA programme.

The workshop agenda is provided in Appendix C. The first activity on day one involved a role play scenario, where participants were required to think outside of their day-to-day decision-making contexts. It also acted as an ice-breaker with everyone sharing ideas from the start and it prompted people to consider possibilities that otherwise might not have occurred to them. Informed by the literature on serious gaming, the activity was set up to be a competition to encourage complete participation and motivate participants.

Participants were split into three groups of 3-4 people and given a scenario where they had to think about a series of potential urban planning decisions which reflected the various sectors in which they work (transport, water and sanitation, infrastructure, health, education, food security, economic planning and development, biodiversity). These sectors and decisions (and the guideline timeframe that would need to be considered, whether annual, short term 1-5 years, or medium term 6-20 years) were provided on a "gameboard" matrix. Groups were also provided with a series of cards denoting current and potential weather and climate information that may be of use to decision-makers. They had to decide the most likely climate impacts that will affect the different nature of decisions and therefore what climate information would be useful to them.

Groups were given 1.5 hours to discuss which the most valuable/ most important type of weather and climate information is for each decision, considering various time-frames and planning horizons in order to decide upon the critical source of information for each scenario (see example in Figure 1). Groups were encouraged to keep notes of their discussions and reasons for their final decisions. At the end of the activity the results were transferred onto a large grid matrix (Figure 2). Each group had to nominate a spokesperson to outline and then provide justification for their choice. In order to keep a competitive game format, each decision was scored by a judge who allocated a certain number of points based on the explanation of how the weather and climate information would be useful. In an attempt to encourage thinking "outside of the box", teams that devised their own weather and climate information, as opposed to relying on the pre-made cards, were given bonus points. More about the activity and the scoring system is provided in Appendix D. The outcome of this role play scenario was twofold: firstly it encouraged participants to think about weather and climate information and how it might be useful in different decisions made over different timeframes given the context of climate change; and secondly it elicited a broad theoretical overview of potential weather and climate information needs (which was then refined by subsequent exercises).

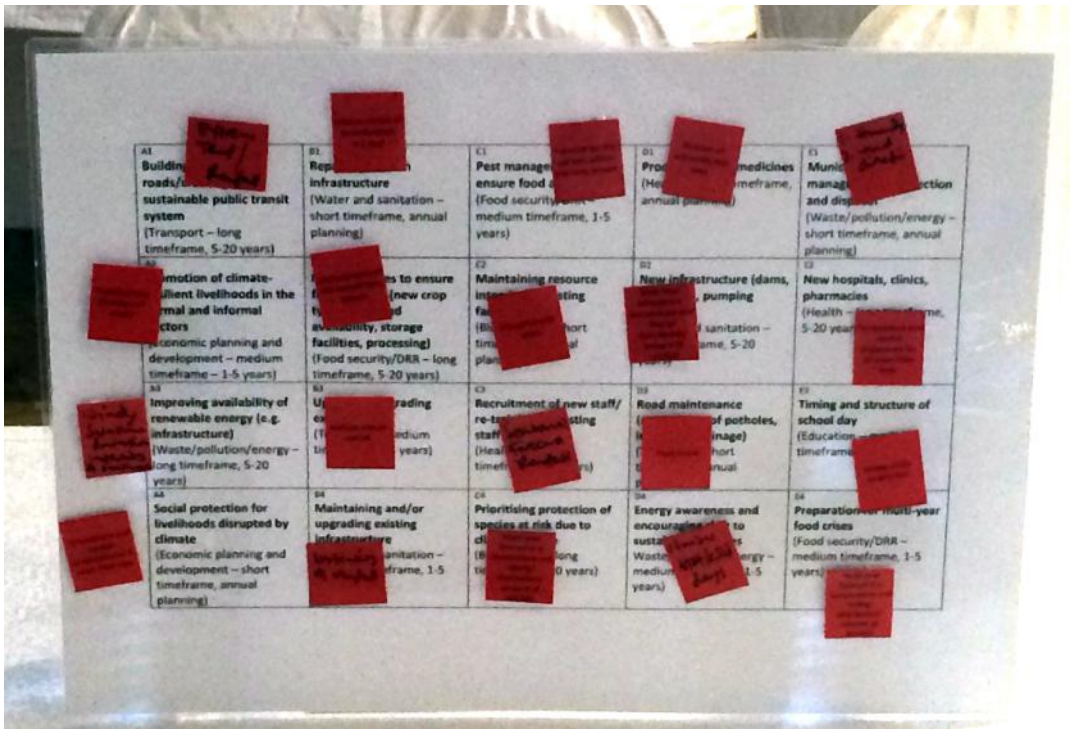

Figure 1. Grid of decision scenarios and climate information needs for urban planning decisions.

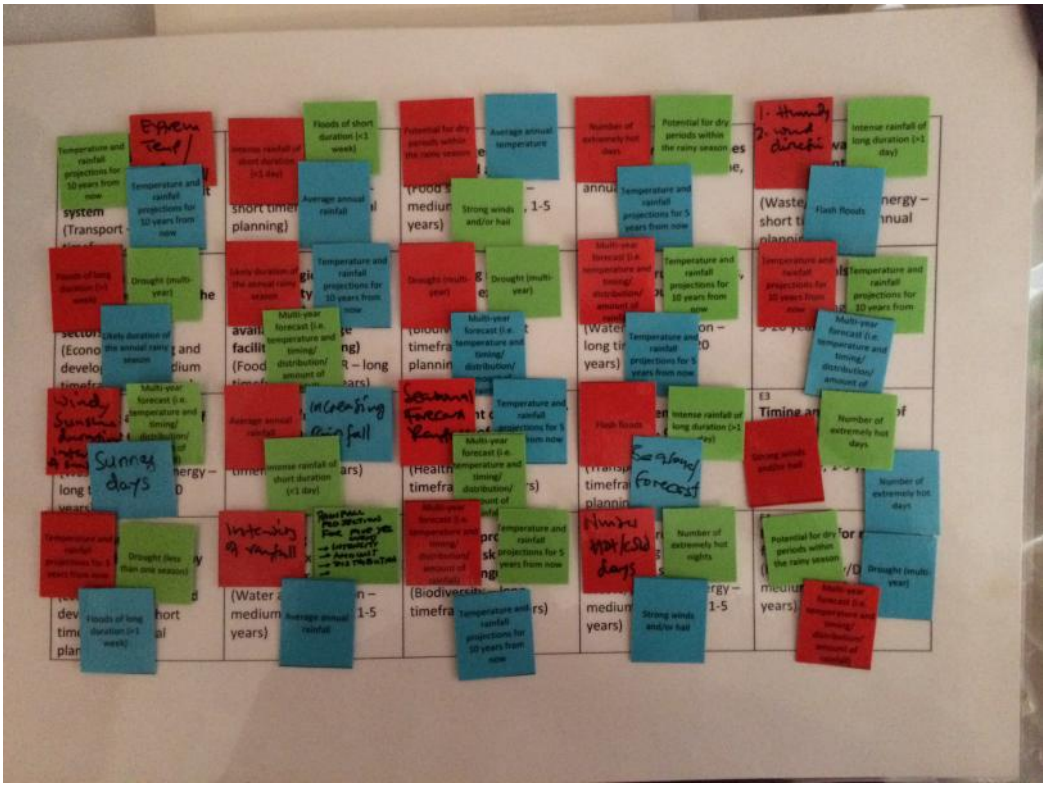

Figure 2. Large grid of decision scenarios matched with climate information needs. Each different colour represents the decision of a different group.

The second activity was based on the game '"Paying for Predictions": a game on the cost, value, and use of early warnings"' (Mendler de Suarez *et al*., 2012). The aim of the game is to demonstrate the trade-offs between early investment in risk reduction (which is also true for longer-term planning) vs. wait-and-see which might risk high costs later on. In our version we modified the aims slightly, by introducing an element of (un)certainty to see how that affected the participants' perceptions of the use, and usefulness, of weather and climate information.

Again, participants were split into groups of 3-4 people. They were asked to role play as disaster managers in different districts (thus each group had three or four disaster managers representing different districts within a region). A series of rounds of the game were played, each building upon the preceding round, to demonstrate the potential of early warning systems and preparedness to reduce the costs of a disaster. The adjudicator rolled a dice and placed it under a cup in secrecy – that represented the seasonal forecast. Each disaster manager had chips, representing resources, which they could decide whether or not to use to pay for the seasonal forecast. The group of disaster managers that could access the forecast were those that paid the most for it. They could then turn over the cup and see the number on the dice. Each disaster manager then rolled their own dice. If the group total of all the disaster managers' dice exceeded 10, there was a flood. Those districts that had paid for the early warning information stood a greater chance of assessing the probability of the total of their dice exceeding or being less than 10, and thus could plan their resources appropriately (preparation costs less than relief and rehabilitation). Several rounds of this were played in order than participants could familiarise themselves with the game and begin to make strategic choices on the utility of early warning.

The game then changed in that a new dimension was added to explore how different levels of certainty could influence the utility of early warning information into planning decisions. Whereas before the assumption had been that the seasonal forecast was correct with 100% certainty, in this case there were differential levels of (un)certainty, which were drawn randomly from a hat. 66% confidence in the forecast information meant that the actual amount of rain represented by the dice under the cup could vary by up to plus one or minus one; 33% confidence in the forecast meant that the actual amount of rain could vary by up to plus two or minus two. With this knowledge and new situation, district disaster managers not only had to decide the value of paying for the information upfront and allowing preparation rather than more costly relief, but they also had to consider how much they would be willing to pay when the information had lower levels of certainty. Full instructions for the game are provided in Appendix D. The outcome of this activity was that workshop participants understood the potential utility of weather and climate information in planning; but also that even though no future decisions are made in a context of 100% certainty, weather and climate information can still be useful.

With the first two activities having set the scene and got participants thinking about weather and climate information and the potential range of uses in planning and decision-making, the next activity in the workshop was to get participants to reflect on their learning and experience from the role play and serious game in the context of their real life jobs. Participants were again split into groups, ensuring each group had a spread between different sectors to provoke discussion and reflection. Groups were asked to identify the types of planning decisions that they make in their real life jobs, and what types of climate information may enable them to make better informed decisions. The activity was split into two parts. The first step was to identify and compare and contrast the day-to-day planning decisions made by each participant and their department/ministry. The second was to consider what weather and climate information could usefully contribute to more robust planning and decision-making in the context of climate change. This activity produced a list of information needs that is discussed further in Section 3.

2.4. Objective four: Desktop review and information from interviews and direct involvement

In order to assess how this pilot project's findings support other ongoing initiatives in Malawi, namely the National Adaptation Plan development, and the GFCS project to improve the quality and quantity of climate services, questions regarding this were included in the stakeholder interviews and additional information obtained from a content analysis (Forbes, 2000) of published meeting minutes and reports. In addition, direct involvement of members of our project team in consultations on the development of these latest national plans and related projects allowed us to report on the complementarity of the processes and projects addressing similar core issues.

3. Findings

The following section summarises the findings from the various methods employed through the project. Section 3.1 starts with a review of the medium- and long-term decision-making process and institutional framework at national level, which guides the nature of sectoral decision-making (objective one) based on the desktop research of national policy documents. Section 3.2 moves on to summarise the existing use of weather and climate information in decision-making (objective two)

gained from the stakeholder interviews, divided by the three cross-cutting themes. Section 3.3 then highlights the potential for weather and climate information to be integrated into decision-making and planning in Malawi (objective three). This section includes the "theoretical" needs identified from the urban planning role play scenario during the workshop; as well as actual needs identified by stakeholders during the interviews, and participants during the workshop. Section 3.4 discusses how this pilot project, and its findings, supports other ongoing initiatives in Malawi, namely the NAP development, and the GFCS project to improve the quality and quantity of climate services (objective four).

3.1. Medium- and long-term decision-making process in Malawi

3.1.1. Vision 2020 and the Malawi Growth and Development Strategy II

Following on from 10 year plans in the immediate post-colonial period since 1964, through to Structural Adjustment in the 1980s, Malawi's long-term development vision is currently outlined in a document that takes a more multi-sectoral (as opposed to purely economic) approach to development. The country's current development strategy defines national goals, policies and strategies and is named Vision 2020 (National Economic Council, 2000). Its vision is that "*by the year 2020, Malawi, as a God-fearing nation, will be secure, democratically mature, environmentally sustainable, self-reliant with equal opportunities for and active participation by all, having social services, vibrant cultural and religious values, and a technologically-driven middle-income economy*" (National Economic Council, 2000: 27). The scope of issues identified as critical to enable Malawi to reach this vision are good governance, sustainable economic growth and development, vibrant culture, economic infrastructure, social sector development, science and technology-led development, fair and equitable distribution of wealth, food security and nutrition, sustainable natural resource management and environmental management. The latter scope includes addressing issues raised by climate change.

The Malawi Growth and Development Strategy (MGDS) is the medium-term strategy intended to implement the longer term development aspirations as outlined in Vision 2020). This succeeded the Poverty Reduction Strategy Papers. MGDSI was active from 2006-11, and the current version is MGDSII, active from 2011-16. MGDSII aims to continue reducing poverty through sustainable economic growth and infrastructure development. The MGDS II identifies six broad thematic areas:

(i) Sustainable Economic Growth
(ii) Social Development
(iii) Social Support and Disaster Risk Management
(iv) Infrastructure Development
(v) Improved Governance; and
(vi) Cross-Cutting Issues.

The thematic areas are the pillars that support the nine key priority areas which include (i) Agriculture and Food Security; (ii) Transport Infrastructure and Nsanje World Inland Port; (iii) Energy, Industrial Development, Mining and Tourism; (iv) Education, Science and Technology; (v) Public Health, Sanitation, Malaria and HIV/AIDS Management; (vi) Integrated Rural Development; (vii) Green Belt Irrigation and Water Development; (viii) Child Development, Youth Development and Empowerment; and (ix) Climate Change, Natural Resources and Environmental Management. The first version of MGDS (2006-11) had six priority areas, and as MGDSII is well underway, there is widespread belief, as reported by the planning officials from the Ministry of Finance and Economic Planning and

Development, that nine priority areas are too many. On climate change in MGDSII, a number of key strategies are set out, including: mainstreaming climate change issues into sectoral policies, plans and programmes, promoting climate change-related education, training, awareness and capacity building, enhancing the implementation of climate change mitigation and adaptation programmes and implementing a comprehensive national climate change investment plan.

3.1.2. How Vision 2020 and Malawi Growth and Development Strategy are negotiated

Vision 2020 and MGDS are defined based on the economic growth potential for different sectors within Malawi. The Department of Economic Planning and Development[5] plays a key role in the definition of both the long-term and medium-term development strategies. They do this by analysing economic projections for each sector and then highlighting which sectors (with growth) can contribute most to Malawi's economy in terms of GDP. This information is provided to Cabinet, who make the political decisions on the selection of priorities and allocate financial resources accordingly through the national budget, which is both directed by, and feeds into, the MGDS. Every 3 years there is a Mid-Term Expenditure Framework (MTEF) which is intended to form a linkage between policy, planning and budgets, being intended to guide the process of national budgeting and ensure consistency with the MGDSII and Vision 2020.

Since the end of Vision 2020 is nearing, the process is underway for the development of its successor (Vision "X") – and there is a role for the FCFA programme to inform this. Each sector formulates its long-term vision (which, at the moment, also includes no quantitative involvement of climate change); then there are consultations and the modelling takes place, and recommendations are made to Cabinet, who make the ultimate decisions on inclusion.

3.1.3. Opportunities for the incorporation of medium-term climate information in Malawi's development strategies

The longest current timeframe for political decision-making in Malawi is thus over approximately a 20 year time horizon. The Department of Economic Planning and Development leads on this process, but in discussions with three of their senior officials stressed that they "*don't yet use climate change information for timescales of five years or more when appraising new projects or policies*" (May, 2014). They are, however, accustomed to economic modelling over this time period, and although they do not do it yet, see a potential role for incorporating climate change projections into those economic models so that they do not end up recommending inclusion of sectors where climate change could limit the economic growth potential.

3.1.4. Sectoral planning processes in Malawi

Sectoral planning processes also take place on a medium time frame of up to five years, and are mainly concerned with the implementation of the MGDSII, where the overarching goals and priority areas are provided. The sectors in Malawi – e.g. education, health, agriculture, water and irrigation – reflect the major ministerial and departmental divisions. In addition there are 16 Sector Working Groups which take cross-sectoral approaches – for example Environment and Natural Resources (ENR). Each Sector Working Group also has its own SWG Strategy – although some of these (such as Agriculture and Health) are now Sector Wide Approaches (SWAps), whereby donors and other development partners are included. Climate change is currently covered under the National Climate Change Programme (NCCP) (which falls under the ENR SWG) and there have been proposals for a Climate

[5] Currently part of the Ministry of Finance and Economic Planning Development, as a result of the cabinet consolidation undertaken by Peter Mutharika after his election as President in May 2014.

Change and Environmental Management SWAp (this would likely finance the investment priorities highlighted in the Climate Change Investment Plan). Theoretically, each Sector and SWG strategy should be five years in duration and align with the time period for the Malawi Growth and Development Strategy (e.g. MGDSII is from 2011-16). In reality, the time taken for these to be finalised is such that they are not all on exactly the same five year cycle. Since they are meant to follow MGDSII, climate change is included as appropriate in these SWAps and SWGs.

3.1.5. Institutional framework for short-term sectoral strategy implementation

Malawi is unusual in terms of government structure in that one department – the Department of Economic Planning and Development in the Ministry of Finance and Economic Planning – has an overarching involvement in the approval of funding for the Sector Strategies and SWG Strategies. There is a Monitoring and Evaluation (M&E) department which cross-checks them against the country's medium and long-term priorities and, depending on their results, recommends the release (or withholding) of budgetary support from the Ministry of Finance. It is into this M&E section that environmental indicators have already been included under the Poverty-Environment Initiative; and climate adaptation indicators will be included as part of the ADAPT-PLAN LDCF-funded project.

3.2. Existing use of weather and climate information

Interviews with representatives from a variety of different government departments and ministries as well as other relevant, non-government, stakeholders (see Appendix A for a list of people interviewed) showed that the existing use of weather and climate data in Malawi remains extremely limited. A planner in the Ministry of Local Government and Rural Development stated that they only use immediate weather information in their planning while DoDMA (the Department of Disaster Management Affairs) and departments in the MoIWD use weekly/ 5-10 day forecasts for planning purposes with daily updates of, for example, extreme weather events. During the season, 10 day bulletins are provided by the DCCMS and then distributed to relevant ministries. A representative from DoDMA admitted that they do not have long-term plans based on long-term climate scenarios due to resource constraints and according to the MoIWD, because there is no advance forecasting capability within the DCCMS.

3.2.1. Food Security

The cross-sectoral Malawi Vulnerability Assessment Committee (MVAC) that monitors food security only look ahead to the coming season, and therefore decisions are currently based on observations, rather than modelling or projections. Various departments within the MoAFS use seasonal forecasts, for example they produce the Agricultural Crop Production Survey and produce information and advice for farmers. However, they also focus on the coming season and therefore, do not consider projections of what will happen in following years. MoAFS and the MoIWD collaborate at all levels of governance on matters relating to food security.

Representatives from departments within the MoIWD outlined that weather information such as rainfall, temperatures, humidity, potential evapo-transpiration rates, etc. are all vital in planning and designing long-term future investments, such as irrigation projects. Weather information (temperature; potential evapo-transpiration rates; rainfall) based on past averages for the same times of the year are also used in the operation of irrigation projects. However, current planning and decision-making are based not on model projections but rather on linear regression of past averages - observations from the past (provided by DCCMS) are used to predict what will happen in the future.

Such linear modelling, which is also used by other ministries, is potentially problematic as it assumes that the future will mirror the past, which may not be the case under projected climate change.

3.2.2. Disaster Risk Management

Evidence from the interviews suggests that seasonal forecasts are being used to inform planning in key sectors, for example, Water, Energy, Agriculture and Disaster Management. DoDMA use seasonal forecasts to inform the National Contingency Plan. Despite participation in cross-government quarterly fora, which provide updates on the disaster situation, line ministries do not always receive the information they need in the form that they can use it in order to be able to give early warning and prepare for disasters. For example existing information does not identify sudden extremes e.g. heavy rain; strong winds; extreme temperatures; etc.

3.2.3. Social Protection

There was little evidence that climate and weather information is used in current social protection planning. The Department of Economic Planning and Development looks at cross-cutting issues across all sectors, including co-ordinating social protection programmes. At the moment this department does not use climate information. Weather and climate information was identified by the MoEPWD as very important for social protection because most people's livelihoods in Malawi are dependent on agriculture, a sector significantly impacted by climate change. However, there is limited use of climate information in current planning by MoEPWD. Interviewees from the MoEPWD do not think that the information they receive or the form it comes in is adequate, thus limiting their ability to use it and respond by, for example, issuing early warnings. This can be a problem for the elderly and disabled, who are not receiving timely information in a format that they can understand. In the same way that MoAFS disseminate information to farmers for use in decision-making, MoEPWD can distribute to groups that require social assistance, as a representative from MoEPWD noted *"[t]he department has the capacity to put information into braille and transmit by radio, as well as letting its membership organisations know what is happening"*.

3.2.4. Use of indigenous knowledge

The use of indigenous knowledge was raised by a number of interviewees. At a local level, farmers' locally-held information on rainfall patterns is important. The Co-ordinator of the Enhancing Community Resilience Programme (ECRP) programme stated that they are keen to link the scientific forecast with indigenous knowledge as they have noticed a lot of capacity at the local level for signs of upcoming weather (on a very short, i.e. daily, basis and not for longer term forecasting). A respondent from the Department of Land Resources and Conservation (which falls within the Ministry of Agriculture and Food Security) echoed this sentiment by arguing for the importance of indigenous knowledge but recognising that, given the changing climatic conditions, "*it is no longer enough to rely solely on this knowledge*".

The linking to indigenous knowledge systems is beneficial to science because the former can support the credibility of the latter (if it links with the traditional signs) as well as showing respect for the traditional systems which will make the science more acceptable to people with limited exposure to, and training in understanding, the science. Furthermore, an interviewee from the Department of Agricultural Extension, MoAFS, reiterated that "*rural people are used to predicting the future and that building on indigenous knowledge is a sound way of introducing the complex idea of uncertainty in future weather and climate predictions*".

3.2.5. Challenges with current information

There was no evidence of ministries using longer-term climate projections in their decision-making, despite the availability of country-specific climate information (McSweeney *et al*., 2010), downscaled models (Davis, 2011), and the synthesis provided by the latest high-profile IPCC report (IPCC, 2013). Even with the limited nature of the use of weather and climate information, a number of perceived limitations of existing weather information were raised during the interviews and the workshop. These limitations include scale, accessibility, policy planning cycles, and timing, which act to impede the use of climate and weather information in decision-making. A summary of these challenges are presented in this section.

One of the challenges of the current information is that it is not downscaled sufficiently – the geographical range of the information is too large. The Director of the Department of Agricultural Extension Services (DAES) in the MoAFS claimed "*this downscaling was extremely important in order to ensure that weather and climate information is not generalised over a number of different agricultural zones"*. According to DoDMA, the lack of downscaling is due to the hardware/ equipment the DCCMS have access to. This means that they cannot pick up sudden extremes e.g. heavy rain and strong winds. In addition to this, the skill level of the seasonal forecasts provided by DCCMS is perceived not to be high enough to cope with the increasing variability and uncertainty. In turn, this is reducing the potential uses of the current information and highlights need for higher resolution climate data over both spatial and temporal scales.

Another challenge, also identified by DoDMA and a representative from the MoEPWD, is the packaging of information and that the terminology used by DCCMS is not easily accessible to all who need to use it. Communications from DCCMS tend to be at the national level and are then meant to be "*interpreted*" for local level populations. However, interviewees from the Environmental Affairs Department (EAD) in the MECCM as well as from the Department of Agricultural Extension Services (DAES) in the MoAFS, made the point that information is not packaged in a form (i.e. scenarios) that decision makers could use but were instead only provided with raw data and no analysis of the trends in, or implications of, this data. There is therefore a lot of uncertainty around the variety of information. This can mean that end-users of this data, for example farmers, may not receive such information. This demonstrates that using information to inform planning and decision-making is not just about the information itself, but also having it effectively communicated in a format that is accessible to a range of decision-makers.

The above points were supported a former member of the DCCMS and now the Climate Change Advisor for DFID who said that it would be very useful for the DCCMS to have a team of people who could communicate complex weather and climate information to various users in a format that they could readily use. While he recognised that the science needed to be improved (especially with regard to numerical weather prediction capability), it was often the communication of information and the lack of training of users of information that led to problems with confidence in/ credibility of forecasts. These challenges were identified by DoDMA as being a particular challenge, not just at the local level but also high up (e.g. Principle Secretaries). The lack of resources and the efficient use of limited resources that the DCCMS faces were raised by a many interviewees as being the root cause of all of these problems. As one DFID interviewee noted, *"resources are needed to improve both the science and the communication of the science"*.

A further challenge relates to the planning cycles in Malawi. Most government departments work on a three-year planning horizon, which makes it difficult to integrate longer term climate projections. A number of representatives from across the different ministries noted that existing use of climate and weather information tends to be reactive, i.e. ministries only respond to information when prompted by an extreme event. Information provided by DCCMS is not always provided in advance, which can be inadequate to provide early warnings. In some cases, for example flooding, Malawi has no effective early warning system (EWS). This is problematic as it can mean that extremes are a surprise, leaving little time to prepare or to deal with impacts of the extremes. Such challenges have resulted in *"a shift from reactive actions to more preparedness and building of resilience such as through the ECRP"* (DFID Interviewee, May, 2014). To overcome this further, one interviewee suggested that early warning could be provided a week in advance and that the links between disaster risk reduction (DRR), which tends to be reactive, and anticipatory climate change adaptation (CCA) could be strengthened in government planning.

3.3. Future potential use of weather and climate information

Despite the aforementioned challenges (Section 3.2.5), the current section identifies some specific examples of potential opportunities for using short- to medium-term climate information. The table below attempts to provide an accessible overview of the weather and climate information that has been identified as useful at the three planning timescales (annual; short-term and medium-term). Much of the information was gathered during the "Role playing urban planning decisions in groups, focusing on weather and climate information" activity which took place during the workshop (see Appendix D for a detailed outline of the activity). During this activity, participants were asked to take on the role of urban planners when deciding which information was the most useful for each investment scenario they were presented with. The intention was that they would then be able to use this simulated experience to help them select the types of weather and climate information (at different timescales) that would be most useful for them in their real-life roles in various departments/ ministries.

Unfortunately, while the simulated role play activity proved to be very successful in provoking much thought and debate around the best weather and climate information for a variety of urban planning investment scenarios, in the lengthy discussion that followed the activity, the participants proved unable to pick up on the potential of different types of weather and climate information (at different timescales) for their own sectors.

However, many of the scenarios that were included in the urban planning role play were scenarios that would fall within the remit of the various departments and ministries from which representatives had already been interviewed. As a result, Table 1 lists hypothetical scenarios that relate to the actual sectors studied (those listed in the first column of the table). The weather and climate information needs identified by the participants as being important for managing each role play scenario have therefore been categorised to fit the most relevant department ministry but are shown in italicised red font to distinguish them from needs identified during interviews with members of each department/ ministry (in normal font black). For those sectors where no representatives were interviewed, the name of the sector is also in italicised red. Furthermore, weather and climate needs identified by non-government stakeholders (e.g. from NGOs working in Malawi) have been added in italicised blue. All the departments and ministries that were included in the research (either through interviews and/ or through participating in the workshop) have been included in the table, even if they

did not provide any relevant information. **It is important to note that the table below includes climate and weather information which may not be currently available – it is partially a "wish list" to direct scientific development (as per objective three of this research).**

Table 1: Future potential use of weather and climate information

Normal black: Weather and climate information needs identified during interviews with members of each department/ ministry
Italicised red: Weather and climate information needs identified by workshop participants as being important for managing each role play scenario and categorised to fit the most relevant department/ ministry. Also for those sectors where no representatives were interviewed.
Italicised blue: Weather and climate needs identified by non-government stakeholders (e.g. from NGOs working in Malawi)

	Annual	**Short-term (1 – 5 years)**	**Medium-term (6 – 20 years)**
Department of Climate Change and Meteorological Services			
Environmental Affairs Department, **Ministry of Environment and Climate Change Management**	• National level maps (downscaled from global models) of, for example, flood risks	• *Drought (multi-year)* • *Multi-year forecast (i.e. temperature and timing/distribution/amount of rainfall)* • *Temperature and rainfall projections for 5 years from now* • Climate change scenarios to support the planning of adaptation options	• *Drought (multi-year)* • *Multi-year forecast (i.e. temperature and timing/distribution/amount of rainfall)* • *Temperature and rainfall projections for 10 years from now* • Climate change scenarios to support the planning of adaptation options
Ministry of Agriculture and Food Security (Department of Agricultural Extension; Land Resources Conservation Department)	• *Likely duration of the annual rainy season* • *Strong winds and/or hail* • *Average annual temperature* • *Potential for dry periods within the rainy season* • More frequent information within the rainy season e.g. a 2 – 3 week forecast	• *Multi-year forecast (temperature and timing/distribution/amount of rainfall)* • *Drought (multi-year)* • Future climate data (longer than seasonal forecast)	• *Multi-year forecast (temperature and timing/distribution/amount of rainfall)* • *Temperature and rainfall projections for 10 years from now* • *Drought (multi-year)* • Future climate data (longer than seasonal forecast)

	Annual	**Short-term (1 – 5 years)**	**Medium-term (6 – 20 years)**
Economic Planning and Development, **Ministry of Finance**	• *Likely duration of the annual rainy season* • *Floods of long duration (>1 week)* • *Drought (less than one season)* • Location of floods and droughts	• *Drought (multi-year)* • *Temperature and rainfall projections for 5 years from now*	• *Drought (multi-year)* • Projections for next 15 years • Future projections and impacts on natural resources
Ministry of Water and Irrigation (Water Resources Department; Water Supply and Services; Surface Water Department; Department of Irrigation)	• *Floods of short duration (<1 week)* • *Average annual rainfall* • *Intense rainfall of short duration (< 1 day)* • *Intensity of rainfall* • Extreme weather events • Current temperature, humidity and evaporation information	• *Rainfall projections for next 5 years (intensity, amount & distribution)* • *Temperature and rainfall projections for 5 years from now* • *Multi year forecast (i.e. temperature and timing/distribution /amount of rainfall)* • Rainfall information for every year for the next 5 years • Temperature, humidity and evaporation information for next 5 years	• *Temperature and rainfall projections for 10 years from now* • *Multi year forecast (i.e. temperature and timing/distribution /amount of rainfall)* • Longer term predictions for future investment in irrigation projects
Department of Disaster Management Affairs		• Extreme events over the next 2 years • Impact of climate change on productivity in next 2 years	
Department of Forestry		• *Medium-term projections (3 – 5 years)*	• *Long-term (25 years/ the time it takes for a tree to grow) projections*
Ministry of Local Government and Rural Development		• Longer term climate projections to better support 3-year planning horizon	

	Annual	**Short-term (1 – 5 years)**	**Medium-term (6 – 20 years)**
Ministry of the Elderly and People with Disabilities	• Sudden and extreme weather events	Weather patterns/ trends to enable advance planning	• Weather patterns/ trends to enable advance planning • Heat range/temperature is important for people with albinism and sight problems – as they need to be provided with particular lotions and sunglasses. (5-10 year timeframe).
Renewable energy	• *Number of sunny days* • *Wind and sunshine duration, intensity of sunshine* • *Number of extremely hot nights* • *Strong winds and/or hail* • *Number of hot and cold days*	• *Multi-year forecast (i.e. temperature and timing/distribution/amount of rainfall)*	• *Multi-year forecast (i.e. temperature and timing/distribution/amount of rainfall)*
Health	• *Seasonal rainfall forecast* • *Potential for dry periods within the rainy season* • *Number of extremely hot days*	• *Multi-year forecast (i.e. temperature and timing/distribution/amount of rainfall)* • *Temperature and rainfall projections for 5 years from now*	• *Multi-year forecast (i.e. temperature and timing/distribution/amount of rainfall)*
Waste	• *Intense rainfall of long duration (>1 day)* • *Flash Floods* • *Humidity & wind direction*		
Education	• *Number of extremely hot days* • *Number of extremely hot days* • *Strong winds and/or hail*		

The following discussion highlights the weather and climate information needs, across three different timescales, identified by the departments and ministries most concerned with the three sectors upon which this research focusses: food security; disaster risk reduction and social protection.

3.3.1. Sub-annual weather and climate information

There is a lot of commonality between the three sectors of the types of weather and climate information that are needed on an annual basis (and a repeated annual basis). While average annual rainfall was identified as being important, much more significant for all the sectors was the nature of that rainfall – what was the likely duration of the annual rainy season and what was the potential for dry period within the rainy season? In the same vein, the MoAFS stated that it would be very useful to have more frequent information within the rainy season (for example, a 2-3 week forecast). Immediate information on extreme events – especially floods and droughts but also strong winds and hail – was regarded as being very useful, as was the location of these extremes. The Department of Environmental Affairs specifically stated that national level maps (downscaled from global models) of, for instance, floods, were vital.

Annual rainfall totals at high resolution each year for the next five years could be used by the MoIWD to conduct hydrological modelling at a sub-basin scale. For existing integrated hydrological models, the future rainfall variable (three days in advance) is required but this is not currently being generated by DCCMS. Annual totals could enable projections of quantity of surface water and groundwater. Population trends and land use (cover and change) could also be factored in to investigate how water demands may change under climate change.

Both the MoIWD and the MoAFS identified current temperature information as being important but only the former also needed current humidity and evaporation information. The MoIWD proposed that the most helpful weather and climate information depends on each catchment, for example, in the north, floods are expected every three years, whereas the Lower Shire floods every year and Lake Malawi floods every 10 years. However, they also recognised that climate change may alter these patterns; thus highlighting how climate changes will influence flooding as an additional information need.

3.3.2. Short-term (1-5 years) weather and climate information

Summarising the short-term needs of all the departments and ministries involved in the research was the MoAFS who stated that they needed climate data that was longer than a seasonal forecast. DoDMA raised the need for information of extreme events and the impact of climate change on productivity over the next two years while the Ministry of Local Government and Rural Development argued that they needed longer term climate projections to better support their three-year planning horizons. Other relevant departments and ministries asked for multi-year (up to five years in advance) forecasts for a variety of parameters (e.g. temperature; intensity, amount and distribution of rainfall; drought). In keeping with its mandate, the MoIWD was alone in identifying temperature, humidity and evaporation information for the next five years as being significant; *"five year projections would be useful to ensure that the designs and infrastructure remain relevant*" (Department of Irrigation, Interviewee, May 2014).

The packaging of this short-term weather and climate information was recognised as being an important issue. The Environmental Affairs Department wanted the five year information to be in the form of scenarios so as to support the planning of adaptation options while the MoEPWD also raised

the point that scenarios would enable future planning. The MoIWD need is for a tool to facilitate decision-making and identify areas where future investments are needed.

3.3.3. Medium-term (6-20 years) weather and climate information

All of the departments and ministries identified as being relevant to the research recognised that the short-term information that they identified above was also useful on the medium (6-20 years) timescale – e.g. temperature and rainfall projections for 10 years from now. The Department of Economic Planning and Development in the Ministry of Finance requested climate projections for 15 years from now in order to fit in with their longer term planning cycle. The DAES stated that information on a 5-10 year timescale would enable better planning for the agricultural sector, for example to identify crop types on which they should focus to ensure production (both for commercial and subsistence purposes). DoDMA believe that medium-term climate scenarios would also support the development of Malawi's NAP. The MoIWD want medium term projections in order to better plan future irrigation investments and the MoEPWD stated that future heat/ temperature range over the next 5-10 years is important as people with albinism and/ or sight problems may need to be provided with special lotions and/ or sunglasses. In addition to this, the MoEPWD identified that information about the frequency of extreme events would also be helpful.

3.3.4. Discussion points raised around future potential use of weather and climate information

The difference in the above table (Table 1) between the weather and climate information needs in italicised red and those in normal font black, is a clear indication of the fact that while participants were able to identify a "wishlist" of future climate and weather needs in the role play activity when they were all pretending to be urban planners, they were not able to translate this into real life. This may be because the normal timeframe for planning in various government departments and ministries is relatively short (between 3-5 years) and government personnel are not used to thinking further than these time horizons. The limited climate data or information for longer than seasonal timescales and the fact that it is regarded as unreliable is another important reason why government personnel do not readily consider how useful short- (1 – 5 years) and medium- (6 – 20 years) term weather and climate information could be.

The lack of access to the most advanced climate projections up until now also means that the users of this weather and climate information are "stuck" on the idea that future circumstances can be predicted on past patterns which, under climate change, may not be the case. For instance, when presented with a seasonal short-term/ annual planning decision, all the groups in the role play activity chose a multi-year type of information (e.g. multi-year drought forecast or multi-year rainfall and temperature forecast). When asked why they had done this the groups argued that it is important to know what has happened in the past in order to "future-proof". While this argument does indicate a lack of understanding of what a multi-year forecast is (i.e. that it is a projection of future weather and climate and not a historical weather and climate pattern), more importantly, it shows a blinkered view of (a) what information can be generated and (b) the accuracy and efficacy of past trends in predicting future weather and climate.

3.3.5. Opportunities for integrating future short- to medium-term climate information

Climate information is needed to improve both the science and the communication of the science and in this regard we circulated a national synthesis of downscaled regional climate scenarios to all interviewees as the first output from this FCFA pilot project (Vincent *et al.*, 2014a).

Findings in this study confirm that the coordination structures for weather and climate information do exist, and certainly seem to function at national level between DCCMS and other line ministries.

There is also evidence of collaboration between ministries in how information is used to contribute to food security, for example between MoIWD and MoAFS. Additionally, DoDMA is developing a Disaster Reduction Communication Strategy. Part of this process involves a Task Force investigating different options for how climate information can be received and integrated into disaster planning. This presents a key opportunity for medium-long-term climate information to feed into decision making.

During consultations, several interviewees highlighted the need for understanding what climate change is and the risks it poses to Malawi, as without that, decision-makers cannot even consider including it. This highlights the need for additional capacity building and training on climate change and its potential impacts. Various departments raised the limited capacity to understand weather and climate information. Therefore, to effectively integrate short- to medium--term information into planning, government departments will need additional knowledge on how to use projections and how to deal with information on a timescale longer than a seasonal basis, which takes into account the changing trends. As one interviewee noted, *"it's not enough to have the information but [we need] to understand how to use it"* (MoAFS Interviewee, May 2014). Short- to medium-term projections were identified by workshop participants as potentially overcoming issues of uncertainty associated with forecasts on shorter timescales. However, the ability of workshop participants to deal with inherent uncertainty in any future projections in the "Paying for predictions" game suggests that the uncertainty here is more around interpretation and confidence in selecting the most appropriate projection or scenario. Another interviewee from MoAFS confirmed, *"To use this medium-term data will also need understanding of predicting .... where understanding uncertainty is important"* (MoAFS Interviewee, May 2014).

More weather and climate information and updates would be useful but it is important that the information is not generalised over all agricultural zones, once again demonstrating the need for higher resolution data. One suggestion is to provide information at the Extension Planning Area (EPA) level. To give an idea of that spatial scale, there are currently 187 EPAs in the country so, given an total land area of c118,500km^2 in Malawi, this means average EPA size is 633km^2. Providing information at this level of resolution is likely not beyond current scientific capacity.

Interviewees from civil society also noted that DCCMS are open and willing to freely share the climate information that they do have. Radio is also widely used to communicate the climate information that is available. Non-governmental organisations and donors also noted the potential to use short- and medium-term climate information. In terms of specific projects of relevance, DFID have been piloting micro-weather insurance with MoAFS. Data from weather stations across Malawi has been used to trigger publicly supported index-linked weather insurance under a number of pilot schemes (Osgood *et al.*, 2007, 2008). However, medium-term climate information could better inform models for insurance and define the trigger points for food insecurity. This highlights a potential need for the type of information FCFA is planning to produce, which could have additional food security benefits and also better inform disaster risk management.

Despite the existing coordination and communication structures, a number of obstacles to effective linking with decision-makers and policy planning remain. Findings suggests that a range of perverse incentives and political obstacles to the effective use of weather and climate information also exist, for example in the case of flooding, knowing about future flooding is not really useful if people do not want to move away permanently as then they will not be eligible for relief benefits. These issues fell beyond the scope of this study, but such issues warrant further investigation and attention.

3.4. Current landscape of weather and climate information generation in Malawi and how it fits in with other initiatives

3.4.1. Government commitment to climate change in Malawi

As well as being expressly mentioned within Vision 2020 and as one of the nine key priority areas in MGDSII, Malawi has made significant political commitment to addressing climate change in recent years. The previous government created the MECCM in 2012, comprising the Department of Environmental Affairs, Department of Forestry, and Department of Climate Change and Meteorological Services[6]. This new ministry took over Malawi's National Climate Change Programme from the-then Ministry of Finance and Development Planning. Following on from a number of preparatory studies around sectoral opportunities and the associated training and capacity building to effect these (e.g. Ministry of Finance and Development Planning, 2011 a; b; c), the National Climate Change Response Policy has been developed by the Climate Change Technical Committee under the direction of the National Steering Committee on Climate Change – a political body that reports directly to the Parliamentary Working Group on Agriculture and Natural Resources and the Cabinet Committee on Environment and Natural Resources (see Figure 3) (Government of Malawi, in draft). At the same time, a National Climate Change and Environment Communication Strategy (2012-16) has been developed in order to raise public awareness (Ministry of Environment and Climate Change Management, 2012).

The National Climate Change Programme has five anticipated outputs for 2014:

1. climate change mainstreamed in policies, development plans and programmes at national level and implemented in 15 disaster-prone districts
2. data and knowledge on the impacts of climate change collected and made accessible to decision-makers in government, private sector and civil society
3. coordination mechanisms and implementation arrangements for climate change established and used at national level and in disaster-prone districts
4. implementation modalities and financial mechanisms for the National Climate Change Investment Plan established and operationalised at national and local level
5. project management and operational support.

A Climate Change Investment Plan and a strategy for the implementation of the policy have also been under discussion. It is also worth noting that disaster risk reduction featured prominently in the 2014 national election, with some campaigning among potential parliamentarians to champion the issue (see Appendix E).

[6] After the change of government in May 2014, this ministry and its component departments became part of the Ministry of Natural Resources, Energy and Mining

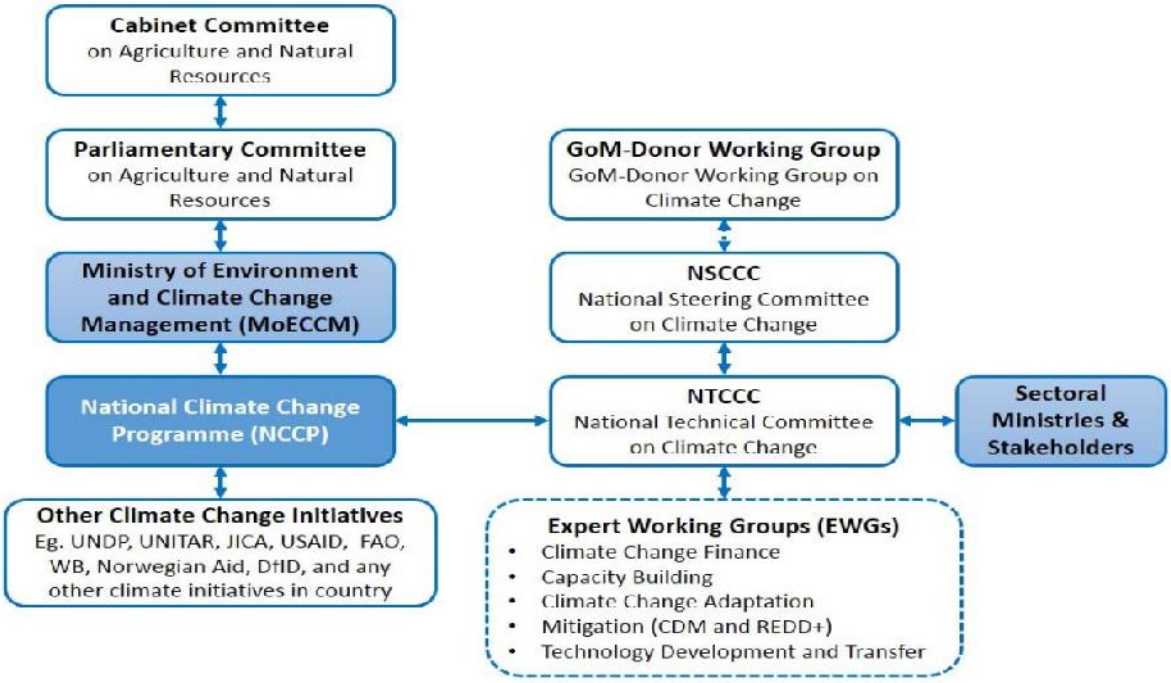

Figure 3. Institutional structure for management of climate change in Malawi (the National Climate Change Programme).

3.4.2. Malawi and international climate change commitments

Malawi is a Party to the UNFCCC, having signed the convention in June 1992; ratified it in April 1994; and become a Party to it in July 1994. The Initial National Communication was produced in 2003 (Government of Malawi, 2002), the National Adaptation Programmes of Action (NAPA) in 2006 (Ministry of Mines, Natural Resources and the Environment, 2006), and the Second National Communication in 2011 (Ministry of Mines, Natural Resources, and the Environment, 2011).

With the NAPAs now becoming aged, and with many countries (including Malawi) having successfully implemented the majority of priority projects identified therein with the support of the Least Developed Country Fund (LDCF), attention is now turning towards the production of the NAPs. This process was established under the Cancun Adaptation Framework and is intended to allow both developing and developed countries to formulate medium- and long-term adaptation needs and develop strategies to address those needs.

Malawi has begun its NAP process, identifying the critical participants from across government and other partners who should participate in the core team. This core team met for the first time in July 2014 and will report to the Climate Change Technical Committee. Under the core team there will be sectoral teams for the already-identified priority sectors, namely agriculture (crops, livestock and fisheries), water resources, transport, infrastructure and physical planning, population and human settlements, human health, disaster risk management, forestry, wildlife, and gender. The core team will be in charge of spearheading the multi-stakeholder consultation process, as well as directing the technical process of NAP production. It is anticipated that the NAP process will involve the generation of climate scenarios for adaptation in the key sectors, a standardised process for vulnerability mapping (building on existing vulnerability assessments that have taken place in Malawi) and measurement of the effectiveness of adaptation initiatives. Having in-depth understanding of the current use of weather and climate information among decision-makers in Malawi can inform this process by highlighting where needs exist and how they can inform the future adaptation scenarios.

3.4.3. Linking Future Climate for Africa (FCFA) to Global Framework for Climate Services (GFCS)

Consultations revealed that, concurrently with the development of this pilot case study, Malawi was chosen to participate in a two-year programme funded by the Government of Norway. The GFCS programme is being coordinated by the DCCMS and also other stakeholders. Similar to the pilot case study and longer-term FCFA programme, GCFS recognises the risks of climate change for Africa and the importance of improving the quality and quantity of climate services in order to enable more effective climate risk management through improved use of that information.

GCFS is being implemented in Tanzania and Malawi. In Malawi the key partners are the DCCMS, LUANAR, Malawi Red Cross Society (MRCS), World Food Programme (WFP) Malawi, World Health Organization (WHO) Malawi, and the Ministry of Health**.** In particular, the intention is to significantly strengthen capacity of end-users to demand, and to access and benefit from co-produced climate services relevant for food security, nutrition, health and disaster risk reduction.

In terms of plans for the programme and the timeframe of activities, the initial planning workshop was held in Arusha, Tanzania, in February 2013. This was followed by a national stakeholder inception workshop in Malawi in February 2014. In Malawi a Project Delivery Team (PDT) was formed comprising of one member from each of the local partners. The PDT has devised a consolidated work plan which was presented at a consultative workshop in June 2014. The size of the project and number of partners means that progress is slower than for a smaller project such as the pilot case study. Each organisation has investigated how it can incorporate analysis of the needs for climate services, and how they can be integrated into existing activities.

Of particular interest to the longer-term FCFA programme is the supporting services planned by Lilongwe University of Agriculture and Natural Resources (LUANAR), and the activities within DCCMS. LUANAR will be undertaking a document analysis of all available frameworks relevant to the programme, including the results of this pilot case study; mapping relevant institutions in Malawi engaged in delivery of climate services and links with national adaptation processes; studying DCCMS procedures when issuing forecasts and advisory in conjunction with relevant institutions; and assessing use of indigenous knowledge in climate forecasting and adaptation. DCCMS will be training staff on best available seasonal forecast downscaling tools, including product development; undertaking capacity development on statistical methods for tailored analysis, interpretation and communication of climate uncertainty, co-production with users and provision of tailored climate services. The findings of this pilot case study can also inform these processes.

3.4.4. Complementarity of the projects

The key issues that the two projects are contributing to is the climate scenario awareness-raising (capacity building) of key stakeholders at national level. They are both working on climate change information service related areas. More synergies are being seen in research, data collection and management. The findings on partner assessment by FCFA will support the GCFS project is identifying areas that require capacity enhancement. Most of the work plans and interventions in the GCFS can also be adopted by the FCFA for development of a proposal that can address the gaps under the GCFS; in particular focusing on further direct support to government structures, since GCFS is working through its member UN organisations.

4. Limitations of the Methodology

A consultative methodology enables active participation and buy-in of stakeholders, and was chosen as the basis for this study, given the potential for stakeholders to learn from findings and improve their use of weather and climate information based on an improved understanding of what currently exists. The semi-structured interviews with identified stakeholders were very helpful for understanding decision-making processes in ministries and departments relevant to the three cross-cutting sectors, and to elicit the actual use of weather and climate information. However, challenges arose in the use of a national stakeholder workshop. A workshop was chosen for the benefits it provides, of enabling discussion and highlighting the similarities and differences between different participants based on their contributions – together with the potential additional output of improved awareness on which participants can act. However, there are increasingly flaws with reliance on workshops, and we experienced many of them in this project (see also Vincent *et al.*, 2014b).

With so many research institutions and development partners working in developing countries, and the popularity of workshops in research and practice, a real "workshop culture" has emerged. Government and non-government actors are receiving more and more invitations to workshops and, as a result, are spending less time in their offices and more time in conference venues and hotel meeting rooms.

Ever-tightening government budgets mean that government officers do not always receive fuel allowances to attend meetings. To compensate for this, many donors and NGOs are having to provide transport allowances to compensate government officers for their participation. However, it is becoming increasingly difficult to secure participation of government officers to meetings taking place in town, especially when they know that the meeting has not budgeted for fuel refunds. A government officer can attend more than three stakeholder meetings every week and has to budget from their salary (which is often significantly less than those of the donors and NGOs that convene the meetings). This results in poor attendance of government officers in workshops which have not indicated a reimbursement of fuel costs, and most workshop organisers struggle to get good participation in meetings happening locally in the city. To enhance participation, some workshop organisers have had no choice but to organise some kind of incentive/allowance for government participants.

The combination of workshop fatigue and payment of such incentives/allowances runs the risk of participants being motivated to attend for the wrong reasons, and also makes it difficult to get people in the room who would most benefit from, and be able to contribute to, the discussions. Despite following the invitation protocol and repeated follow up of RSVPs and commitments to attend, on the morning of the workshop, none of the participants arrived at the agreed start time. Follow up phone calls were made from which some registered participants had indicated that they were on their way. In total 28 people were invited from the seven departments/ministries. Although each of the departments/ministries had confirmed their attendance by the day prior to the workshop, on day one ten people attended, including the regional climate scientist and CDKN representative. Various Malawians had warned that attendance on the first day did not mean participants would return on the second (half) day. The agenda had been designed to enable role playing on day one, with the opportunity to reflect on how the emerging experience compared and contrasted with the day-to-day roles of decision-makers, such that their potential use of weather and climate information, and requests for new scientific information, were to be elicited on the second day. However, in light of the logistical concerns, the agenda was shifted forwards so that the substantive discussions also took place on day one. This was a good decision, because only three people arrived on day two: one of

them was an hour after the proposed starting time; the other two arrived 2.5 hours after the proposed starting time. We were therefore forced to cancel the second day.

In terms of methodology, reliance on national stakeholder workshops is thus an increasingly risky strategy in Malawi. Instead, small focus group-style meetings within ministries and departments and/or participation through existing fora (such as the Climate Change Technical Committee) are proposed as more productive alternatives which reduce additional stress on government staff and overcome the growing perverse incentives for workshop attendance. However, it is important to note that the particular context determines whether or not workshops are appropriate tools: in Swaziland when one representative from a department is invited, there is often expression of interest to attend multiple staff to benefit from the capacity building opportunities. Workshops there have acted as important collaborative opportunities for government staff in different departments, and have previously been used to lead to positive outcomes (e.g. Stringer *et al*., 2008) and to identify further research priorities (e.g. Whitfield *et al.,* 2014).

5. Project Conclusions

The findings of this FCFA Pilot Case Study show that the longest current timeframe for political decision-making in Malawi is over a 10-20 year time horizon and that this is solely led by the Department of Economic Planning and Development (objective one). As yet, sectoral planning processes currently take place on a shorter time frame of up to five years, and are mainly concerned with the implementation of the Malawi Growth and Development Strategy. There is no evidence of ministries using any climate projections or climate scenarios in their current decision-making, despite the availability of regionally-downscaled projections (objective two). Instead only sub-annual (seasonal and 5-day) forecasts are used.

A number of perceived limitations of existing climate information were raised during the interviews and the workshop. These limitations include scale, accessibility, policy planning cycles and timing, which act to impede the use of climate and weather information in decision-making. Further consideration of such challenges and ways to address them is required for more effective use of medium-long-term climate information.

Objective three of the research included the task of identifying weather and climate information which may not as yet exist but which end-users would find useful. Our findings highlight that there are potential uses for short-term climate information for planning on a 1-5 year timescale which currently does not exist. There is a clear need for spatial information on likely extreme events – especially floods and droughts but also strong winds and hail. Many ministries asked for multi-year (up to five years in advance) forecasts for a variety of parameters (e.g. temperature; intensity, amount and distribution of rainfall; drought). Additionally, all of the departments and ministries recognised that the short-term information that they identified above was also useful on a medium (6-20 years) timescale – e.g. temperature and rainfall projections for 10 years from now.

Existing coordination structures for weather and climate information exist in Malawi, and function at national level between the DCCMS and other line ministries. However, several interviewees noted the need for a better understanding about what climate change is and the risks it poses. Additionally, various departments reported limited capacity to understand weather and climate information. Additional capacity building and training on climate change, its potential impacts and how to integrate short and medium-term climate information into existing policies and decision-making processes

remains needed. The long-term GCFS plans to build on previous efforts to improve the quality and quantity of climate services, as well as to plan for improved integration in decision-making, spearheaded by the member UN organisations.

As well as feeding into the GCFS programme, this pilot case study has raised many timely findings for Malawi's current responses to climate change, both in terms of national policy and international commitments (objective four). The new National Climate Change Policy and Investment Plan highlight the importance of improved use of weather and climate information in ensuring that climate change is addressed in different sectors, and so these findings highlight some of the opportunities and barriers. The intended creation of adaptation scenarios within the locally-driven development of the National Adaptation Plan will also benefit from the findings on potential use of weather and climate information. The combination of the policy and institutional framework for addressing climate change issues in Malawi devises a structure in which improved use of weather and climate information is not only recognised as important, but can feasibly be actioned in order to improve medium-term decision-making and planning that will be robust in the context of a changing climate.

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Appendix A: Interview schedule for May 2014 consultations

Name	Institution	Phone and email	Date	Time
Mr. Khumbo Kamanga	Coordination Unit for the Rehabilitation of the Environment	0992 815001 kjkamanga@yahoo.co.uk	5th May, 2014	12:30
Mrs Gertude Kambauwa, Chief Land Resources Officer	Director, Department of Land Resources and Conservation, Ministry of Agriculture and Food Security	0888 876161 mussajj@gmail.com +265 (0) 1 755 048/ 011 1 209 934 Cell: +265 (0) 88 8 321 562 gkambauwa@gmail.com	5th May, 2014	14:30
Ms Stella Kankwamba	Director, Department of Agricultural Extension Services, Ministry of Agriculture and Food Security	0884 148448	6th May, 2014	09:00
Ms Sabine Joukes	Coordinator, Enhancing Climate Resilience Programme (Christian Aid)	0999 988441 sjoukes@christian-aid.org	6th May, 2014	10:30
Mr George Phiri	Climate Change Officer, FAO	George.phiri@fao.org 0995611748	6th May, 2014	Lunchtime at Ufulu Gardens
Mr. Felix Sapala	Deputy Director, Ministry of Persons with Disabilities and the Elderly	0999 957227 fsapala@yahoo.com	6th May, 2014	15:30
Ms Florence Rolle	Resident Representative, FAO	Florence.rolle@fao.org (dorah.gondwe@fao.org)	7th May, 2014	08:00
Dr Donald Kamdonyo	Programme Officer, DFID	0888 865633 dkamdonyo@DFID.gov.uk	7th May, 2014	10:30
Mr David Chalmers	Team Leader – Environment, USAID	dchalmers@usaid.gov	7th May, 2014	11:30
Mrs Nyuma Mercy Mughogho	Deputy Director, Department of Forestry	0888646137 nmughogho@hotmail.com	7th May, 2014	14:00
Mr James Chiusiwa Dr. Kanyinji (Principle Secretary) Stern Kita Fwayupi Mafongo	Director, Department of Disaster Management Affairs, Office of the President and Cabinet	0999 937952 chiusiwaj@yahoo.com 0999 951658 – Dr. Kanyinji	7th May, 2014	15:30
Modesta Kanjaye Mr. Pepani Kaluwa	Department of Water Resource Development, Ministry of Irrigation and Water Development Deputy Director of Surface Water	0888853188, 0999464670 0999 911280 pepanikaluwa@yahoo.com	8th May, 2014	09:00

Mr Yona Kaphale	Director of Economic Planning, Ministry of Economic Planning and Development	0888 893405 ykamphale@yahoo.com	8th May, 2014	10:30
Mr Geoffrey Mwepa	Deputy Director, Department of Irrigation, Ministry of Water and Irrigation	0999 291813/ 01 751 150 Mamba.geoffrey5@gmail.com	8th May, 2014	13:30
Mrs Mary Shaba Richard Chakhame (Director of research) Did not make meeting	Permanent Secretary, Ministry of Gender, Child Development and Community Development	0999 800280	8th May, 2014	14:30
Mr Walusungu Kayira – unable to meet, but saw Cathy Bondo in his place	Head of Planning, Ministry of Local Government and Rural Development	0999 198913 wvkayira@yahoo.co.uk	8th May, 2014	15:30
Mr John Kerkering Mr Alinafe Chinabwa	REDD programme, Department of Forestry	Usfs.redd.malawi@gmail.com	8th May, 2014	16:00
Dr Aloysius Kamperewera	Director, Environmental Affairs Department, Ministry of Environment and Climate Change Management	0888 869446 Kamphatso1@gmail.com	9th May, 2014	08:30
Mr Steve Mwanza	Department of Water Supply Services, Ministry of Water and Irrigation	08888 825402 / 0999 950369 gchilunga@yahoo.com	13th May, 2014	08:00
Mr Chavungduma Did not arrive for two meetings made	Principal Meteorologist, DCCMS, Lilongwe Airport		13th May 2014	10:30
Mr Trent Bunderson	Total Land Care	trentbunderson@yahoo.com	13th May, 2014	15:00 via skype

One additional interview was conducted around the August workshop

Mr Sipho Billat and Mrs Charity Gambalula	Principal Economist and Economist, Ministry of Economic Planning and Development	siphobillat@yahoo.com, charity01mphatso@gmail.com	13th August, 2014	13:00

Appendix B: August 2014 workshop list of attendees

Tuesday, 12 August 2014				
Name	**Position**	**Organisation**	**Email address**	**Phone number**
Austin Tibu	Land Resource Conservation Officer	Malawi Ministry of Agriculture	austintibu@yahoo.com	0884 018 060
Hastings Chapeta	Under Secretary	DoDMA	hkchatepa@yahoo.com	0999 120 110
Jolamu Nkhokwe	Director	Department of Climate Change and Meteorological Services	j.nkhokwe@yahoo.com jnkhokwe@metmalawi.com	0999 911 314
Izidine Pinto	PhD student	CSAG, University of Cape Town	izidimep@gmail.com	+27 72 316 5492
Charlotte Scott	Junior Project Manager	CDKN	charlotte.scott@cdkn.org	+27 78 404 0013
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Appendix C: August 2014 workshop agenda

Future Climate for Africa (FCFA) Pilot Case Study – Malawi

Decision-makers' Workshop, 12-13th August 2014

AGENDA

DAY 1: Tuesday, 12 August 2014	
08h30 – 09h00	Workshop registration
09h00 – 09h30	Opening address from DFID representative Introduction of participants and facilitators
09h30 – 10h30	"Setting the scene" – Overview of the project and its aims; structure of the workshop and the desired outcomes
10h30 – 11h00	Tea/ coffee break
11h00 – 12h30	Activity 1 (part 1) – Role playing urban planning decisions in groups, focusing on weather and climate information
12h30 – 13h30	Lunch
13h30 – 15h00	Activity 1 (part 2) - Feedback from groups
15h00 – 15h30	Tea/ coffee break
15h30 – 17h00	Game around uncertainty

DAY 2: Wednesday, 13 August 2014	
08h30 - 09h30	Facilitated discussions around weather and climate information needs and certainty in 3 groups: Disaster Risk Reduction; Food Security; Social Protection
09h30 – 10h30	Activity 2 - Identifying weather and climate information needs and acceptable levels of (un)certainty
10h30 – 11h00	Tea/ coffee break
11h00 – 12h00	Group presentations of information needs with questions and discussions
12h00 - 12h30	Consolidating the list of cross-sectoral information needs in conjunction with national and regional weather and climate scientists
12h30 – 13h00	Wrap-up/ further questions/ next steps
13h00 – 14h00	Finish and Lunch

Appendix D: August 2014 workshop role play/ games summaries

ACTIVITY 1: Role playing urban planning decisions in groups, focusing on weather and climate information

Rationale:
The role play is ideal as a first activity as it acts as an ice-breaker and has all participants sharing ideas from the start. Unlike many other serious games which have as their intended goal the raising of awareness, we designed this activity to result in a concrete outcome – i.e. a wish list of weather and climate information. However, as the literature on serious gaming suggests that scoring/introducing some element of competition is advisable to encourage complete participation and motivate participants, we added in a competitive element during the discussion part of the activity.

Participant organisation:
Participants are broken into groups of between three and five members each. It is better to have as many groups as possible so, in the case of a small number of participants, rather have more groups with fewer members than fewer groups with more members. If possible, ensure a mix of backgrounds/ expertise in each groups. Participants are encouraged to "step outside" of their daily lives/ jobs and take on the role of an urban planner. [We chose urban planning as the role which all participants had to adopt as it was different from any of their day jobs and yet familiar as they all had experience with urban areas. Participants can be asked to assume different roles and the investment decisions they are asked to consider would therefore also change.] Each group is allocated a different colour and is asked to elect a note taker and spokesperson (it works best if this is the same person).

Equipment needed:
Each group should receive a grid matrix comprised of 5 columns and 4 rows (i.e. 20 blocks) printed on A3 paper and laminated (see below). Each block should be numbered e.g. A1; A2: A3; etc. In each block is printed an urban-based investment decision. The timeframes over which each decision needs to be made can also be added in order to aid the participants.

A1 **Building new roads/creating a sustainable public transit system** (Transport – long timeframe, 5-20 years)	B1 **Repairing leaks in infrastructure** (Water and sanitation – short timeframe, annual planning)	C1 **Pest management to ensure food availability** (Food security/DRR – medium timeframe, 1-5 years)	D1 **Procurement of medicines** (Health – short timeframe, annual planning)	E1 **Municipal waste management – collection and disposal** (Waste/pollution/energy – short timeframe, annual planning)
A2 **Promotion of climate-resilient livelihoods in the formal and informal sectors** (Economic planning and development – medium timeframe – 1-5 years)	B2 **New strategies to ensure food security (new crop types, new land availability, storage facilities, processing)** (Food security/DRR – long timeframe, 5-20 years)	C2 **Maintaining resource integrity in existing facilities** (Biodiversity – short timeframe, annual planning)	D2 **New infrastructure (dams, boreholes, pumping stations)** (Water and sanitation – long timeframe, 5-20 years)	E2 **New hospitals, clinics, pharmacies** (Health – long timeframe, 5-20 years)
A3 **Improving availability of renewable energy (e.g. infrastructure)** (Waste/pollution/energy – long timeframe, 5-20 years)	B3 **Upgrading/re-grading existing roads** (Transport – medium timeframe, 1-5 years)	C3 **Recruitment of new staff/ re-training of existing staff** (Health – medium timeframe, 1-5 years)	D3 **Road maintenance (repairs, e.g. of potholes, improved drainage)** (Transport – short timeframe, annual planning)	E3 **Timing and structure of school day** (Education – medium timeframe, 1-5 years)
A4 **Social protection for livelihoods disrupted by climate** (Economic planning and development – short timeframe, annual planning)	B4 **Maintaining and/or upgrading existing infrastructure** (Water and sanitation – medium timeframe, 1-5 years)	C4 **Prioritising protection of species at risk due to climate change** (Biodiversity – long timeframe, 5-20 years)	D4 **Energy awareness and encouraging shift to sustainable sources** Waste/pollution/energy – medium timeframe, 1-5 years)	E4 **Preparation for multi-year food crises** (Food security/DRR – medium timeframe, 1-5 years)

Each group is given a deck of at least 60 cards (each group's deck should be printed on "their" colour), cut to a size smaller than the blocks on the grid matrix and laminated (see below). On each card are different types of weather and climate information that could potentially be of use to urban decision-makers (whether this information already exist or not). The cards can include doubles/ triples of information as well as blank cards that participants can write down either new information wishes or use to create copies of existing cards.

Strong winds and/or hail	Flash floods	Intense rainfall of short duration (<1 day)	Likely start date of the annual rainy season	Average annual rainfall
Strong winds and/or hail	Floods of short duration (<1 week)	Intense rainfall of short duration (<1 day)	Likely start date of the rainy season	Average annual temperature
Strong winds and/or hail	Floods of short duration (<1 week)	Intense rainfall of long duration (>1 day)	Likely start date of the rainy season	Average annual temperature
Frost	Floods of short duration (<1 week)	Intense rainfall of long duration (>1 day)	Potential for dry periods within the rainy season	Average annual temperature
Frost	Floods of long duration (>1 week)	Intense rainfall of long duration (>1 day)	Potential for dry periods within the rainy season	Number of extremely hot days
Frost	Floods of long duration (>1 week)	Likely duration of the annual rainy season	Potential for dry periods within the rainy season	Number of extremely hot days
Flash floods	Floods of long duration (>1 week)	Likely duration of the annual rainy season	Average annual rainfall	Number of extremely hot days
Flash floods	Intense rainfall of short duration (<1 day)	Likely duration of the annual rainy season	Average annual rainfall	Number of extremely hot nights
Temperature and rainfall projections for 5 years from now	Drought (less than one season)	Drought (multi-year)	Temperature and rainfall projections for 10 years from now	Number of extremely hot nights
Temperature and rainfall projections for 5 years from now	Drought (less than one season)	Drought (multi-year)	Temperature and rainfall projections for 10 years from now	Number of extremely hot nights
emperature and rainfall projections for 5 years from now	Drought (less than one season)	Drought (multi-year)	Temperature and rainfall projections for 10 years from now	
Multi-year forecast (i.e. temperature and timing/ distribution/ amount of rainfall)	Multi-year forecast (i.e. temperature and timing/ distribution/ amount of rainfall)	Multi-year forecast (i.e. temperature and timing/ distribution/ amount of rainfall)		

Each group should also be given prestik [blue tack] so that they can stick each card to the grid matrix; a pen suitable for writing on the laminated blank cards and paper on which to make notes of the decisions they have taken.

Method:
Groups are then given time (1.5 hours) to, in their assumed role of urban planners, discuss which type of weather and climate information (one per card) best supports/ is the most useful for each urban investment decision that needs to be made. Once the group decides which type of weather and climate information best suits a particular decision then they should stick the card to the grid matrix over the appropriate block. It may be necessary to remind groups that the point of the game is not to simply match the information to the blocks – rather, groups should study the urban investment decisions that need to be made and decide on what type of weather and climate information they would need in order to best make that decision. Only then should they see if such a card exists and, if not, use a blank card to write down their own choice.

There will probably be a few information cards that can be matched to each urban investment decision but the groups will need to discuss each choice and come up with the one that they believe is the most critical source of information for each decision. Groups should be encouraged to keep notes of their discussions and reasons for their final decisions as they will be asked to defend these decisions later on in the role play.

There is more than one information card with the same type of weather and climate information – in other words, groups can decide that the same type of information is the most useful for numerous different urban investment decisions. There are also blank cards on which groups can add their own (or simply variations of what already exists) weather and climate information and printed cards can be turned over and the backs used for own choices if a group runs out of blank cards. Groups should be encouraged to use as many of their own choices as possible – during the scoring part of this activity, extra points will be earned for innovative (but relevant!) weather and climate information ideas.

Blank cards cannot be used to repeat, *verbatim*, existing weather and climate information cards. Groups may find that, as they progress through the grid matrix of different urban investment decisions to be made, they will need to swop information cards as it becomes obvious that a particular type of information is more useful/ critical for a different urban investment decision.

It is vital to reiterate throughout the hour and a half allocated to this part of the role play activity that groups keep detailed notes of the reasons for their choices/ any disagreements within the groups/ etc.

Discussion:
At the end of the hour and a half, each group should be asked to transfer their final choices to a large version of the grid matrix. This version will be big enough so that each group can fit their card into the relevant block and the entire grid will be visible in plenary. [We found it easiest to put the grid matrix on a power point slide and then project that slide onto a screen]. As each group has a different coloured deck of cards it is easy to identify what type of weather and climate information each group has chosen as being the most useful in supporting the various urban investment decisions on the grid matrix.

A judge should be chosen (obviously not someone who has been part of a group and ideally someone who has also not been directly involved in facilitating the role play activity) as well as a "deputy judge" (introduced to the participants as someone there to help them best defend their decisions by asking

probing questions but really someone who knows the desired outcomes of the role play activity and is there to facilitate relevant discussion) and a score-keeper.

If time allows, choose which block to discuss (and score) by picking a number (A3; B4; C1; etc.) out of a hat until all the blocks have been discussed. If time is limited, the deputy judge can choose the blocks that s/he thinks will result in the most fruitful discussions (the blocks where own choices with regard to weather and climate information have been included are very important as they contain new ideas). Groups can also be given the opportunity to choose a block they would like discussed and scored. This is particularly important if not all the blocks can be discussed/ scored as it goes some way to lessening the feeling of unfairness a group may have if their strongest match is not chosen. Each group's spokesperson should be given the chance to explain why they allocated a particular type of information to the block under discussion. The judge will then rank the choices.

With regards to scoring – there are many ways in which this can be done. Any system is fine as long as it is explained to the groups and is seen to be transparent and consistent. The system we used was as follows:

- When the choices were all the same, each group receives one point
- When there were a number of different choices: the group's choice ranked as the best was awarded the maximum number of points (if there were a total of four different choices then the maximum number of points was four; if there were six different choices in total then the maximum number of points was six, and so on). The next best option (in the opinion of the judge) received the next number down in points and so on.
- Bonus points were given to innovative and relevant own choices even if they were not judged the best choice.
- Points awarded by the judges were added up and the group with the most number of points was the winner.
- A small prize was awarded to the winners.

	GROUPS					
Block	**Blue**	**Green**	**Orange**	**Red**	**Yellow**	**Purple**
Total						

ACTIVITY 2: PAYING FOR (UNCERTAIN) PREDICTIONS GAME

The game is closely based on the Red Cross/Red Crescent Climate Centre game "Paying for Predictions" but it includes a small modification to introduce the element of uncertainty in predictions.

Rationale:
The aim of this game is to show the trade-offs between early investment in risk reduction vs. wait-and-see which might lead to high costs later on. The game emphasises the importance of information in making decisions while the modification to the game also introduces the idea that information is never absolutely certain. It shows players that even though information may be less than 100% accurate, it is still useful ("acceptable" levels of certainty) but that there may come a time when the level of certainty is so low that it is not worth spending limited resources on it ("unacceptable" levels of certainty).

Participant organisation:
Groups of three people each.

Equipment needed:
Each group should be given: four dice; one cup; a piece of card representing money spent/ "the bank"; 30 chips (divided equally between the three participants in the group).

The facilitator will also need sets of cards representing different levels of uncertainty.

Method:
Each person in each group is a district commissioner, representing a particular district in a region i.e. there are three districts in each region. Each district commissioner has 10 chips to "spend". Each group gets four dice – one per district commissioner and one in the cup. When all four dice add up to 10 or above, there is a flood in that region. The catch is – the die in the cup represents weather information that acts as an early warning system (EWS) and is not available to all regions. As a region, the three district commissioners need to decide how much they are willing to pay in order to have that early warning information, bearing in mind that if they do not have it, and there is a flood, the cost of dealing with the consequences of the disaster may be more. Only some of the regions – the highest bidding ones – will be able to access that information. [The number of highest bidding regions will depend on the total number of groups – more groups mean that more than one group can be the highest bidding].

At the beginning of the round ("the season"), each region will decide how many chips they are willing to pay for the early warning system information (represented by the die in the cup). They should be encouraged to keep this amount secret from the other regions so as not to be outbid. Groups should place these chips on the card representing money spent/ "the bank" and tally the total. Each team then throws the die in the cup but only the highest bidding region(s) is able to see theirs.

Each district commissioner then decides whether they want to invest one chip in disaster preparedness, or not. Those deciding to invest this money need to place their money spent in the bank. Those regions that have access to the EWS information (the die in the cup) can make a more informed decision about whether they should invest in disaster preparedness than those who are not allowed to see the die in the cup.

Each district commissioner then throws their own die. If the total of all four dice (representing district and regional rains) is over 10 then that counts as a disaster. Those district commissioners who paid one chip for disaster preparedness are safe but those who did not will have to pay four chips to the bank for relief and rehabilitation efforts.

The game is then repeated with each round representing another season. The highest bidding region(s) from the beginning of the game continue to have access to the information represented by the die in the cup in the following rounds and will therefore ostensibly be able to make more informed decisions about when to spend limited resources on disaster preparedness. When a district runs out of money, the population of that district (represented by the district commissioner) will have to leave the region and go and stay in a refugee camp [another table in the corner of the room].

We then added to the established "Paying for Predictions" game by introducing an element of uncertainty into the weather information represented by the die in the cup. Depending on how much time is available and therefore how many rounds the game can encompass, the element of uncertainty can be introduced at the beginning of any round. As we did not have a lot of time, we introduced this at the beginning of the third round:

- We explained to the groups that the forecast (the die in the cup) in years one and two had a certainty level of over 90% certainty so the forecast was completely accurate – what was shown on the die was what happened in the season.
- In year three the level of certainty has dropped to 66%. Groups are informed of this before they are given the opportunity to bid again on the forecast. The amount of rainfall might be what they see on the dice, but they cannot be 100% certain. It might be the number on the die plus one or, worst case, plus two. They will not know how correct the forecast is until the rainy season has started, so they need to make the decision whether or not to invest in disaster preparedness under conditions of uncertainty.
- The game is then played as normal except for the fact that after all the dice are thrown, the facilitator draws a card out of a hat indicating whether zero, one or two should be added to the total dice number.
- The game can be played with this level of uncertainty for a few rounds (the groups do not bid again – the highest bidder for the 66% certain forecasts remains the same)
- A worse level of certainty can then be introduced – by year x the level of certainty has dropped to 33%. Groups are informed of this before they are given the opportunity to bid again on the forecast. The amount shown on the dice could be correct or it could be +1, +2, +3 or, worst case, +4. The groups will have to consider all these options in deciding how to plan and invest their limited resources.

Discussion:

"Paying for Predictions" is a well-known game for triggering reflection around the value of acquiring and using forecast information about extreme weather events, especially given climate change. Participants, in their role as district commissioners with limited resources, are encouraged to consider the value of knowledge when deciding on what to bid for access to the information. Furthermore, the game asks the district commissioners to decide whether it is better to spend money to prepare for disasters or run the risk of having to pay more later in the event that relief and rehabilitation is necessary.

The introduced element of uncertainty tries to make the game more realistic – no forecast is ever 100% accurate but some are more certain than others. The game showed that even in the face of uncertainty, information is still useful but its value will drop as the level of uncertainty rises.

ACTIVITY 3: IDENTIFYING INFORMATION NEEDS AND ACCEPTABLE LEVELS OF CERTAINTY

Rationale:
The aim behind this activity is to add resolution to the short list of weather and climate information arising from the discussion following Activity 1 because we can provide not only information needs, but also where efforts should be spent on reducing uncertainty. There is a lot of discussion in the literature about this at the moment – and whether we have reached the law of diminishing returns in trying to improve certainty levels beyond that which can ever be possible for any future event.

Participant organisation:
Participants are asked to join the group they most identify with – disaster risk reduction; food security; social protection.

Equipment:
A3 laminated template (see below); pen to write on laminated page and chips.

Information need/ wish (in no particular order)	Place chips here to indicate importance of certainty

Method:
Each group is then given time to come up with and list (on the A3 laminated template provided to them) their identified information needs (in no particular order).

A limited number of chips (to represent limited resources) is given to each group which they need to allocate to each need/ wish depending on where levels of certainty are most critical. Each group will decide how to "spend" their limited number of chips – is certainty much more critical for some information than others? Are there other sources of information where certainty is not that important? Any "no regrets" options?

Discussion:

Each group should be given the chance to present their short list of the most important weather and climate information needs along with the levels of certainty that are required for each information type. Along with providing the most important outcome for this workshop (a "wishlist" of weather and climate information), the discussion provides a knowledge-sharing opportunity when for experts (either the facilitators and/ or other participants) can highlight which information already exists or what alternative information can be used.

Appendix E: Report on Disaster Risk Management Campaign

2014 was an election year in Malawi. Along with consultations with a number of relevant people, the project team also kept up-to-date with the extent to which climate change and disaster risk reduction issues were included in the campaigning of the various political parties. Below is one example.

DISASTER RISK MANAGEMENT CAMPAIGN-CONDUCTED BY CATHOLIC DEVELOPMENT COMMISSION OF MALAWI-CHIKWAWA DIOCESE

Background of the Campaign

The Episcopal Conference of Malawi, through its development arm the Catholic Development Commission in Malawi (CADECOM), in partnership with Oxfam conducted a Disaster Risk Management Policy campaign which was aimed at contributing to sustained and improved legal and institutional framework on DRM in Malawi beyond May 20, 2014 general elections. This is a campaign that aimed at seeking political commitment from all the aspiring members of parliament to support the approval of the DRM Policy and Act once voted into power.

Specific Objectives of the Campaign

To contribute to enhanced commitment of aspiring office bearers (presidential candidates, members of parliament and parties) on the need to prioritize the DRM Policy approval, enactment, implementation and integration of disaster risk management work once elected into office.

Get aspiring candidates at all levels commit/ sign a commitment that they will get the DRM Policy approved and the DRM Act in place within the 1st to second year of being in government.

To empower the electorates to demand from the office bearers the services they require in Disaster Risk Management in their areas and make follow ups after the May 20, 2014 general elections

Contribute to the review and finalization of National Emergency Cash Transfer Programming in Malawi.

CADECOM therefore, invited all aspiring parliamentarians from Chikwawa and Nsanje districts to an interface meeting with members of the Civil Protection Committee and other community representatives from all constituencies where the community representatives would present the key issues and expectations from the aspirants in relation to disaster risk management once they are voted into power.

What CADECOM Accomplished

In realizing the need to involve the people affected by disasters in these two districts, CADECOM sort views from representatives of the Civil Protection Committees on what they would like their aspiring parliamentarians to do in order to address issues regarding DRM once voted into power. A documentation on such manifestos from the citizens was done and a date was arranged where the CPCs would meet the aspiring parliamentarians in these two districts to deliberate on the same.

The interface took place in both districts of Chikwawa and Nsanje where a total of 33 aspiring parliamentarians in both districts committed to ensuring that DRM issues are prioritized. This was an interactive session where Civil Protection Committees and Community members sort political will and

commitment from aspirants through signing of pledge forms to see to it that the DRM Policy is approved, passed into a Bill and enacted upon.