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Background on the Debates and Documentation of Research on Climate Change and Food Security in Southern Africa



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LIST OF ACRONYMS

ACF	Agriculture Consultative Forum
ACFS	Africa Centre for Food Security
ACTS	African Centre for Technology Studies
AGIS	Agricultural Geo-referenced Information System
AIACC	Assessments of Impacts and Adaptation to Climate Change
AIDS	Acquired Immuno-Deficiency Syndrome
AR ₄	Fourth Assessment Report (of the IPCC)
CAETS	Council of Academies of Engineering and Technological Sciences
CASS	Centre for Applied Social Studies
CBA-X	Community-Based Adaptation Exchange
CCAA	Climate Change Adaptation in Africa
CGIAR	Consultative Group on International Agricultural Research
CICERO	Centre for Climate and Environmental Research
CISANET	Civil Society Agriculture Network
CLACC	Capacity Strengthening of Least Developed Countries for Adaptation to Climate Change
COMESA	Common Market for Eastern and Southern Africa
COP	Conference of the Parties
CSAG	Climate Systems Analysis Group
CSIR	Council for Scientific and Industrial Research
CTA	Centre for Technical Cooperation
CURE	Coordination Unit for the Rehabilitation of Environment
CYMMT	International Centre for the Improvement of Maize and Wheat
DENIVA	Development Network for Indigenous Voluntary Association
DFID	Department for International Development
DIMP	Disaster Mitigation for Sustainable Livelihoods
ECBI	European Capacity Building Initiative
EECZ	Energy and Environmental Concerns for Zambia
EGS	Department of Environmental and Geographical Science
ENDA	Environmental Action in the Third World
EPMS	Environmental Protection and Management Services
EPRI	Economic Policy Research Institute
ESSP	Earth System Science Partnership
EU	European Union
FANR	Food, Agriculture and Natural Resources
FANRPAN	Food, Agriculture and Natural Resources Policy Analysis Network
FEWSNET	Famine Early Warning System Network
FIVIMS	Food Insecurity Vulnerability Information Mapping Systems
FAO	Food and Agriculture Organisation
GCM	General Circulation Model/Global Climate Model
GECAFS	Global Environmental Change and Food Security
GECHS	Global Environmental Change and Human Security
GED	Action Group for Renewable Energies and Sustainable Development
GTZ	German Technical Cooperation
HIV	Human Immuno-Deficiency Virus
ICRAF	International Centre for Research in Agro-Forestry
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics
ICSU-ROA	International Council for Science – Regional Office for Africa
IDRC	International Development Research Centre

IFDC	International Fertiliser Development Centre
IFPRI	International Food Policy Research Institute
IGU	International Geographical Union
IHDP	International Human Dimensions Programme on Global Environmental Change
IIED	International Institute for Environment and Development
IITA	International Institute of Tropical Agriculture
INGC	National Disaster Management Institute
IPCC	Intergovernmental Panel on Climate Change
IPO	International Project Office
ISSC	International Social Science Council
ITCZ	Inter-tropical Convergence Zone
IWMI	International Water Management Institute
LARED	The network for social studies in disaster prevention in Latin America
LSHTM	London School of Hygiene and Tropical Medicine
MDG	Millennium Development Goals
MSU	Michigan State University
NAPA	National Adaptation Programme of Action
NASA	National Aeronautics and Space Administration
NDVI	Normalised Difference Vegetation Index
NEPAD	New Partnership for Africa's Development
NOAA	National Oceanographic and Atmospheric Administration
NRF	National Research Foundation
NVAC	National Vulnerability Assessment Committee
OCHA	Office for the Coordination of Humanitarian Affairs
ODI	Overseas Development Institute
PACOM	Pan African Committee
PBS	Program for Bio-Safety Systems
PIK	Potsdam Institute for Climate Impact Research
PRSP	Poverty Reduction Strategy Paper
RCCP	Regional Climate Change Programme
RCSA	Regional Centre for Southern Africa
REBA	Regional Evidence Building Agenda
ReVAMP	Vulnerability, Adaptation and Mitigation Planning
RFE	Rainfall Estimation
RHVP	Regional Hunger and Vulnerability Programme
RVAA	Regional Vulnerability Assessment and Analysis
RVAC	Regional Vulnerability Assessment Committee
SACAU	Southern African Confederation of Agricultural Unions
SADC	Southern African Development Community
SARPN	Southern African Regional Poverty Network
SAVI	Southern African Vulnerability Initiative
SC	Save the Children
SECS	Sudanese Environment Conservation Society
SEI	Stockholm Environment Institute
SRES	Special Report Emissions Series
START	System for Analysis Research and Training
TAR	Third Assessment Report (of the IPCC)
TGICA	Task Group on Scenarios for Climate and Impact Assessment
TWAS	Third World Academy of Science
UCT	University of Cape Town
UK	United Kingdom

UKZN	University of KwaZulu Natal
UNAIDS	Joint UN Programme on HIV and AIDS
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children’s Fund
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
USGS	United States Geological Survey
VAA	Vulnerability Assessment and Analysis
VAC	Vulnerability Assessment Committee
WFEO	World Federation of Engineering Organisations
WFP	World Food Programme
WMO	World Meteorological Organisation
WRSI	Water Requirements Satisfaction Index
WSSD	World Summit for Sustainable Development

EXECUTIVE SUMMARY

The recent Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC) highlights Africa as being particularly vulnerable to the influence of climate change. Southern Africa in particular already experiences climate variability, in the form of droughts and floods, and this is projected to intensify in the future. This will have implications for agricultural productivity by changing the nature of the growing season and the spatial area suitable for different crop types. Whilst food security is not solely dependent on food availability, changes in productivity are likely to have implications for the food security of vulnerable groups of the population. This is particularly the case given that southern Africa already suffers from regular episodic food crises (the most recent of which was 2002-03). In conjunction with the other multiple stresses that face the region, including the HIV/AIDS pandemic and weak institutional capacity, it is important to understand the interaction between climate change and food security, not least because climate change threatens to impede the achievement of the Millennium Development Goals (MDGs).

With this in mind, the Danish Development Research Network has commissioned this report with two main objectives in mind:

1. to synthesise the results of recent research on climate change and food security within the Southern African Development Community (SADC), and
2. to map the institutions that operate in the region linked to climate change and food security

This report has been compiled through desktop research based on the authors' prior knowledge and contacts, plus internet and literature searches. The report is structured into seven main sections. Following the introduction in section 1, section 2 gives a broad overview of climate change, focusing on the evidence, impacts and projected future changes; and then gives a conceptualisation of food security and charts how thinking around food security has broadened over time. In Africa warming is likely to place at 0.2-0.5°C per decade, which is more than the global annual mean warming throughout the continent; and although changes in precipitation are less certain, there is consensus that rainfall will decrease in the winter rainfall region of southern Africa (much of the western region), and the intra-seasonal distribution will also change.

These projected changes will inevitably have profound implications for food security across the globe, but this will be through affecting more than just the availability of food. Section 2 continues by reviewing two major approaches to food security: food security analysis and entitlement theory. Food security analysis is based on the premise that food security is based on a systems approach whereby four dimensions are important: availability, stability, utilisation and access to food. Climate change is likely to impact on all four of these elements, not just on availability. Amartya Sen's entitlement theory is based on the notion that food can be available through means other than direct in-country production, and thus food security is dependent on entitlements, which can be related to production, labour, trade or transfers.

Section 3 elaborates on how the evolving climate change and food security debates have been brought together in the food systems approach, which looks at food systems as coupled social-ecological systems, and thus provides conceptual space for the analysis of climate change on all aspects of the system beyond just production – considering also such elements as distribution and access. It outlines some major research programmes which have taken place in southern Africa using this holistic approach, including the ongoing Global Environmental Change and Food Systems Southern Africa (GECAFS-SA) and Southern African Vulnerability Initiative (SAVI).

Section 4 provides a synthesis of research to date, highlighting the gaps and opportunities for involvement of the Danish Development Research Network (DDRN). Whilst a lot of technical

capacity exists within southern Africa, research and findings are poorly disseminated. There is therefore a role for DDRN to act as a boundary organisation, ensuring information is appropriately communicated to relevant end-users. Communication of a different sort, in terms of awareness raising on climate change and building capacity amongst government departments in order to enable them to make use of such information, is also an important role for technical assistance through DDRN. There is also room for further research, particularly around markets and food prices, and the role of biofuels.

Section 5 summarises the conclusions and recommendations for next steps. It is well accepted that climate change needs to be mainstreamed within development initiatives, since it is a cross-cutting issue that will affect a number of other concerns, including food security, water and health, and thus cannot be adequately addressed in isolation. Raising awareness of climate change and its implications for relevant partners is thus imperative, and these partners include those which arguably should be aware of climate change but are not currently considering it. Technical assistance, for example through skill-share visits, to those programmes that already exist, to enable them to better publicise their findings, would promote further cross-regional learning through partnership formation and lesson sharing.

Section 6 outlines research programmes/knowledge platforms/networks and institutions that are/have been concerned with climate change and food security in southern Africa from 2000 to the present. As the tables show, there are a number of research programmes already underway in southern Africa addressing climate change and food security. On paper, their descriptions are impressive, but from our experience of working in the region, they often do not live up to expectations due to shortfalls in implementation capacity. The overarching conclusion and recommendation of this study is therefore that rather than commencing a new research programme, DDRN consider placing their research and technical capacity in an existing programme in order to revive/continue it.

1 INTRODUCTION

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With terms of reference such as this – that considers two major areas of research in a major geographical region, it is important to be clear about the boundaries that we have used in order to determine what should be included and what should be excluded:

- The review of literature cites major research outputs – in terms of peer-reviewed academic literature, as well as non peer-reviewed project reports and other grey literature that highlights the evolution of climate change and food security within the region.
- When deciding what research programmes/knowledge platforms and networks to include in section 6, we have only included those that are directly concerned with both climate change and food security at a regional level. Similarly with institutions: we have listed only those institutions where there exists a recognised research group (i.e. more than one person) undertaking research into the fields of both climate change and food security. We have not included other research programmes or institutions that are concerned solely with climate change or food security. This is a difficult decision, as there are a number of such programmes and institutions, and arguably where one issue is considered without the other

the ultimate sustainability will be in question. Indeed one recommendation for DDRN's involvement in this field would be to advocate for consideration (particularly) of climate change within a number of research initiatives and practical interventions where it is currently not taken into account.

- We have not included national level initiatives that address climate change and food security – these are primarily at sub-regional level (typically national or sub-national level) and tend to be actual development interventions rather than having a research component. An example would be projects taking place to promote adaptation to climate change with funding from multilateral institutions or bilateral donors.
- We have not included national government ministries that are concerned with climate change and/or food security, although again consideration of the institutional and policy frameworks in country is important for addressing both issues.

As these limits run the risk of excluding institutions of which DDRN should probably be aware before deciding on an agenda for involvement in climate change and food security in southern Africa, and many of them could be considered as potential partners, we have included an indicative, but non-exhaustive, list in an appendix.

2 CLIMATE CHANGE AND FOOD SECURITY-EVOLUTION OF THE DEBATES WITHIN SOUTHERN AFRICA

The following section gives a broad overview of climate change, focusing on the evidence, impacts and projected future changes; and then gives a conceptualisation of food security and charts how thinking around food security has broadened over time.

2.1 Evidence for climate change

In late 2007, the Intergovernmental Panel on Climate Change released their Fourth Assessment Report (AR4), drawing together the scientific evidence on climate change (IPCC 2007). This report states unequivocally the manifold evidence that climate change is occurring. Global average air temperatures are rising, with eleven of the last twelve years (1995-2006) ranking amongst the twelve warmest years in the instrumental record of global surface temperature. The 100-year linear trend (1906-2005) of 0.74°C is larger than the corresponding trend of 0.6°C (1901-2000) given in the Third Assessment Report (TAR), published in 2001 (IPCC 2001). This trend for temperature increase occurs across the globe, and is slightly greater at higher northern latitudes. Warming is also occurring in Africa, with the Third Assessment Report (TAR) noting an average decadal warming of 0.05°C over the 20th century, with the five warmest years occurring since 1996 (Desanker and Magadza 2001).

Although land surfaces have warmed faster, there is also evidence for rising sea levels consistent with warming of the oceans. The global sea level has risen since 1961 at an average rate of 1.8mm/yr and since 1993 at 3.1mm/yr, with contributions from thermal expansion, melting glaciers and ice caps, and the polar ice sheets. It is, as yet, unclear whether this latter faster rate is due to decadal variation of an increase in the longer-term trend. The effects of climate change on precipitation patterns are more varied, with significant increases in eastern parts of North and South America, northern Europe and northern and central Asia in the period 1900-2005; but decreases in the Sahel, the Mediterranean, southern Africa and parts of southern Asia. Globally, the area affected by drought has likely increased since the 1970s.

Other extreme weather events are also correlated in various ways with climate change. It is very likely over the past 50 years that cold days, cold nights and frosts have become less frequent over most land areas, and hot days and hot nights have become more frequent. It is likely that heat waves have become more frequent over most land areas, and the frequency of heavy precipitation events has increased over most areas. There is also observational evidence of an increase in intense tropical cyclone activity in the North Atlantic since about 1970, although there is no clear trend in the number of cyclones, and little evidence of similar increases elsewhere.

There is more data than ever before to suggest that human activity is responsible for these observed changes in climate. The IPCC AR4 states that there is very high confidence that the net effect of human activities since 1750 has been warming. In contrast, changes in solar irradiance are estimated to have caused a much smaller warming effect ($+1.12\text{W}/\text{m}^2$ compared with $+1.6\text{W}/\text{m}^2$). Most of the observed increase in globally-averaged temperatures since the mid 20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations.

2.2 Projected future changes in climate

Projections show that these changes are likely to continue into the future, meaning that the nature of climate change will exacerbate, with the resultant changes for agricultural productivity, and thus potential effects on food security. The IPCC AR4 states that there is high agreement and much evidence that with current climate change 'mitigation' policies and related sustainable development practices, global greenhouse gas emissions will continue to grow over the next few decades. Greenhouse gas emissions at or above current rates would cause further warming and induce other

changes in the global climate system during the 21st century that would very likely be larger than those observed in the 20th century. A number of scenarios of socio-economic development have been developed to help project the range of potential future climate change, depending on different patterns of fossil fuel use. For the next two decades a warming of about 0.2°C is projected for a range of these scenarios, after which potential increases vary with the scenario in question. Regional projections for Africa show that warming is likely to take place at 0.2-0.5°C per decade (Hulme et al. 2001). Put a different way, this degree of warming is very likely to be larger than the global annual mean warming throughout the continent and in all seasons, with the drier sub-tropical regions (including much of southern Africa) warming more than the moister tropics (Christensen and Hewitson 2007).

Southern Africa is a particularly critical area where water availability is concerned. The region's climate is influenced by a range of climate factors including the El Niño-Southern Oscillation (ENSO) and large-scale, atmospheric pressure system interactions that can enhance periods of extended rainfall and dryness. Changes in mean seasonal rainfall are less well defined than for temperature: but under low scenario few areas show trends that exceed the current 30-year variability. Under medium scenario by 2050 north Africa and the interior of southern Africa will have decreases in the growing season that exceed one standard deviation of natural variability. With the high scenario, large areas of Africa would experience changes in December-January-February or June-July-August rainfall that significantly exceeds natural variability (Hulme et al. 2001). Rainfall in southern Africa is also likely to decrease in much of the winter rainfall region and western margins; and the distribution of rainfall – in terms of the seasonal and intra-seasonal patterns - is also likely to change (Christensen and Hewitson 2007). In addition to influencing soil moisture levels, river basins are already showing decreases in water availability. The Limpopo is projected to suffer a -5 to -15% change in precipitation, a 5-20% change in potential evapotranspiration, and a -25 to -35% change in runoff (Arnell 1999)

Changing temperature and precipitation patterns will affect the geographical distribution of extra-tropical storm tracks, leading to a poleward shift and in turn reinforcing changes in wind, temperature and precipitation patterns. There will very likely be an increase in tropical cyclone intensity. The frequency of hot extremes, heat waves and heavy precipitation is also very likely to increase. This altered frequency and intensity of extreme weather events, including droughts, heat waves and floods, together with sea level rise, is expected to have mostly adverse effects on natural and human systems.

2.3 Projected impacts of climate change

IPCC AR4 concluded with high confidence that projected changes in the frequency and severity of extreme climate events will have more serious consequences for food and forestry production, and food insecurity, than will changes in projected means of temperature and precipitation. Since the IPCC Third Assessment Report in 2001, scientific confidence has increased that some weather events and extremes will become more frequent, more widespread and/or more intense during the 21st century; and more is known about the potential effects of such changes.

Nevertheless, AR4 also notes that much uncertainty remains of how changes in frequency and severity of extreme climate events with climate change will affect food, fibre, forestry, and fisheries sectors (Easterling et al. 2007). Projection of sub-regional impacts of extreme events is highly uncertain, and the complexity of assessing global impacts on food security is enhanced by uncertainty over the future role of agriculture in the global economy. Although most studies available for AR4 assume a rapidly declining role of agriculture in the overall generation of income, no consistent and comprehensive assessment was available.

2.4 Approaches to food security

Climate change will have profound implications for food security across the globe, but these implications are far from clear and the causal pathways from changes in climate to changes in food security outcomes are complex and likely to vary from region to region. The examination of food security needs to consider the broader range of sectors and activities contributing to food production, including agriculture, fisheries and forests. It also requires increasing attention to urban and peri-urban areas rather than only a rural focus, as these areas become increasingly important areas for markets, storage and production as well as consumption. Whilst the availability of food is obviously a necessary prerequisite for food security, there have been cases of food insecurity and even famine where food has been available: thus food security is dependent on both availability and entitlements. This section reviews the potential influence of climate change on both food availability and entitlement theory.

2.4.1 Food security analysis

The standard definition of food security used by the Food and Agriculture Organisation is a "situation that exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO 2002). Food security analysis under these terms tends to have been based on a systems or livelihoods perspective and encompasses four main elements of food security – the availability, stability, utilisation and access to food. Climate change is likely to impact on all four of these elements, not just on availability.

Availability of food

The most direct impact of climate change on food security is through changes in food production. Short term variations are likely to be influenced by extreme weather events that disrupt production cycles. These more geographically heterogeneous impacts are difficult to predict with accuracy and have a bearing on the stability aspect of food security outlined below. Most assessments of the impacts of climate change deal with aggregate changes (gains and losses) in arable land, changes in actual and potential yields, and inter-annual variability of harvests. Climate change is projected to lead to 5-170 million additional people being at risk of hunger by 2080 (Schmidhuber and Tubiello 2007), with this large range explained by the variations in different model outputs. The UK Hadley Centre's two climate models - HadCM2 and HadCM3 - for example, suggest that climate change will lead to increased crop yields at high and mid latitudes, but decreased yields at low latitudes (Parry et al. 1999). While initially the global food system may be able to accommodate such changes – because falling production in some regions could be offset by rising production elsewhere – these models estimate that about 80 million people will be at risk of hunger by the 2080s due to climate change impacts. Most of these food insecure people will be located in arid regions and the sub-humid tropics, particularly Africa, which is projected to suffer reductions in yields and decreases in production under both models. Later work by the same team refines these projections by running the models under various 'SRES' - projected socio-economic scenarios (Parry et al. 2004), thus adding greater complexity to the analysis, but at the same time increasing the range of potential outcomes in terms of food insecure.

These models all agree that climate change impacts on the availability of food will vary geographically. Africa is expected to experience marked reductions in yield, decreases in production and increases in the risk of hunger under the HadCM2 climate scenario, with an even more marked effect on hunger under the HadCM3 scenario (Parry et al. 1999). Higher carbon dioxide concentrations may also have a positive influence on many crops, especially C₃ crops such as wheat, rice and soybean; although conversely C₄ crops such as maize and sorghum will experience fewer positive effects. The popularity of these C₄ food crops in southern Africa, in

conjunction with the climate projections, contributes to a significant decrease in food availability. A recent meta-analysis of climate risks for crops in 12 food insecure regions based on statistical crop models and climate projections for 2030 from 20 global climate models shows that South Asia and southern Africa will suffer negative impacts on food crops that are important to food insecure populations, particularly if sufficient adaptation measures are not adopted (Lobell et al. 2008).

One global simulation model concluded that the total amount of land available for cereals cultivation is likely to increase by some 9% by 2080, with the biggest gainers being the Russian Federation (+64%), Central Asia (+53%), North America (+41%) and northern Europe (+16%) (see Table 2) (Fischer, Shah, and Velthuisen 2002). However, most of Africa – especially Southern Africa and North Africa, but also West Africa and East Africa – is projected to lose much of its current farmland, with highly damaging consequences for food security in the world’s most food insecure continent. Projected losses of cereal production potential in sub-Saharan Africa range from 33% by 2060 to 12% by 2080 (Norse 1994). Certain countries will be hit more than others: a disaggregated analysis of African agriculture concludes that three countries – Chad, Niger and Zambia – will lose “practically their entire farming sector” by the year 2100 (Mendelsohn, Dinar, and Dalfelt 2000). More immediately, climate change threatens to impede the attainment of the Millennium Development Goal of halving hunger by 2015, particularly since there are already 798 million people classified as “undernourished” (Devereux and Edwards 2004). A recently constructed composite indicator – the poverty and hunger index (PHI) – measures countries’ performance towards achieving the MDG on hunger, and finds that two southern African countries – Swaziland and Malawi – have a medium PHI (Gentilini and Webb 2008).

Table: Projected impact of climate change on suitable land for cereals

Region	Reference	Relative to reference			
	1961–1990 (1,000 ha)	1990	2020	2050	2080
North America	358,202	102	110	121	141
Eastern Europe	124,935	103	101	96	96
Northern Europe	45,462	101	109	113	116
Southern Europe	38,524	98	94	94	91
Western Europe	63,267	100	98	98	97
Russian Federation	243,898	105	124	148	164
Central America & Caribbean	51,505	99	105	109	99
South America	653,060	102	104	105	102
Oceania & Polynesia	115,310	102	102	102	88
Eastern Africa	316,282	99	98	100	96
Middle Africa	254,500	102	104	106	102
Northern Africa	11,782	106	97	62	25
Southern Africa	31,316	88	55	48	54
Western Africa	178,095	99	101	100	96
Western Asia	23,561	105	112	94	101
Southeast Asia	97,831	100	98	103	104
South Asia	189,132	101	101	99	97
East Asia & Japan	149,694	102	99	108	110
Central Asia	12,908	111	117	147	153
Developed	993,529	102	110	119	128
Developing	1,965,735	101	101	103	100
World	2,959,264	101	104	108	109

Source: (Fischer, Shah, and Velthuisen 2002); regions projected to lose farmland are in bold.

A key challenge for food security policy in highly affected countries – especially in southern Africa, where agriculture remains the dominant economic sector – is to determine whether (and for how

long) to continue investing in agriculture as the main livelihood activity and source of food for the majority of the population, and when to switch the policy focus to diversification and facilitating viable exits from agriculture for those farmers whose livelihoods are directly compromised by these processes.

Stability

Although much scientific attention has been paid to the availability of food through modelling, relatively less is known about the stability of food supplies and its effect on food security. The stability element of food security refers to adequacy of food supplies “at all times” and to the potential for losing access to the resources needed to consume adequate food, since even a temporary disruption to food supplies or access can have fatal consequences. This may occur, for example, through failing to insure against income shocks or lacking the reserves to compensate for such shocks.

Weather extremes and climate variability are the main drivers of food production instability, especially in rain-fed farming systems with limited irrigation. There remains little analysis of the impact of the changing frequency of extreme weather events on stability, particularly the interaction at the local level between relatively moderate impacts of climate change on overall agroecological conditions and much more severe climatic and economic vulnerability (Easterling et al. 2007). Already many areas, such as southern Africa, are accustomed to unpredictable and unstable harvests based on inter-annual climate variability, but even for these places the pace and projected levels of warming may expand, and rising frequency and intensity of extreme events such as droughts is likely to increase the instability of food production. Several models forecast not just higher average temperatures and lower rainfall in semi-arid regions, but increasing probability of El Niño Southern Oscillation (ENSO) events, which have become more frequent, persistent and intense since the mid-1970s (IPCC 2001). Other locations with formerly stable and predictable weather conditions may become subject to variability, contributing to emerging potential for food crises.

Utilisation

The third element of food security refers to the utilisation of food. Climate change will alter the conditions for food safety and use. Changing temperature and precipitation patterns will alter the ranges of vector, water- and food-borne diseases, such as cholera and diarrhoea. Projected increases in risk of flooding of human settlements, especially in coastal areas from both sea level rise and increased heavy precipitation, is likely to result in an increase in the number of people exposed to vector-borne (e.g. malaria) and water-borne (e.g. cholera) diseases (Martens et al. 1999; van Lieshout et al. 2004). This in turn lowers their capacity to utilise food effectively, as when people are ill they are unable to use food effectively, thus compromising their status of food security.

Populations in water-scarce regions are likely to face decreased water availability, particularly in the sub-tropics, with implications for food processing and consumption (Easterling et al. 2007). Changing climatic conditions also affect safe and storage. Increasing temperature, for example, could increase the likelihood of food poisoning, especially in temperate regions. Although there has been much research on the health impacts of climate change, as with stability of food, this element of food security remains understudied to date.

Access

Arguably as important as the availability of food is access to food by all members of the population. This means that market conditions and considerations like political stability and the presence of civil

strife are also important in determining access to food. It also serves to explain the seeming paradox between self-sufficiency and food security: while Hong Kong and Singapore, for example, are far from self-sufficient because their food production is constrained by limited land; they are food secure at both national and household levels because their populations derive access to food through other sources. Other countries (such as South Africa and the United States) are food secure at national level, but have members of their population suffering food insecurity due to poverty and failures of markets and social welfare systems.

At the global level, lower food prices and rising incomes have led to improvements in food security, despite rapidly rising populations, as more and more people are able to access affordable food. Climate change, however, poses a threat to this positive trend, as regional and aggregate shifts in food production and availability will affect markets and commodity prices. Indeed, currently 'soaring' food prices suggests that this process might already have started. When food becomes scarce, due to a variety of factors including the impacts of weather related extreme events such as a drought or flood, or because of gradual processes of falling per capita food production, prices will rise. This affects both national economic performance (e.g. through impacts on agricultural exports) and household-level food security (Reilly, Hohmann, and Kane 1994).

Access to and the development of markets for food, especially in remote rural areas, therefore remains a crucial response to enable greater food security in the face of climate shocks and stresses. Access to food is also likely to be influenced by complex secondary impacts of climate change including conflict, human insecurity and migration. As with stability and utilisation, exploring the access element of food security under alternative climate change scenarios has been underrepresented in the academic literature to date. This is reflected in the poor level of citable literature in the AR4 report of the IPCC in 2007, which, while noting these lacunae, focuses on changes in food availability through modelling of gradual long term climatic changes.

2.4.2 Entitlement approach

The 'entitlement approach' was developed by Amartya Sen, whose work on famines showed that rather than being caused by drought or flood and consequent crop failure, most famine mortality results from the inability of people to acquire food through either purchase or exchange, or transfers (Sen 1981). The entitlement approach is useful for our purposes because it draws analytical attention to other sources of food apart from production, and highlights the need for more empirical research and modelling on the likely effects of climate change on other components of local and national food systems. The distribution and reproduction of entitlements to food is determined by the livelihood system in the local economy, as well as structural factors in the local political economy that construct 'social vulnerability' (e.g. gender) (Bohle, Downing, and Watts 1994). In Sen's terminology, famine – or food insecurity – results from 'entitlement failure', which could occur in one or more of four domains: production, labour, trade or transfers.

Production-based entitlement

The projected impacts of climate change at the aggregate (global and regional) level have been discussed. The entitlement approach operates best at the micro-level of households or livelihood groups (e.g. farmers, landless labourers), often in combination with a livelihoods framework. An entitlements-based analysis of climate change would take account of differences in dependence on food production by different groups of households. For instance, farmers are most directly vulnerable to 'failure of production-based entitlement' due to climate change, because they depend most heavily on crop production for both their food and their income. Poor farmers with undiversified livelihoods and few asset buffers are most vulnerable of all, because they lack alternative sources of food when their harvests fail.

Labour-based entitlement

When crop production is inadequate, farmers look for work to supplement their food and income, and the rural non-farm economy becomes an important determinant of household food security, through its capacity to generate 'labour-based entitlement' to food. Apart from farmers, other groups that depend indirectly on agriculture for their living are also vulnerable to a collapse of demand for their services – such as landless labourers. (Sen labelled this effect 'derived destitution'.) One plausible consequence of climate change is that pressure on rural labour markets will increase, and if the supply of labour rises while demand for labour is constant or falling, real wages will fall, exacerbating food insecurity in poor rural communities. Another 'second round' consequence of climate change could be an increase in labour migration out of areas where food production is more variable and employment opportunities are falling, with unpredictable implications for household food security that require detailed context-specific analysis and modelling.

Trade-based entitlement

'Trade-based entitlement' describes the ability to convert income or assets into food through purchase or exchange. In rural areas, farmers and pastoralists already face falling terms of trade during climate-triggered food crises when they convert their assets (such as livestock) into food – excess supplies of assets on local markets drives asset prices down, while excess demand for food pushes food prices up, until the poor are priced out of the market for food and face starvation. Urban residents and others who do not grow their own food are likely to feel the effects of climate change indirectly, through rising prices in places where food availability is falling or more unstable. To some extent, the relative affluence and political influence of urban consumers, plus increasingly interconnected global markets, might insulate urban residents against negative shocks and processes affecting food production even within their own country: food can always be imported. It is notable that even during major famines, cities are rarely affected. Here again, the entitlement approach highlights the importance of an analysis disaggregated both geographically (within as well as between countries) and by livelihood system.

Transfer-based entitlement

The final legal source of food is 'transfer-based entitlement', which describes all gifts or donations (including food aid) from others. Informal transfers are provided by extended families and communities ('informal social security systems', patronage networks, the 'moral economy'), but are vulnerable to covariate shocks. If climate change undermines agricultural production in a farming community, the capacity of local residents to support each other will be compromised and the scale of informal transfers can be expected to contract. Formal transfers are provided by governments and donors, and range from humanitarian relief during emergencies to institutionalised social welfare systems that deliver regular cash transfers to 'vulnerable groups' (such as pensioners). A 'best bet' prediction is that climate change will place increased demands on the international relief system to fill domestic food gaps with emergency food aid, as well as increasing the caseload of chronically food insecure people who need longer term social assistance, in the form of regular food aid or cash-based safety nets. Given the likelihood that food production will be undermined most in countries that are already poor and food insecure, this scenario implies a declining capacity of governments in the worst affected countries to deliver food security for their citizens, and an increasing role for the international community in underwriting food security in these countries.

The application of entitlements analysis for climate change is important as it recognises that humans are not passive recipients of impacts: rather their exposure to physical phenomena is embedded in, and mediated by, the social determinants of the particular human context (Adger and Kelly 1999). Whilst a physical climate phenomenon is necessary for the production of a hazard, the

translation into risk and potential for a food insecurity situation is therefore contingent upon human exposure and a lack of capacity to cope with the negative impacts that such exposure might bring to individuals or human systems (Pelling 2000). In doing so, it has helped shift the debate on climate change adaptation away from food production alone (and related solutions based only on technology or factors directly related to climate) and towards a more comprehensive approach to tackling climate change and development through identification of who is vulnerable and where they are located.

3 LINKING CLIMATE CHANGE AND FOOD SECURITY: THE FOOD SYSTEMS APPROACH

It is clear from the above descriptions that food security is dependent on more than just the production or availability of food: in addition it is dependent on stability, utilisation and access, which in turn is best explained by entitlement theory. The conceptualisation of food systems has important implications for how wide to cast the net when trying to determine the vulnerability of those food systems to stresses such as climate change. Much work has been undertaken to address the agronomic aspects of climate change, looking at how climate change may affect crop productivity. Whilst this is important, other research questions have been raised as being important in linking this agronomic research to a wider appreciation of the effect of climate change on food systems. These include: an understanding of how climate change will affect cropping systems; assessing technical and policy options for either reducing the deleterious impacts or enhancing the benefits of climate change on cropping systems while minimising further environmental degradation; and understanding how to best report and communicate agronomic research results that will assist the development of food systems adapted to climate change (Ingram, Gregory, and Izac 2008).

Arguably a better way of conceptualising vulnerability to climate change as a form of global environmental change is to look at food systems as a coupled social-ecological system, and thereby integrating factors across the multiple facets of the food system (Ericksen 2008a, b). This approach has been advocated by the Global Environmental Change and Food Systems (GECAFS) project: a joint project of the International Geosphere-Biosphere (IGBP), the International Human Dimensions Programme on Global Environmental Change (IHDP) and the World Climate Research Programme (WCRP). This international research programme investigates the vulnerability of human food systems to, and interactions with, global environmental change; and has been developed to address the growing need for integrated analyses of vulnerability and impacts of global environmental change on food systems, adaptation options, and consequences of possible adaptation strategies on both socio-economic and environmental conditions (Ingram and Brklacich 2002).

A food systems approach is also useful as it provides the space for recognising the multiple drivers play a role in bringing about a situation of food security or insecurity in any given place at any given time, and also analysis of the interactions and feedbacks operating between these factors (Ericksen 2008a). As well as climate change being a major stress to food systems, particularly in southern Africa; other multiple stresses also play a role in influencing vulnerability, including conflict, HIV/AIDS, governance systems, the growth in interest in biofuels, and market fluctuations, as seen in 2008 (Gregory, Ingram, and Brklacich 2005; Hendriks 2005; Eide 2008; Evans 2008). In investigating the interacting influence of two major global processes influencing vulnerability, a concept of double exposure has been introduced, that suggests there will be double losers (O'Brien and Leichenko 2000). When applying this framework to southern Africa results show that the combination of global and national economic changes are altering the context under which farmers cope with climate variability and adapt to long term change. Those farmers that "win" from both climate change and economic liberalization are the inland commercial farmers, whilst those that "lose" from both processes are the smaller, poorer farmers (Leichenko and O'Brien 2002). Identifying the appropriate winners and losers from the interaction of global processes has important implications for policies to address vulnerability (O'Brien and Leichenko 2003).

A key underlying focus of the double exposure concept, and multiple stresses framework, is that the interaction of the various acting processes can only be investigated in specific contexts. Much on-the-ground empirical research has taken place in southern Africa to look at the nature of vulnerability to multiple stresses on the ground. In Sekhukhune, South Africa, for example, investigation has taken place into how rural communities adapt to the stresses of water, climate

and health (Ziervogel et al. 2006). Similarly the UNRAVEL (Understanding Resilient and Vulnerable Livelihoods) project involved grassroots research in South Africa, Malawi and Zambia to investigate the role of multiple stresses on vulnerability to food insecurity. It found that poverty was a greater cause of food insecurity than HIV/AIDS, and that South Africa differs from Malawi and Zambia in that fewer people rely on agriculture for their livelihoods, and there is a greater safety net through the provision of social grants (Ziervogel 2006). This backs up the results of a meta-analysis of 49 local level household economy community-level studies in southern Africa that shows that the direct causes of problems accessing food are poverty, environmental stressors and conflict, rather than merely the environmental constraints to food production (Misselhorn 2005).

A major regional initiative, the Southern African Vulnerability Initiative (SAVI) has developed based on this recognition of multiple stressors creating vulnerability. SAVI brings together scientists from different disciplinary backgrounds, many of whom are based in the region, and aims to investigate how multiple stressors interact to create differential vulnerability, how responses to one stressor may enhance vulnerability to other stressors, and what type of interventions influence whether a process of change manifests as a stressor or an opportunity (Quinlan, Ziervogel, and O'Brien undated). Large scale macro level changes, such as the spread of infectious diseases, climate change, trade liberalisation and water management reforms can expose certain areas or groups within a particular context to HIV, drought, import competition, water privatisation, and other such transformations and shocks (O'Brien, Quinlan and Ziervogel, 2009).

4 SYNTHESIS OF RESEARCH GAPS/OPPORTUNITIES FOR DDRN

Previous sections of this report have outlined the background to climate change and food security, conceptual frameworks for linking the two areas of concern, and outlined research projects and programmes assessing climate change and food security in southern Africa. This section summarises the extent of the knowledge to date, and in particular identifies a number of further research directions, paying particular attention to identifying potential links between and interaction with other themes.

As the AR4 has shown, a wide variety of models are able to project future changes in climate; and with the SRES scenarios these projections can take into account different potential socio-economic conditions. Outputs of these large scale models are fairly robust, but only accurate at national level and above. Regional downscaled models provide higher resolution data on projected changes, and southern Africa benefits from substantial output of these, particularly from the University of Cape Town's Climate Systems Analysis Group, which has been designated a START-PACOM regional centre of excellence.

Given that the knowledge of how climate change is likely to manifest is known, the most important is arguably to ensure that appropriate adaptation options are undertaken, in order to reduce vulnerability to these impacts and ensure that food security is not endangered. Although food security is not solely driven by agricultural production, this clearly has a vital role to play in food systems, and is a prerequisite for food security. Recent research using a polynomial distributed lag structure for agricultural research within a simultaneous system of equations framework shows that agricultural research contributes significantly, and reduces the number of poor by 2.3 million or 0.8% annually (Alene and Coulibaly, in press).

Arguably one of the most important arenas of research for agricultural productivity is the availability of climate information. The major 1991-1992 drought was catalytic in raising the need for better climate information in order to ensure that other aspects of the food system could adapt in the case of lower productivity to maintain food security (Dilley 2000). Following improvements in the ability to model El Nino and other large-scale interannual climate variations, most national meteorological services are now able to produce seasonal forecasts. Seasonal forecasts model a range of climate parameters and provide probabilistic short term forecasts of the likelihood of rainfall being less than the average, average, or higher than average over the coming season.

Whilst seasonal forecasts are important at the national level, food security is often more likely to be manifest at the sub-national level, and so ensuring that this information is transmitted to farmers is essential (Ziervogel and Calder 2003). Simulated experiments with small-scale rural subsistence farmers in Zimbabwe have shown that they are able to effectively use such information to adapt their farming methods and mitigate the adverse effects of drought (Patt, Suarez, and Gwata 2005). But despite recognising the importance of such information, dissemination channels are often inadequate or inappropriate, meaning that there is a discontinuity between the information provided and the farmers (Ziervogel et al. 2008; Archer 2003).

Beyond just information on the climate, sophisticated information systems have also been established to monitor the situation of food security. These information systems are typically based on a number of indicators which vary from country to country (Eele 1994)(for a review, see (Quinn and Kennedy 1994). SADC itself has been closely involved in the establishment of Vulnerability Assessment Committees to monitor the situation of food security. Recent experiences of increasing food insecurity in the region, prompted by extreme droughts in the 1990s, resulted in the establishment of a Regional Vulnerability Assessment Committee (RVAC) in 1999. The impetus was for a better understanding of vulnerability in the region (Marsland 2004). The RVAC programme falls under the FANR directorate, within a programme known as Regional Vulnerability Assessment

and Analysis (RVAA). Key partners in this programme include major regional stakeholders concerned with food security and humanitarian responses: among them the World Food Programme (WFP), Food and Agriculture Organisation (FAO), Famine Early Warning System Network (FEWSNET), Save the Children UK, United Nations Office for the Coordination of Humanitarian Affairs (OCHA) and UNICEF. The RVAC produces emergency needs reports and special vulnerability assessment reports; and is now accompanied by similar higher resolution reports from a number of national Vulnerability Assessment Committees that also exist in the region. At the moment climate change is not explicitly addressed in these assessments – although clearly weather as a contextual factor is taken into account – but the recently established Regional Climate Change Programme (RCCP) is hoping to work with the RVAC to better integrate consideration of climate change.

In addition to the RVAC, a number of SADC member states also have national VACs, whose approach to monitoring food security is based on the household-economy approach developed by Save the Children UK. A competing methodology is adopted by the FAO in their Food Insecurity Vulnerability Information Mapping Systems (FIVIMS), which is currently active in South Africa and Mozambique (Du Toit and Ziervogel 2004), and also Namibia and Madagascar. These food security monitoring systems issue warnings to advise of impending situations of food insecurity, and these are important for humanitarian organisations and NGOs to plan appropriate responses. However, as with climate forecasts, whilst the information is available at national level, it rarely makes it to the ground where people could use it to employ additional local coping strategies. A major gap which currently needs to be addressed, therefore, is the provision of a “boundary organisation” which could facilitate the communication discontinuity between information providers and potential information users (Vogel and Vincent 2008). Botswana currently has a relatively successful programme of drought management, partly due to the technical strength of the information and monitoring system, but also due to the commitment of the government, and district-level capacity, in ensuring timely dissemination, together with availability of domestic and international resources to ensure appropriate response (Belbase and Morgan 1994).

Botswana is fortunate to have strong institutional (government) capacity and resources, and this highlights another important aspect of the southern African region: the diversity of countries. As is apparent from this review, a disproportionately large proportion of the research capacity and programmes within the region either originate from, or are housed in South Africa. This reflects the presence of a number of world class universities and research institutions, together with the size of the country relative to some of its neighbours. But even in South Africa, where the research capacity is superior, it is still clear from reviewing the tables in section 6 that a number of key individuals play pivotal roles in a lot of the various initiatives that are underway in the region on climate change and food security. This situation is even more marked in other countries, particularly those with the lower levels of human development (excluding Botswana, Namibia and Mauritius), where a handful of individuals are typically always approached with regard to various development initiatives. The recently approved Regional Climate Change Programme is funding doctoral studies related to climate change in order to build capacity, but there is still much more demand. A major role that DDRN could play, therefore, is in using the research and technical expertise within the network to strengthen both institutional and individual capacity. This could take place, for example, through exchange visits and skill-share visits, whereby a member of DDRN spends some time in-country with the appropriate institution/individual to raise their awareness of issues and disseminates available information in order to increase their capacity.

The need to strengthen institutional and individual capacity applies both to research institutions but also to government structures. Part of the reason for failure to disseminate national climate and food security information relates to gaps within governance structures that impede the cascading from national down to local level. A major problem here is the inability of the public sector to

compete with private sector remuneration packages, which means that high quality staff within government are often soon “poached” – particularly at sub-national level. Although this is not something that can be addressed in the short term, there is need for technical assistance and training to ensure that institutions are aware of the resources available to them. Under the UNFCCC and the Kyoto Protocol, for example, are a number of funding mechanisms administered by the Global Environment Facility (GEF). As international financial and technical flows for adaptation grow, there is a requirement to strengthen capacity of agriculture sector institutions to access these resources. Strengthening national institution capacity, particularly for long term agricultural planning and agricultural extension, would in turn feed into the potential for national and international research links to put emerging technologies into practice. Given the importance of water in agriculture, this is also a potential area of overlap for the Danish Water Network. Capacity building could be undertaken in conjunction with both networks: whereby climate change training is provided by DDRN and the Danish Water Network to show water-related agriculture staff how they can integrate this into their planning.

But of course there will always remain pure research needs, due to the dynamism of the situation surrounding climate change and food security. A case in point is the 2008 food price crisis, which provided an additional stressor to the food system and endangered food security in many southern African countries, leading to protests and other civil society manifestations. Although the situation reached a head in 2008, the underlying instability and volatility of markets has long been a factor in fluctuating food prices reflecting variable productivity (Jayne, Zulu, and Nijhoff 2006). As variable productivity is likely to continue under climate change, it is even more imperative to investigate the desirability and options for the stabilisation of staple food prices in southern Africa (Poulton et al. 2006). Simulation models have already shown that hedging maize food security imports into Malawi and Zambia on the South African Exchange (SAFEX) can spread import costs over time, thereby reducing variability and also possibly generating lower average costs (Dana, Gilbert, and Shim 2006). Similarly there will remain a need to assess the impact of climate change on food prices linked to both climate shocks and the evolving markets for both biofuels and biomass for carbon sequestration.

Table: Summary of recommendations of gaps for DDRN to fill in southern Africa

- | |
|--|
| <ul style="list-style-type: none"> ▪ Acting as a boundary organisation between technical information services and end-users to ensure dissemination of research-based knowledge; <ul style="list-style-type: none"> ○ Ensuring seasonal forecasts are disseminated to farmers ○ Ensuring food security alerts are disseminated to donors and relevant national government departments ▪ Providing technical assistance to government departments through exchange visits and skill-share visits; <ul style="list-style-type: none"> ○ Building capacity to understand and make use of appropriate information available to them ○ Providing a link between government departments and international research findings ○ Providing training on climate change – as a cross-cutting issue – to a variety of different government departments ○ Building awareness of international funding opportunities and partnerships ▪ Building research capacity with regards to climate change, especially outside of South Africa <ul style="list-style-type: none"> ○ Working with existing researchers whose work is relevant to climate change even if they don't realise it, for example in, <i>inter alia</i>, agriculture, geography, biology or economics departments ▪ Research gaps |
|--|

- Market influences on food prices, including (but not exclusively) the role of biofuels

5 CONCLUSION AND RECOMMENDATIONS

As this report has shown, both climate change and food security are areas of major concern for southern Africa. A number of research programmes, of varying size, geographical scope and duration, have taken place within the region. Whilst this report has focused on the research programmes, it is important to note that there are also a plethora of smaller development interventions taking place to address the impacts of climate change on food security in southern Africa (see the appendix for a selection of other regional actors who are engaged as practitioners in climate change and food security debates).

Climate change is a cross-cutting issue that will affect a number of other concerns, including food security, water and health (the three focal areas that DDRN is investigating). *Mainstreaming consideration of climate change into other arenas, rather than trying to address it as standalone, is thus imperative.* Climate change has arguably gained more recognition in the developed world, and with the UNFCCC encouraging technology transfer and north-south funding mechanisms for mitigation and adaptation, it is not surprising that a lot of the work in Africa is driven by international donors (both bilateral and multilateral). A number of key international actors are directing their activities accordingly. For example, in their recent White Paper the UK's Department for International Development cite climate change as a key development priority (DFID 2006). The joint International Development Research Centre (Government of Canada) and DFID Climate Change Adaptation in Africa (CCAA) has recently launched in Africa, promoting adaptation research and capacity building regionally and across the continent.

Furthermore, general development activities play an important role in food security, and indeed often aim to address food security. At best, if such development interventions consider climate change, they can promote adaptation, but at worst if they don't, there is a risk to the successful outcome of the project and its deliverables, or that the project might inadvertently increase vulnerability to climate change. This has been highlighted with particular reference to NGO interventions by the Working Group on Climate Change and Development (a coalition of NGOs) by the two reports: *Up in Smoke?* and *Africa: Up in Smoke?* (Simms, Magrath, and Reid 2004; Simms 2005).

A number of donors and development agencies have also committed to "climate-proofing" their activities. Among them are Norway (Eriksen and Naess 2003), Germany (Klein 2001) and the World Bank (Burton and Van Aalst 2004). In 2006 the OECD Environment Ministers made the Declaration on Integrating Climate Change Adaptation into Development Cooperation; and monitoring of the progress of member states in mainstreaming awareness of risks and high level policy endorsement has commenced, but could be improved, particularly through cooperation between different bilateral and multilateral donors (Gigli and Agrawala 2007). Indeed it is generally considered that the most appropriate way of promoting adaptation to climate change is to mainstream adaptation into development activities (Schipper 2004; Beg et al. 2002; Davidson et al. 2003).

In reality, however, mainstreaming adaptation into development tends to be problematic to implement due to the fact that climate change is a cross-cutting issue that does not sit well with existing institutional structures. As a result, policies which ought to consider climate change and adaptation are often developed in isolation: in Tanzania, for example, the government has failed to incorporate climate change into its National Strategy for Growth and Reduction of Poverty, its National Environmental Policy and its National Disaster Management Policy – all of which seriously impede the country's potential to actively address the potential adverse impacts of climate change (Ehrhart and Twena 2006).

This report has looked at those research programmes that do integrate climate change and food security, but there are many more initiatives which arguably should include climate change, but

currently do not do so. Examples are the New Partnership for Africa's Development's (NEPAD) Comprehensive Africa Agriculture Development Programme (CCADP), which has no mention of climate change in its programme specification. We firmly believe that *raising awareness of the implications of climate change for such relevant partners is imperative*, and is a key role that DDRN could undertake. Related to this is the *general promotion of climate change communication*.

In order to complete the tabular data on research programmes and institutions, we have relied primarily on websites and other web-based resources. A major finding of this work is that websites are rarely maintained and updated, and without this, dissemination of important research findings is clearly impeded. A number of international-based web portals currently exist to try and rectify this situation – for example a number of themed Eldis Development Reporters issued by the Institute of Development Studies at the University of Sussex, but they are, of course, reliant on being able to find the information in the first place. One way that DDRN could improve this situation is to provide technical assistance to programmes/institutions in order to ensure that they have a communication strategy and that it is up-to-date. This would also *promote further cross-regional learning through partnership formation and lesson sharing*.

Our final conclusion from this research is that, as the tables show, there are a number of research programmes already underway in southern Africa addressing climate change and food security. On paper, their descriptions are impressive, but from our experience of working in the region, they often do not live up to expectations due to shortfalls in implementation capacity. By merely commissioning these scoping studies, it is clear that DDRN is intent on exploiting opportunities rather than re-inventing the wheel. Following this, it is our recommendation that, rather than commencing a new research programme, *DDRN consider placing their research and technical capacity in an existing programme in order to revive/continue it*.

6 RESEARCH CAPACITY IN SOUTHERN AFRICA

Research programmes/knowledge platforms/networks

Alphabetical listing as entries appear:

Listings in italics indicate that no changes have been made to the information provided in the February 2009 report

1. Assessments of Impacts and Adaptations to Climate Change (AIACC) in Multiple Regions and Sectors¹
2. Capacity Strengthening of Least Developed Countries for Adaptation to Climate Change (CLACC)
3. Climate Change Adaptation in Africa (CCAA)
4. *Famine Early Warning Systems Network (FEWS NET)*²
5. Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN)
6. Food Insecurity and Vulnerability Information and Mapping Systems (FIVIMS)
7. Global Environmental Change and Food Systems (Southern Africa) (GECAFS-SAF)
8. International Council for Science – Regional Office for Africa (ICSU – ROA)
9. International Food Policy Research Institute (IFPRI)
10. International Institute for Environment and Development: Climate Change Group (IIED)
11. **The International Center for Water Economics and Governance in Africa (IWEGA)**³
12. Regional Climate Change Programme (RCCP)
13. Regional Hunger and Vulnerability Programme (RHVP)
14. *Southern Africa Regional Poverty Network (SARPN)*
15. Southern African Development Community Regional Vulnerability Assessment Committee (SADC-RVAC)
16. *Southern African Vulnerability Initiative (SAVI)*

¹ All entries in standard font have been extensively updated from the February 2009 report

² Entries in italics indicate that no changes have been made to the information provided in the February 2009 report

³ Entries in bold are new and did not appear in the February 2009 report

Summary of programme types, dates of operation, and geographical focus:

Programme name	Programme type	Dates	SADC Countries included:
Assessments of Impacts and Adaptations to Climate Change (AIACC) in Multiple Regions and Sectors	Global funding initiative	2001-current	Botswana; Malawi; Mozambique; Seychelles; South Africa; Tanzania Zambia; Zimbabwe
Capacity Strengthening of Least Developed Countries for Adaptation to Climate Change (CLACC)	International network	2003-current	Malawi; Mozambique; Tanzania; Zambia; Zimbabwe
Climate Change Adaptation in Africa (CCAA)	Regional donor-led funding programme for research projects	2006-current	Madagascar; Malawi; Mauritius; Mozambique; Namibia; South Africa; Tanzania; Zambia; Zimbabwe
<i>Famine Early Warning Systems Network (FEWS NET)</i>	<i>US-funded technical assistance initiative</i>	<i>1985-current</i>	<i>Malawi; Mozambique; Tanzania; Zambia; Zimbabwe</i>
Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN)	A regional policy research and advocacy network whose operations are informed by major regional policy frameworks and processes in Southern African.	2002-current	Angola; Botswana; Lesotho; Swaziland; Mauritius; Malawi; Madagascar; Mozambique; Namibia; South Africa; Tanzania; Zambia; Zimbabwe
Food Insecurity and Vulnerability Information and Mapping Systems (FIVIMS)	UN inter-agency working group	2000-current	Madagascar; Mozambique; Namibia South Africa
Global Environmental Change and Food Systems (Southern Africa) (GECAFS-SAF)	International research programme	2001-2011	Angola; Botswana; Lesotho; Malawi; Mozambique; Namibia; South Africa; Swaziland; Zambia; Zimbabwe
International Council for Science – Regional Office for Africa (ICSU – ROA)	Non-governmental (research) organisation	2005	Sub-Saharan Africa
International Food Policy Research Institute (IFPRI)	Research institute of CGIAR	1975	Angola; Botswana; Democratic Republic of the Congo; Lesotho; Madagascar; Malawi; Mauritius; Mozambique; Namibia; South Africa; Swaziland; Tanzania; Zambia; Zimbabwe
International Institute for Environment and Development: Climate Change Group (IIED)	Independent international research organisation running several programmes	2001	Developing countries

The International Center for Water Economics and Governance in Africa (IWEGA)	A fully specialised research and training programme on water economics and governance	May 2009	SADC countries
Regional Climate Change Programme (RCCP)	Regional programme for southern Africa funded by DFID	August 2007	Angola, Botswana, DR Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe
Regional Hunger and Vulnerability Programme (RHVP)	Regional programme for southern Africa funded by DFID	2005-2010	Whole of SADC
<i>Southern Africa Regional Poverty Network (SARPN)</i>	<i>Regional network/NGO</i>	<i>2001-current</i>	<i>Whole of SADC</i>
Southern African Development Community Regional Vulnerability Assessment Committee (SADC-RVAC)	Multi agency regional committee	1999	Whole of SADC
<i>Southern African Vulnerability Initiative (SAVI)</i>	<i>Regional research programme and network</i>	<i>2003</i>	<i>Southern Africa</i>

Programme title	Assessments of Impacts and Adaptations to Climate Change in Multiple Regions and Sectors (AIACC)
Programme type	A global initiative to advance scientific understanding of climate change vulnerabilities and adaptation options in developing countries.
Contact details/ key personnel	<p>Jyoti Kulkarni, AIACC-START Contact 2000 Florida Ave. NW Suite 200 Washington, DC 20009 Phone: 202.462.2213 Fax: 202.457.5859 Email: jkulkarni@agu.org</p> <p>Mahendra Kumar, Task Manager for AIACC Climate Change Enabling Activities Division of Policy Development and Law United Nations Environment Programme P.O. Box 30552 Nairobi, Kenya Phone: (254 20) 623489 Fax: (254 20) 624324 / 622788 Email: mahendra.kumar@unep.org</p> <p>General AIACC inquiries: aiacc@agu.org</p>
Country/ies	<i>SADC countries:</i> Botswana Malawi Mozambique Seychelles South Africa

	Tanzania Zambia Zimbabwe
Agencies involved/ partnerships	<ul style="list-style-type: none"> ▪ developed in collaboration with the UNEP/WMO Intergovernmental Panel on Climate Change (IPCC) ▪ funded by the Global Environment Facility with collateral funding has been provided by the United States Agency for International Development, the Canadian International Development Agency, the United States Environmental Protection Agency, and the World Bank ▪ executed jointly by START and the Third World Academy of Sciences (TWAS).
Year started	2001
Programme description	By funding collaborative research, training and technical support, AIACC aims to enhance the scientific capacity of developing countries to assess climate change vulnerabilities and adaptations, and generate and communicate information useful for adaptation planning and action.
Programme aims and objectives	<p>Filling Gaps in Scientific Knowledge and Capacity</p> <p>The Third Assessment Report of the IPCC highlighted that developing countries are highly vulnerable to climate change. Yet gaps exist in understanding the nature of this vulnerability and opportunities for adaptation. Furthermore, in many of these countries, there is a need for improved scientific and technical capacity to conduct the integrated, multi-disciplinary regional investigations necessary to fill these gaps.</p> <p>AIACC aims to fill these gaps by funding, training, and mentoring developing country scientists to undertake multi-sector, multi-country research of priority to developing countries. The research activities will address a range of questions about vulnerabilities to climate change and multiple other stresses, their implications for human development, and policy options for responding. The information, knowledge, tools and skills that will be produced by AIACC research will enhance the ability of developing countries to assess their vulnerabilities and adaptation options.</p> <p>AIACC takes an approach to capacity building that is research driven. The most important component of the AIACC capacity building program is the expertise that scientists will gain through participation in multidisciplinary research teams working on joint 3-year research projects of their own design. The research experience is supplemented by a program developed with input from the regional study participants that includes training, mentoring and networking with participating scientists for mutual assistance.</p> <p>Anticipated Outcomes of AIACC</p> <ul style="list-style-type: none"> ▪ Publication of peer-reviewed scientific articles by participating scientists that significantly expand understanding of developing country vulnerabilities and adaptation options ▪ Increased numbers of developing country researchers, particularly young researchers, who are actively engaged in global change research ▪ Increased participation of developing country scientists in future assessments of the IPCC

	<ul style="list-style-type: none"> ▪ Wider understanding of climate change issues among stakeholder groups in developing countries ▪ Use of information generated by AIACC studies in National Communications and for planning adaptation actions
Outputs	<ul style="list-style-type: none"> ▪ Funding Research to Support Adaptation Decisions AIACC is providing financial support to 24 regional study teams to conduct three-year investigations of climate change impacts, adaptation and vulnerability in 46 developing countries. Participating in these studies are 235 developing country scientists and more than 60 graduate and undergraduate students. The AIACC regional studies are diverse in their objectives, scientific methods, and in the sectors and systems to be investigated. These include, among others, food security, water resources, livelihood security, and human health. Despite this diversity, the studies share a common "second generation" assessment approach that places understanding vulnerability at the centre of the assessment, engages stakeholders in the assessment process, and gives priority to strengthening the information base for making decisions about adaptation to climate change. ▪ Moving Toward a Second Generation of Climate Change Assessments A first generation of climate change assessments sought to understand how climate might change and what would be the likely impacts. These studies revealed that impacts would differ for different people, places and times, prompting a new set of questions. Who is vulnerable to harm from climate change and why are they vulnerable? Will these vulnerabilities exacerbate, or be exacerbated by, other environmental and social changes that stress societies? How can people adapt and lessen their vulnerability to climatic and other stresses? A second generation of assessments is emerging which focuses on these and similar questions while engaging stakeholders in the assessment process to help focus research on local and regional priorities. Second-generation assessments examine vulnerability by analyzing exposures to stresses, including climate change, the sensitivities of exposed people and systems to the stresses, their capacities to cope and adapt, and their resilience or recovery potential. They also evaluate the range of response options for reducing risks. The regional studies funded under the AIACC project include elements of first generation assessments, but take the state of the science one step further to incorporate elements of second generation assessments. These elements include evaluation of vulnerabilities and adaptation strategies, use of observed impacts of recent climate variability to understand present vulnerabilities, use of socioeconomic scenarios to investigate multiple and interacting future stresses, and engagement of stakeholders. From this initial orientation toward assessment of vulnerabilities and adaptation, AIACC can be expected to make a major contribution to the evolution of second-generation assessments. ▪ Training The training component was initiated with a series of three workshops in 2002. International teams that included experts from the IPCC and other organizations provided training in methods and tools for assessing vulnerability and adaptation and constructing scenarios of climate and socioeconomic conditions. The training emphasized the second-generation approach to

assessment. Participants were encouraged to rethink and revise the scientific designs of their projects. The workshops also provided opportunities for participants to discuss their projects and learn from each other. Additional training activities are being planned. The 2002 workshops included:

- A project-launching workshop hosted by UNEP in Nairobi, Kenya in February 2002.
- A scenarios workshop hosted and co-organized by the Tyndall Centre, University of East Anglia, UK, in April 2002.
- A vulnerability and adaptation workshop hosted by TWAS in Italy and co-organized by the Stockholm Environment Institute – Oxford.

▪ **Mentoring**

The regional study teams have been aided in their early efforts to plan and initiate their projects by a team of AIACC Mentors. The mentors, drawn from both developing and developed countries, will assist the study teams throughout the AIACC project. The mentors will advise regional study teams on the selection and application of data, methods, models and scenarios for climate change assessment, help study teams to troubleshoot problems as they arise, and direct teams to other sources of expertise as needed. An important function of the mentors will be to encourage and facilitate publication of AIACC study results in peer-reviewed journals. In addition, a searchable database of international experts in the field is currently under development.

▪ **Networking**

Regional workshops are being planned for early 2003 and 2004 in Africa, Asia/Pacific and Latin America/Caribbean. The regional workshops will bring together AIACC mentors, regional study participants, and invited researchers and stakeholders from the region. Participants will present papers from their research, share advice for next steps, collaborate across study teams to solve common problems, plan for joint publications, and consult with mentors and other experts about their projects. In addition to the workshops, regional study team members will also provide technical support to each other through an active AIACC on-line discussion group. The workshops and discussion group will help to establish regional networks of scientists who can collaborate and support each other in continuing investigations of global change.

▪ **Publications**

Lessons from the AIACC regional assessments are available in two new 8-page pamphlets from the AIACC project:

- For *Whom the Bell Tolls, Vulnerabilities in a Changing Climate* summarizes lessons about vulnerability to climate change from the AIACC investigations in Africa, Asia, Latin America and Small Island States. The vulnerability lessons include the urgency of climate change risks, the role of social and governance systems in dampening or amplifying vulnerability, impediments to development from water scarcity, worsening land degradation, threats to rural poor, vulnerabilities in coasts and small islands, risks to ecosystems and species, and human health risks.
- Lessons for climate change adaptation are summarized in *A Stitch in Time, Adapting to a Changing Climate*. The

adaptation lessons include: adapt now, adaptation is development, adaptation is for ourselves, international financial help is necessary, strengthen institutions, involve those at risk, expand information and awareness, and adaptation is place-based.

Studies from SADC countries:

- Impacts and Adaptations to Climate Change by the Biodiversity Sector in Southern Africa (Robert Scholes, CSIR Division of Water, Environment and Forest Technology, South Africa)
- Development of Regional Climate Change Scenarios for Sub-Saharan Africa (Bruce Hewitson, Climate System Analysis Group, University of Cape Town, South Africa)
- Integrated Assessment of Miombo Region: Exploration of Impacts and Adaptation Options in Relation to Climate Change and Extremes (Paul Desanker, Department of Environmental Sciences, University of Virginia, USA, and Manuel Ferrao, Centro Nacional de Cartografica e Teledeteccao, Mozambique)
- Impacts of Climate Change, Vulnerability and Adaptation Capacity in the Limpopo Basin of Semi-Arid Land Southern Africa: The Case of Eastern Botswana (Opha Pauline Dube, Department of Environmental Science, University of Botswana, Botswana)
- Capacity Building in Analytical Tools for Estimating and Comparing Costs and Benefits of Adaptation Projects in Africa (Ogunlade Davidson, Energy and Development Research Centre, University of Cape Town, South Africa)

More detailed information about the AIACC regional studies can be found at the CIESIN/AIACC Data Methods and Synthesis website. The CIESIN/AIACC Data Methods and Synthesis website was developed with partners at the Center for Climate Systems Research (CCSR) and the Center for International Earth Science Information Network (CIESIN) at Columbia University to provide a web-based information network about the AIACC regional studies.

Workshops and meetings relevant to the SADC region:

- Second AIACC Regional Workshop for Africa and Indian Ocean Islands, 24-27 March, 2004, Hotel Ngor-Diarama, Dakar, Senegal
- First AIACC Regional Workshop and Open Meeting for Africa and Indian Ocean Islands, 10-13 March, 2003, Hartebeespoort, South Africa
- AIACC Project Development Workshop: Climate Change Vulnerability and Adaptation, 3-14 June 2002, Trieste, Italy. Hosted by the Third World Academy of Sciences
- AIACC Project Development Workshop: Development and Application of Scenarios in Impacts, Adaptation and Vulnerability Assessments
15-26 April 2002, Norwich, UK. Hosted by the Tyndall Centre for Climate Change Research at the University of East Anglia
- AIACC Global Kick-off Meeting, 11-15 February 2002, Nairobi, Kenya. Hosted by United Nations Environment Programme

AIACC Working Reports

	<p><i>AIACC Final Reports</i></p> <p><i>AIACC Project Newsletter</i></p> <p><i>Articles and Documents about AIACC</i></p> <p><i>Meeting and Workshop Summary Reports</i></p> <p><i>AIACC Presentations</i></p> <p><i>AIACC Regional Study Progress Reports</i></p>
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Programme title	Capacity Strengthening of Least Developed Countries for Adaptation to Climate Change (CLACC)
Programme type	International group of fellows and experts
Contact details/ key personnel	<p>Dr. Saleemul Huq Head, Climate Change Programme International Institute for Environment and Development (IIED) 3 Endsleigh Street London WC1H 0DD United Kingdom</p> <p>Telephone: +44 (0) 20 7388-2117</p>

	<p>Fax: +44 (0)20 7388-2826 Email: saleemul.huq@iied.org</p>
Country/ies	<p><i>SADC countries:</i> Malawi Mozambique Tanzania Zambia Zimbabwe</p>
Agencies involved/ partnerships	<p><i>International partners:</i> International Institute for Environment and Development (IIED) 3 Endsleigh Street, London, England, WC1H 0DD Tel: +44 (0) 20 7388-2117, Fax: +44 (0)20 7388-2826</p> <p>London School of Hygiene & Tropical Medicine (LSHTM) Keppel Street, London WC1E 7HT, UK Switchboard: +44 (0)20 7636 8636, Fax: +44 (0)20 7436 5389</p> <p>Stockholm Environment Institute (SEI) University of York, Heslington, York, YO10 5DD, UK. Tel +44(0)1904 432897, fax +44(0)1904 432898</p> <p>Potsdam Institute for Climate Impact Research (PIK) P.O. Box 60 12 03, 14412 Potsdam, Germany Phone +49-331-288-2500, Fax +49-331-288-2600 Email pik@pik-potsdam.de</p> <p><i>Partners in southern Africa:</i> Regional Co-ordinator: ZERO Regional Environment Organisation 158 Fife Avenue, Harare PO Box 5338, Harare, Zimbabwe Tel/Fax: (+263 4) 791333/700030/720405</p> <p>Local Partners: Coordination Unit for the Rehabilitation of the Environment (CURE)</p>

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Local Partners
Sudanese Environment Conservation Society (SECS)
P.O. Box 321 Khartoum , Sudan
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Environmental Protection and Management Services - EPMS
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	<p>Phone : +256 (0) 41 530575 / 531150, Fax : +256 (0) 41 531236</p> <p>Funded by</p> <ul style="list-style-type: none"> ▪ Royal Norwegian Ministry of Foreign Affairs ▪ UK Department for International Development - DFID ▪ Dexter Trust, Embassy of the Federal Republic of Germany ▪ Norwegian Agency for Development Cooperation - NORAD ▪ Swedish International Development Cooperation Agency - Sida <p>CLACC is being undertaken by the Regional and International Networking Group (RING), and is managed by IIED on behalf of the group.</p>
Year started	2003
Programme description	The aim of CLACC is to strengthen the capacity of organizations in poor countries and support their initiatives in sustainable development through the network of fellows. CLACC believes that adaptation to climate change goes hand in hand with sustainable development. CLACC experts come from a wide variety of fields, including microbiology, wildlife conservation, natural resources, agriculture, hydrology and anthropology. This multi-disciplinary approach helps bridge the gap between climate change and development. While the network is also an advocate for adaptation during international conferences such as the COP and with local governments.
Programme aims and objectives	<p>CLACC objectives:</p> <ul style="list-style-type: none"> ▪ Strengthen the capacity of civil society in LDCs to adapt to climate change creating greater adaptive capacity among the most vulnerable groups ▪ Establish an information and knowledge system catering to countries dealing with the adverse impacts of climate change ▪ Mainstream the NAPA (National Adaptation Programmes of Action) process with key non-governmental stakeholders
Outputs	<ul style="list-style-type: none"> ▪ CLACC Research: A research programme started in 2005. This will assess grass-roots adaptation activities in various sectors (coastal areas, water management, disaster preparedness and response, health, agriculture, forestry etc.), and feed this information into national adaptation planning (including NAPAs) and international decision-making. National and regional workshops will consolidate lessons learned in LDCs on adaptation to climate change and the NAPA process. Lessons learned will be disseminated at international meetings and through published reports. <p>The first research topic focused on climate change and health in the LDCs. CLACC partners engaged with in-country health experts, and with support from the London School of Hygiene and Tropical Medicine (LSHTM) conducted an assessment of key climate change and health issues in their country. This information fed into national adaptation planning (including NAPAs) and international decision-making processes.</p>

Following the research on health, the CLACC programme embarked on a research programme on climate change and cities. This acknowledges the little attention given to how urban areas in the poorer nations will cope with climate change impacts in the years to come. The work involves a mapping exercise to assess where vulnerable areas are and illustrate this on maps. Official city maps do not provide such information. Fellows need to meet a range of stakeholders in order to assess where key vulnerabilities lie. This research is ongoing and will be followed by a programme of work on the economics of climate change in selected LDCs.

▪ **Regional Workshops:**

The CLACC programme has by now had sufficient experience and knowledge on issues of adaptation to climate change to convene a group of like-minded actors from civil society in the four regions to discuss, brainstorm and plan next steps on the adaptation agenda in their respective regions and countries.

In collaboration with ecibi, four workshops were held in 2008:

West Africa; Botswana; Guinea and Maldives.

▪ **CLACC project (2008): Cities and Climate Change**

Climate change related extreme events and gradual changes have rarely been considered in urban planning or infrastructural design in the LDCs. There is also a lack of city level risk and vulnerability maps that could facilitate awareness raising, planning, and decision making processes in the LDCs. Because of these issues, CLACC has placed special emphasis on the linkage between climate change and urbanization for the year 2007-8. Innovative urban policies and practices have shown that adaptation is possible and can be built into development plans. These include community-based initiatives led by organizations formed by the urban poor and local governments working in partnership with their low-income populations. CLACC's work on climate change adaptation in cities aims to provide the necessary information for communities and local governments alike to address this issue in the best possible way.

The specific objectives of the work on cities and climate change are:

- to collect and analyse available city reports and maps in order to prepare a review document highlighting climate related problems (current stressors and projected climate change impacts) and their impacts (on a variety of sectors, and affected by the level of adaptive capacity present) in each city;
- to conduct an institutional mapping exercise of relevant stakeholders (their current function and potential role in climate change adaptation) and to discuss the review document with these;
- to produce a set of base maps for each city (showing key physical, administrative and demographic features), to superimpose climate related risk and vulnerability on these, and to prepare an international CLACC City Atlas displaying this information in a comparative format;

- o to provide the necessary information for communities and local governments to address climate change adaptation in the best possible way.

Selected publications relevant to the SADC region:

- Climate Change and Health in Tanzania, E. Kibona, 2008 (CLACC Working Paper 7)
- Climate Change and Health in Mozambique, A. J. Bambaige, B. Cuamba, M. dos Anjos Hauengue, 2008 (CLACC Working Paper 6)
- Climate Change and Health in Zambia, G. Kasali, 2008 (CLACC Working Paper 2)
- Climate Change Vulnerability Mapping: The Case of City of Harare, Zimbabwe, S. Zvigadza, 2008 (Cities and Climate Change Workshop)
- CLACC and IIED- Eastern and Southern Africa Regional Workshop on Adaptation to Climate Change, C. Awuor and S. Zvigadza, 2008 (Workshop Report)
- Environment and Urbanization Brief-15, Saleemul Huq, Sari Kovats, Hannah Reid, David Satterthwaite, 2007 (Brief)
- Disaster risk, climate change and international development: scope for, and challenges to, integration, Lisa Schipper and Mark Pelling, 2006 (Article)
- Climate change and disaster management, Geoff O'Brien, Phil O'Keefe, Joanne Rose and Ben Wisner, 2006 (Article)
- Reducing hazard vulnerability: towards a common approach between disaster risk reduction and climate adaptation, Frank Thomalla, Tom Downing, Erika Spanger-Siegfried, Guoyi Han & Johan Rockström, 2006 (Article)
- Financing climate change adaptation, Laurens M. Bouwer and Jeroen C. J. H. Aerts, 2006 (Article)
- Global Governance Initiative, 2006 (Annual report)
- Adaptation Science Newsletter, Don Maclver (editor), 2006 (Newsletter)
- A conceptual design tool for exploiting interlinkages between the focal areas of the GEF, Habiba Gitay, 2004 (Report)
- Adverse Impacts of Climate Change and Development Challenges: Integrating Adaptation in Policy and Development in Zambia, Johannes Chigwada, 2004 (CLACC report)
- Adverse Impacts of Climate Change and Development Challenges: Integrating Adaptation in Policy and Development in Mozambique, Johannes Chigwada, 2004 (CLACC report)
- Adverse Impacts of Climate Change and Development Challenges: Integrating Adaptation in Policy and Development in Malawi, Johannes Chigwada, 2004 (CLACC report)
- National Communication, Malawi, 2003 (Report)

Programme title	Climate Change Adaptation in Africa CCAA
Programme type	Regional-Africa donor-led funding programme
Contact details/ key personnel	For southern Africa: Jabavu Nkomo Senior Programme Specialist CCAA Eastern and Southern Africa Regional Office Liaison House, 2 nd and 3 rd Floors State House Avenue, PO Box 62084 Nairobi, Kenya
Country/ies	Across Africa (and projects in the following SADC countries: Madagascar, South Africa, Zambia, Zimbabwe, Malawi, Tanzania)
Agencies involved/ partnerships	Funded by DFID and IDRC Implemented through a number of research projects across Africa awarded by tender
Year started	2006
Programme description	The Climate Change Adaptation in Africa (CCAA) research and capacity development programme aims to improve the capacity of African countries to adapt to climate change in ways that benefit the most vulnerable. With joint funding from DFID and IDRC, it provides grants to research projects related to the overall aim, which are awarded on the basis of tender.
Programme aims and objectives	The Climate Change Adaptation in Africa (CCAA) research and capacity development programme aims to improve the capacity of African countries to adapt to climate change in ways that benefit the most vulnerable. Building on existing initiatives and past experience, the CCAA program works to establish a self-sustained skilled body of expertise in Africa to enhance the ability of African countries to adapt. The objectives are: <ol style="list-style-type: none"> 1. To strengthen the capacity of African scientists, organizations, decision makers and others to contribute to adaptation to climate change. 2. To support adaptation by rural and urban people, particularly the most vulnerable, through action research. 3. To generate a better shared understanding of the findings of scientists and research institutes on climate variability and change. 4. To inform policy processes with good quality science-based knowledge
Outputs	The CCAA project supports the above objectives through four main activities:

1. Communications and networking

Knowledge sharing is key to achieving all of the CCAA program's core objectives. In particular, it is essential to support shared learning on adaptation, and to inform policy processes with good quality, science-based knowledge. The CCAA program supports a number of communication and networking initiatives that aim to share knowledge and increase learning on adaptation. Such activities take place within all CCAA-supported research projects, involving the people most directly affected by climate change. In addition, the CCAA program team coordinates a number of information resources. The program also supports a three-year partnership to build networking and communication capacity among African institutions working on adaptation

- CCAA Learning Forums:

- Improving access to and use of seasonal forecasts in Africa
Nairobi, Kenya, March 8-12, 2010

- Introducing AfricaAdapt

Africa now has a new platform for learning and sharing knowledge about climate change and adaptation. AfricaAdapt – a pan-African networking initiative – was launched in May 2009. More than just a website, AfricaAdapt provides a means for researchers, policymakers, and all Africans affected by climate change to test new ways of sharing their experiences and challenges across barriers of distance, culture and language.

AfricaAdapt is led by four core partner organizations with complementary skills:

- ENDA-Tiers Monde, an international NGO based in Senegal
- Forum for Agricultural Research in Africa (FARA), a pan-African agricultural research organization with its secretariat in Ghana
- IGAD Climate Predictions and Applications Centre (ICPAC), a leading climate information organization based in Kenya
- Institute of Development Studies (IDS), a UK-based research and training institution with extensive experience facilitating knowledge exchange on international development issues

AfricaAdapt originated with the Climate Change Adaptation in Africa (CCAA)-supported project "Knowledge Sharing for Climate Change Adaptation in Africa." This three-year project explores how the livelihoods of vulnerable people in Africa can be improved by sharing climate adaptation knowledge between CCAA partners and other research teams, policy makers, civil society organizations, and vulnerable groups themselves.

The AfricaAdapt network provides a starting point for a continent-wide model of knowledge sharing. A range of tools and activities will support the networking and knowledge exchange, including a web site linking

network members; print, radio and other audio-visual resources; and face-to-face networking events. AfricaAdapt also provides small grants to test new ways of transforming adaptation knowledge into forms that can be used by African communities at risk from climate change.

The project is organized on a research-based learning model, with the aim of seeing core activities in knowledge exchange devolve to lead African institutions. Knowledge sharing officers based at each of the four core partner institutions provide hands-on support to the network and its contributors.

AfricaAdapt website: www.africa-adapt.net

- o Support for meetings and conferences

To increase regional capacity on adaptation, the CCAA programme provides financial assistance to institutions to facilitate African attendance at relevant national, regional and international events.

2. Education and Training

Building African capacity to address the expected impacts of climate change is core to CCAA's mandate. Weak adaptive capacity is a major contributor to Africa's high vulnerability to climate change. CCAA's focus is on helping researchers, policy makers and at-risk groups to collectively develop adaptation strategies to reduce this vulnerability. The program's support for action research brings these stakeholders together in a shared process of learning-by-doing. To complement this experiential learning on adaptation, the program supports a range of targeted capacity development initiatives across the continent, for CCAA partners and other key stakeholders in Africa.

- **African Climate Change Fellowships:** In 2007, CCAA approved funding for a suite of fellowships to support early- to mid-career African professionals and researchers in pursuing advanced studies related to climate change and adaptation. A call for applications was launched in August 2008 and in November 2008, 48 African scholars were selected as awardees for 2009-2010.

The African Climate Change Fellowships program is led by START (the global change SysTem for Analysis, Research and Training), the Institute of Resource Assessment (IRA) of the University of Dar es Salaam, and the African Academy of Sciences (AAS). A range of other institutions sponsor and host participating fellows.

These awards will increase both research and institutional capacity in Africa to address the expected impacts of climate change. Over the 30-month term of the initiative, the management of fellowship activities will shift towards the African partner institutions such that the IRA and AAS will play a leading role in global change science and education.

Fellowships range from six to 18 months duration. Selected Fellows will share their learning through adaptation seminars bringing together Fellows, their host supervisors, and others in the science and policy communities to share

experience and further debate on climate change in Africa.

- **CCAA training workshops:** Since August 2007, following an initial planning workshop held in Nairobi for staff and trainers, a series of workshops aimed at African researchers and other stakeholders was launched by CCAA, addressing topics key to action research on adaptation.

The workshops aim to build a strong cadre of institutions able to assess and integrate climate adaptation issues into long-term strategic development planning and expand the community of adaptation practitioners. Research partners gain knowledge of key issues in adaptation research, and the tools necessary to evaluate the risks climate change poses to people, governments, infrastructures and ecosystems.

In September 2007, a proposal development workshop was offered to prospective CCAA partners, to hone their skills in developing good quality proposals. The chart below summarizes workshops held to date, all led by a range of strong African institutions. Each workshop has been offered in both French and English, with participation typically ranging from 30 to 45 people. A number of workshops have involved policymakers, journalists and NGO representatives active on climate change.

3. Monitoring and evaluation

We measure the success of CCAA program activities by monitoring the resulting outputs, such as the number and range of projects supported, the range and quality of training provided, and the networks and communication channels created. We also look further ahead to the outcomes resulting from these strategies by monitoring progress by our partners. We look for signs that:

- Research institutions are better able to assess climate-related vulnerabilities and to evaluate and develop adaptation options
- At-risk groups, policymakers, and researchers share learning and expertise on climate vulnerability and poverty
- The poor in rural and urban environments apply their experience of adaptation with the knowledge and technologies generated by research to implement improved and effective adaptation strategies
- Policy processes are informed by good quality science-based work on vulnerability and adaptation, and by the experiences of the rural and urban poor.

- *NarrAdapt:*

NarrAdapt is a new initiative launched by the CCAA program to help researchers use testimonial narratives to monitor and evaluate adaptation and communicate adaptation experiences. CCAA-supported researchers are served by an email exchange list that allows for informal exchange with peers and access to mentoring from communications consultant Minielle Tall. A NarrAdapt project page has been created on the AfricaAdapt web site to make resources on using testimonials more widely available.

4. Participatory Action Research

The participatory action research supported by the CCAA must be of practical application, serving the needs of African communities by contributing to policies that reduce vulnerability.

Action research on adaptation brings representatives of affected communities and decision makers together with scientists in a shared process of "learning by doing." It weaves scientific and local knowledge to test and validate adaptation strategies. The linkages between researchers, policymakers and communities, which are at the core of this approach, help to ensure supported research is driven by the demands of research users, rather than the available supply of research institutions.

Projects currently underway in southern Africa include:

- *Climate Change Adaptation during the Conference of the Parties (COP 15)*; commencing 01/12/2009, ending 01/12/2010
The forthcoming Conference of the Parties to the Kyoto Protocol (COP 15) will be held in Copenhagen, 7-18 December 2009. It will be a landmark event given the importance of the post 2012 negotiations. There are a number of projects funded by IDRC's Climate Change Adaptation in Africa (CCAA) research and capacity development program that are both mature and beginning to yield good results. This grant will support the participation of three CCAA research partners in sessions during Climate and Development Day, convened by the International Institute for Environment and Development (IIED), and Agriculture and Rural Development Day, hosted by the Consultative Group on International Agricultural Research (CGIAR).
Implementing partner: International Development Research Centre (CIID; CRDI; IDRC)
- *Five-City Network to Pioneer Climate Change Adaptation in sub-Saharan Africa*; commenced 21/07/2009, ending 21/07/2012
Local governments and coastal cities in Southern Africa face a serious threat associated with climate change. Current climate change projections indicate that temperature increases, rising sea levels (permanent and temporary), changes in precipitation, and extreme events (floods, droughts, high winds) are likely to occur. These events are likely to have the greatest impact on those with the least access to infrastructure and services, the poorer sectors on the urban fringe. This project aims to design a framework for managing increased risk from climate change by applying the well-tested principle of locally designed and locally owned projects for the common good, as practiced by Local Governments for Sustainability (ICLEI). The project is expected to lay the groundwork for a local climate change adaptation strategy and action plan for each of the five urban centres under study: Cape Town (South Africa); Dar es Salaam (Tanzania); Maputo (Mozambique); Windhoek (Namibia); and Port St Louis (Mauritius).
Implementing partner: International Council for Local Environmental Initiatives (ICLEI) (Lucinda Fairhurst)
- *Monitoring and Evaluation Toolkit for Climate Change Adaptation Initiatives*; commencing 15/07/2009, ending 15/07/2011
Many African countries, regions and organizations are making plans for climate change adaptation. If such plans are to be effective, they will need to be monitored and evaluated on an ongoing basis. This grant will support the integration of monitoring and evaluation (M&E) in climate change adaptation initiatives by designing and testing an M&E toolkit and training materials in a number

of partner organizations. The idea is to harmonize approaches to M&E in a core group of climate change adaptation initiatives. Project outputs will include, in addition to the toolkit and training materials, a set of case studies on the test experiences and an outreach strategy for promoting the toolkit throughout Africa.

Implementing partners: United Nations Economic Commission for Africa (CENUA; CEPA; UNECA); Observatoire du Sahara et du Sahel (OSS); Centre Regional AGRHYMET

- *Urban-Rural Interdependence and the Impact of Climate Change in Malawi and Tanzania*; commencing 13/07/2009, ending 13/07/2012

Today, 39% of the African population lives in urban areas. Considering the current urbanization rate of 3.5% per annum, this proportion is expected to grow significantly, increasing the demand for food, shelter and social services in urban areas while putting pressure for increased food production on rural areas. But increased food production in rural areas of sub-Saharan Africa may not be possible owing to continued loss of young agricultural workers to the cities, declining soil fertility in many farming areas and dependence on rainfed agriculture. A growing concern is how climate change and climate variability will affect the growing urban population and the food supply systems sustain it. This study will attempt to elucidate rural-urban interdependency in Malawi and Tanzania; document the vulnerabilities and coping strategies of communities and how these will be affected by climate change; and offer communities, local governments and those involved in food supply systems alternatives for adapting to climate change and climate variability.

Implementing partner: Institute of Resource Assessment (IRA) (Dr Emma Liwenga)

- *African Researchers with Adaptation Policy Spaces*; commencing 18/03/2009, ending 18/09/2010

Poor understanding of policy processes tends to reduce the value of research results and the ability of researchers to influence policy. One of the main goals of IDRC's Climate Change Adaptation in Africa (CCAA) program is to build the capacity of researchers to influence policy. This grant will help CCAA partners in three countries in East Africa to do so. Researchers will investigate the complexity of adaptation policy processes in different countries and identify policy spaces; use this knowledge to build policy engagement tools and strategy; develop an analytical framework for investigating climate change adaptation policy processes in Africa; and mentor relationships between participatory action researchers and academic partners.

Implementing partners: International Development Research Centre (CIID; CRDI; IRDC) (Thomas Tanner)

- *Support Fund for Local Adaptation*; commencing 17/02/2009, ending 17/02/2011

The Climate Change Adaptation in Africa (CCAA) research and capacity development program aims to improve the capacity of African countries to adapt to climate change in ways that benefit the most vulnerable. This project seeks to strengthen the

leadership and technical and organizational capacity of grassroots communities in the area of adaptation to climate change. It will do so by putting in place a process for selecting pilot projects, identifying team needs in terms of capacity building, contracting providers of (public or private) capacity building, sharing the information generated with groups at risk and making a case before decision-makers.

Implementing partners: Innovations, Environnement Developpement en Afrique (IED Afrique) (Bara Gueye)

- *Promoting Participatory Action Research on Climate Change Adaptation in Africa Through Structured Learning*; commencing 04/04/2008, ending 04/04/2010

Climate models have shown that even if global greenhouse gas emissions are significantly reduced, the negative impacts of global warming will continue for a long time to come. This has led to calls for adaptation as the most viable option for reducing the threats associated with climate change, particularly in Africa, which is considered the continent most vulnerable to climate change. IDRC's Climate Change Adaptation in Africa (CCAA) program endeavours to promote adaptation to climate change through participatory action research projects targeted primarily to the poor. But, while there exists some expertise in participatory action research in the area of natural resource management in Africa, there is a near absence of it within the climate change adaptation research community. This project will therefore seek to build the capacity of CCAA grantees to apply participatory action research in support of climate change adaptation through an experiential process (learning by doing) under the guidance of experienced mentors.

Implementing partners: International Development Research Centre (CIID; CDRI; IDRC) and the Centre for International Forestry research (CIFOR)

- *Knowledge Sharing for Climate Change Adaptation in Africa*; Commencing 31/03/2008, ending 31/03/2011

This project aims to put in place a vast mechanism for sharing information on climate change adaptation across the continent of Africa. The interactive network will be a platform for exchange of ideas, debate and information sharing between diverse actors (communities, researchers, development practitioners, decision-makers, policymakers, civil society, donors, etc.) involved in solving the problem of adapting to climate change. Using information and communication technology (ICT), as well as traditional channels, the project will translate and process research findings and data in usable form for stakeholders. Moreover, the network will allow stakeholders to test the pertinence of research undertaken to date, identify gaps in available knowledge and propose research subjects to fill those gaps. In short, it will be a tool that will allow Africans to take charge of the issue of climate change at the local, national and continental level, and to defend their interests at the international level.

Implementing partners: Institute of Development Studies (IDS) (Tom Mitchell)

- *Community Based Adaptation to Climate Change in Africa*; commenced 13/02/2008, ending 13/02/2011

This project proposes to carry out climate change adaptation pilot projects in communities in eight African countries, six of which are least developed countries. The communities will be selected in collaboration with relevant actors, particularly meteorological

services, using the South-South-North Adaptation Project Protocol (SSNAPP), a methodology used for mapping vulnerability to climate change. The projects, implemented by nongovernmental organizations, will take a learning-by-doing approach, identifying ways of communicating climate change information to poor communities, and from communities to other stakeholders. The lessons learned will be shared with stakeholders at the local, national, regional and international levels, and inform ongoing initiatives promoting climate change adaptation and sustainable development.
Implementing partner: African Centre for Technology Studies (ACTS) (Prof. Judi W. Wakhungu)

- *Transferring the malaria epidemic prediction model to users in East Africa*; commenced 21/8/2007, ending 21/8/2010
In the highlands of East Africa, epidemic malaria is an emerging climate-related hazard that urgently needs addressing. Malaria incidence increased by 337% during the 1987 epidemic in Rwanda. In Tanzania, Uganda and Kenya, malaria incidence increased by 146%, 256% and 300%, respectively, during the 1997/1998 epidemic. About 80% of statistical variation in malaria incidence can be explained by rainfall and temperature. Current methods of detection do not provide sufficient lead-time to introduce effective intervention. In 2001, however, a malaria epidemic prediction model was developed by the Kenya Medical Research Institute that uses climatic factors to detect an epidemic 2-4 months before its occurrence, allowing sufficient time for intervention. The model has been tested and validated in parts of Kenya and Tanzania. This project will fine-tune the model, incorporate site-specific factors and transfer it to end users in Kenya, Tanzania and Uganda, and eventually other countries in East Africa. It will enhance the capacity of policymakers and health officials to provide early warning and intervene in an effective manner, and the capacity of local populations to respond appropriately. Considering that climate is not the only factor driving malaria, researchers will assess the role of non-biophysical factors in determining the incidence and control of the disease.
Implementing partner: Kenya Medical Research Institute, Nairobi (Dr Andrew K. Githeko)

- *Advancing Capacity to support Climate Change Adaptation: Five Pilot Programmes*; commencing 10/08/2007, ending 10/02/2010
This project seeks to reduce the vulnerability of poor populations in sub-Saharan Africa to climate change by mobilizing scientists and all the other actors concerned to inform political decision-making. It will do so by means of five pilot projects in rural and urban populations. The project will emphasize the generation, organization and communication of information on the risks resulting from climate change, climate variability and extreme climatic events, as well as preparation for their effects on food security (Cameroon, Ethiopia, Kenya) and water supply (South Africa, Burkina Faso). The lessons drawn from the five experiments can then be applied in larger scale projects.
Implementing partner: United nations Institute for Training and research (UNITAR) (Mamadou Moussa Diakhite)

- *African Climate Change Fellowships*; commencing 30/07/2007, ending 30/12/2010
Limited adaptive capacity is often cited as a major factor in vulnerability to climate change. IDRC's Climate Change Adaptation in Africa (CCAA) aims to enable African societies to cope with climate change. This grant will foster indigenous capacity to advance

and apply scientific knowledge to climate change adaptation by supporting the pilot phase of the African Climate Change Fellowship program. The program will provide about 58 early-to-mid-career African professionals and researchers with policy, doctoral, post-doctoral and teaching fellowships.

Implementing partners: International Development Research Centre (CIID; CRDI; IDRC) and the American Geophysical Union (AGU)

- *Climate Change Adaptation in Africa: Scoping Exercise*; commencing 13/07/2007, ending 10/08/2009

This grant will support a scoping phase for IDRC's Climate Change Adaptation in Africa (CCAA) program. The scoping phase will comprise five studies. The first - vulnerability assessment - will analyze the impact of climate change in North, South, West and East Africa, with reference to 16 projects currently funded under CCAA. The second - the economic evaluation - will estimate the cost of climate change on key economic sectors such as agriculture, food security and water resources. The third will examine the determinants and drivers of policy processes for adaptation to climate change in an effort to obtain an effective policy framework. The fourth - an institutional mapping exercise - will identify the strengths and weaknesses of institutions working on climate change, vulnerability and adaptation. And the fifth - regional dimensions of climate change adaptation - will focus on opportunities and constraints for regional risk-sharing. The results will serve as a knowledge base for thematic areas within CCAA and help identify priorities.

Implementing partners: International Development Research Centre (CIID; CRDI; IDRC)

- *Monitoring and Evaluating of Adaptive Capacity Relative to Climate Change*; commencing 21/06/2007, ending 10/11/2009

This project aims to enable IDRC's Climate Change Adaptation in Africa (CCAA) program initiative and partners to use monitoring and evaluation as a learning tool to strengthen adaptive capacity and evaluate how their efforts contribute to it. CCAA will engage a group of between six and 12 African experts to assess training needs and mentor project team members (two or three projects each). Specific project objectives are to support the creation of a monitoring and evaluation community of practice in the area of adaptation to climate change; strengthen the capacity of CCAA staff, teams and partners to monitor and evaluate adaptive capacity using a learning-by-doing approach; and strengthen the capacity of CCAA teams and partners to use narratives developed through writing, photography, video and audio recordings to document and provide evidence of their progress. A training video and local guidebook will be produced to assist them with the narratives.

Implementing partners: International Development Research Centre (CIID; CRDI; IDRC)

- *Vulnerability and adaptation to climate change: agricultural systems in Madagascar*; commenced 11/06/2007, ending 11/06/2010

Madagascar has completed its national plan of action for adapting to climate change. Several actors and decision-makers - agricultural policymakers, regional rural development managers, emergency services coordinators - are involved in the implementation of the plan. Unfortunately, they are far from understanding the spatial dimension of vulnerability to climate change, and lack the information, tools and skills to set priorities. This project will allow the University of Antananarivo to facilitate a dialogue between decision-makers and researchers at the national, regional and local level; to produce spatial information on the factors affecting vulnerability to climate change on the whole island of Madagascar; to better understand existing and possible

adaptation strategies; to explore various intervention strategies under different scenarios; and to reinforce national capacity in analysis of climate change vulnerability and adaptation.

Implementing partner: Universite d'Antananarivo (Lilia Rabaharisoa)

- *Managing climate risk to agriculture and water resources in South Africa*; commenced 27/3/2007, ending 27/3/2010

The Western Cape is South Africa's most valuable agricultural area and makes a substantial contribution to the country's balance of payments. But the Cape is experiencing rapid growth in water demand and increasing competition between agricultural and urban use. Moreover, the Intergovernmental Panel on Climate Change (IPCC) Special Report Emission Series (SRES) consistently suggests a future reduction in rainfall. Given the potential overlap between climate change and existing forms of climate variability, this project seeks to integrate the current treatment of seasonal and annual climate variability with decadal forecasts and long-term scenarios (up to 2050) generated by global climate models, also known as general circulation models (GCMs). The project will feature a previously tested model, extensive stakeholder engagement and capacity-building for local scientists. The idea is to enable private and public institutions in the Western Cape and the country to better integrate information on climate change and climate variability into water resources policy, planning and management.

Implementing partner: University of the Free State (Dr Daniel Barend Louw)

- *Resilience and the African smallholder: enhancing the capacity of communities to adapt to climate change*; commenced 27/3/2007, ending 27/3/2010

Because of the prevalence and intensity of poverty, populations in sub-Saharan Africa are highly vulnerable to the negative impacts of climate change, particularly those who depend on an environment that is already degraded. Any short- or long-term climate change will force farmers to adopt new agricultural practices, which may include a different choice of crop varieties, a change in the timing of major operations or an alternative food supply system. This project aims to enhance the ability of households, communities and relevant institutions to respond to changing circumstances with a view to reducing future threats to food security and environmental integrity. It will do so by working with farmers to identify improved farming technologies, and translating the results into action plans at the appropriate institutional level whether local or national.

Implementing partner: University of Zimbabwe (Dr Paul Mapfumo)

- *Building capacity to adapt to climate change in Zambia and Zimbabwe*; commenced 27/3/2007; ending 27/3/2010

This project seeks to improve incentives and opportunities for households in southern Zambia and south western Zimbabwe to cope with climate change. It will do so by investing in improved production technologies of practical value to small-scale farmers and encouraging their adoption by linking their dissemination with complementary investment in weather forecasting and projects of a useful nature (humanitarian relief, input provision, product marketing). The idea is to make the capabilities rather than the vulnerabilities of the poor the starting point for moderating the negative effects of climate change on agricultural production. Key interventions will include strengthening local institutions, building demand-led rural services, designing decision-support tools for managing smallholder assets including livestock, and developing new technologies for natural resource use under variable rainfall. Once identified and evaluated, the adaptation strategies will be used to prevent or mitigate the effects of climate change.

Implementing partner: Midlands State University (Prof Francis Themba Mugabe)

	<ul style="list-style-type: none"> • <i>Managing risk, reducing vulnerability and enhancing productivity under a changing climate; commenced 27/3/2007, ending 27/3/2011</i> The countries of the Greater Horn of Africa are particularly vulnerable to drought, exacerbated by widespread poverty and dependence on rainfed agriculture. Even with normal rainfall, the region does not produce enough food to meet its needs. The result is frequent climate-induced famines that are addressed using short-term emergency relief. Little or no attempt has been made to encourage producers to prepare for these events by modifying their agricultural systems. Nevertheless, opportunities exist to reduce the impact of drought and poverty in the region by capitalizing on the inherent adaptability of small-scale farmers. Using case studies from Ethiopia, Kenya, Sudan and Tanzania, this action-research project seeks to contribute to the development of adaptive strategies by gathering knowledge on vulnerability to drought within different social, political and economic contexts, and designing decision-making tools to reduce vulnerability. Implementing Partner: Sokoine University of Agriculture, Tanzania (Prof Henry Fatael Mahoo) • <i>Strengthening local agricultural innovation systems in less favourable and high potential areas of Malawi and Tanzania; commenced 23/3/2007, ending 23/3/2011</i> In many sub-Saharan African countries, poverty is linked to low agricultural productivity, which climate change threatens to aggravate. This action-research project aims to bring together institutions and individuals from the research, policymaking and farming communities to develop agricultural innovation systems that are better able to adapt to climate change and variability. They will do so with reference to case studies of farmers in two different agro-climatic sites - one disadvantaged and the other high-potential - in each of Malawi and Tanzania. Implementing partner: Institute of Resource Assessment, University of Dar es Salaam, Tanzania (Dr Amos Majule)
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Programme title	The Famine Early Warning Systems Network (FEWS NET)
Programme type	FEWS NET is a USAID-funded activity and is implemented by a private firm and several US Government agencies.
Contact details/ key personnel	Southern Africa <i>Regional Representative</i> Tel 1: +27 12 362-6494 Tel 2: +27 12 362-5650

	<p>Fax: +27 12 362-5651 Email: SouthernAfrica@fews.net</p> <p><i>USGS Regional Scientist</i> Tel: +267 395-1863 ext. 5069 Fax: +267 392-4099 Email: SA-USGS@fews.net</p> <p>East Africa <i>Regional Representative</i> Tel1: +254 20 3861475 Tel2: +254 20 3861476/9 Fax: +254 20 3861480 Email: EastAfrica@fews.net</p> <p><i>USGS Regional Scientist</i> Tel: + 254 20 37 54 950 Fax: +254 20 37 50 839 Email: GHA-USGS@fews.net</p>
Country/ies	<p><i>FEWS NET works in the following SADC countries:</i></p> <p>Malawi Mozambique Tanzania Zambia Zimbabwe</p>
Agencies involved/ partnerships	<p>The FEWS NET implementing partners are:</p> <ul style="list-style-type: none"> ▪ Chemonics International, Inc. ▪ United States Geological Survey (USGS) ▪ National Aeronautics and Space Administration (NASA) ▪ National Oceanographic and Atmospheric Administration (NOAA) ▪ United States Department of Agriculture (USDA) <p>FEWSNET collaborates with international, regional and national partners</p>
Year started	1985
Programme description	<ul style="list-style-type: none"> ▪ Provides timely and rigorous early warning and vulnerability information on emerging and evolving food security issues. FEWS NET professionals monitor and analyze relevant data and information in terms of its impacts on livelihoods and markets to identify potential threats to food security.

	<ul style="list-style-type: none"> ▪ Once these issues are identified, FEWS NET uses a suite of communications and decision support products to help decision makers act to mitigate food insecurity. ▪ FEWS NET also focuses its efforts on strengthening early warning and food security networks.
Programme aims and objectives	<p>Aims:</p> <ul style="list-style-type: none"> ▪ strengthen national and regional capacity for early warning and response planning; ▪ increase the usefulness of information for decision makers; ▪ improve the appropriateness of responses to food security related issues through a better understanding of food insecurity; ▪ improve the timeliness of responses to food insecurity, including fostering early policy action; ▪ improve local monitoring and analysis. <p>Objectives:</p> <ul style="list-style-type: none"> ▪ Production of high quality targeted early warning information. FEWS NET provide timely and accurate information to pinpoint and assess emerging or evolving food security problems, using the livelihoods approach combined with in-depth market analysis. FEWS NET strive to understand the information needs of decision makers and work to ensure the right information is available at the right time, in order to facilitate action to mitigate food insecurity. ▪ Develop sustainable networks. FEWS NET assists in the capacity development of information providers, and promotes the inclusion of a broader range of network participants from the United Nations, governments, the private sector, NGOs and civil society. ▪ Emphasis on policy-useful information. Although FEWS NET continues to monitor emerging and evolving food security problems, increased emphasis will be placed on understanding the underlying causes of food insecurity, and identifying long term development needs. All information will be oriented toward meeting the needs of a broader set of decision makers. ▪ Continued innovation in analytical tools and methods. FEWS NET develops and disseminates cutting-edge early warning tools and methods.
Outputs	<p>FEWS NET offers a range of information products, tools, and services for decision-makers including up-to-date information necessary to avert or mitigate the impact of a food security hazard. Those relevant to southern Africa include:</p> <p><i>Reporting Products</i></p> <ul style="list-style-type: none"> ▪ Food Security Updates: Monthly report with comprehensive coverage of current and projected food security conditions and their implications. ▪ Alerts: One page statements issued when a crisis is emerging or deteriorating or when early action is recommended. ▪ Executive Overview Briefs: Two-page monthly summary and analysis of food security threats in FEWS NET countries. ▪ NOAA Weather Hazards Impact Assessments: Weekly assessment of current weather conditions and their impact on food security in Afghanistan, Africa, Central America, and Haiti ▪ Cross Border Trade Bulletins: Periodic reports on cross border trade in key food commodities. ▪ Special Reports: Periodic reports issued by FEWS NET and partners that cover a broad range of topics and geographic areas. ▪ Market Studies: Distinct from regular reporting (monthly updates), market studies aim to enhance the knowledge base on

markets and food security.

- **Market Reviews:** An overview of market networks, key market relationships, and basic market dynamics, taking into consideration both national and regional factors and tailored to the FEWS NET audience and working environment. Recommendations for the incorporation of markets into regular food security monitoring, analysis, and early warning are also provided.
- **Rain Watches:** One page report issued every 10 days that assesses the progress of the current rainy season and its implications for food security in a specified area.

Livelihood Products

- **Livelihood Zone Profile:** A description of the livelihood options and market access of different wealth groups in a livelihood zone and the hazards to which they are vulnerable.
- **Livelihood Baseline:** A detailed, quantified breakdown of household livelihood options for different wealth groups highlighting market linkages and economic constraints and opportunities. It is used to assess whether people will be able to meet their survival requirements and/or protect their livelihoods after a shock.

Maps, Data and Imagery

- **Maps**
- **Current Estimated Food Security Conditions:** A map updated on a monthly basis which shows the current food security conditions in a country using the estimated highest level of severity of food insecurity at a sub-national level.
- **Food Security Outlook:** A map updated semi-annually which shows projected food insecurity for a country using the estimated highest level of severity of food insecurity at a sub-national level.
- **Livelihood Zone:** A map which delineates geographic areas within which people broadly share the same livelihoods patterns, including access to food, income, and markets.
- **Production and Market Flow Maps:** Maps developed in collaboration with partners which provide a summary of experiential knowledge on market networks (catchments and commodity flows) significant to food security: basic grains, livestock, and labour.
- **NOAA Weather Hazards Impact Assessments:** The map that accompanies the weekly hazard assessment, indicating where weather conditions are impacting food security.
- **Data**
- **Prices**
Monthly nominal retail prices (US\$/kg) and a five-year average.
- **Production:** The most recent annual production estimate (1,000 MT) and a five-year average.

Satellite Imagery

- **Rainfall Estimation (RFE):** A gridded estimate of rainfall based on both satellite and rain gauge station data at an approximate horizontal resolution of 10 km.

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| | <ul style="list-style-type: none">▪ Normalized Difference Vegetation Index (NDVI): An indicator of the vigour and density of vegetation on the ground.▪ Water Requirements Satisfaction Index (WRSI): An indicator of crop performance based on the availability of water to the crop during a growing season.▪ Inter-Tropical Convergence Zone (ITCZ): The northern limit of the rain belt over West Africa which forms the dividing line between the southwestern winds and the northeastern surface winds.▪ Irrigation Supply and Demand: Measurement of the correspondence between water supply and crop water demand for irrigated areas of 18 watersheds in Afghanistan. |
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Programme title	Food, Agriculture and Natural Resources Policy Analysis Network FANRPAN
Programme type	A regional policy research and advocacy network whose operations are informed by major regional policy frameworks and processes in Southern African.
Contact details/ key personnel	<p>Website: http://www.fanrpan.org/</p> <p>Dr Lindiwe Majele Sibanda Chief Executive Officer imsibanda@fanrpan.org</p> <p>Director: Communication and Policy Advocacy policy@fanrpan.org</p> <p>Ms Sharon Alfred Office Manager – Human Resources and Administration salfred@fanrpan.org</p> <p>Mr Lufingo Mwamakamba Protocol and Networking Manager lmwamakamba@fanrpan.org</p> <p>Dr. David Kamchacha Director: Agricultural Inputs and Outputs Market dkamchacha@fanrpan.org</p> <p>Programme Manager: Food Systems and Agricultural Systems policy@fanrpan.org</p> <p>Ms Sithembile Ndema Programme Manager: Natural Resources and Environment sndema@fanrpan.org</p> <p>Mr Samuel Manda</p>

	<p>Finance Officer smanda@fanrpan.org</p> <p>Director: Policy and Research policy@fanrpan.org Ms Getrude Chanakira Finance Officer gchanakira@fanrpan.org</p>
Country/ies	<p>FANRPAN is mandated to work in all SADC countries and currently has activities in 13 SADC countries:</p> <p>Angola Botswana Lesotho Madagascar Malawi Mauritius Mozambique Namibia South Africa Swaziland Tanzania Zambia Zimbabwe</p>
Agencies involved/ partnerships	<p>Country nodes</p> <ul style="list-style-type: none"> ▪ FANRPAN works through an inter-sectoral platform designated as country nodes. Each country node has members comprising stakeholders from government, private sector, farming unions, policy research institutions such as universities, national farmers organisations and civil society organisations. ▪ Each country node is served by a hosting institution which provides a secretariat and coordination services and is supported by a steering committee ▪ The nodes convene in-country stakeholder consultations to define policy agenda, undertake policy research and conduct policy advocacy. ▪ The following institutions host the FANRPAN nodes: <p>Angola Ministry of Agriculture and Rural Development http://www.angola-portal.ao/MINADER/Default.aspx</p>

Dr. David Tunga: angolanode@fanrpan.org

Botswana

Botswana Institute for Development Policy Analysis (BIDPA)

<http://www.bidpa.bw>

Dr. Tebogo B. Seleka: botswananode@fanrpan.org

Lesotho

Institute of Southern African studies (ISAS)

<http://www.nul.ls/institutes/isas.htm>

Dr Resetselemang Clement/ Thope Matobo: lesothonode@fanrpan.org

Madagascar

Department of Rural Development Policies: Ministry of Agriculture

<http://www.maep.gov.mg/>

Rahaingo Vololona Mireille: madagascarnode@fanrpan.org

Malawi

Civil Society Agriculture Network (CISANET)

Victor Mhoni: malawinode@fanrpan.org

Mauritius

Faculty of Agriculture, University of Mauritius

<http://www.uom.ac.mu>

Balraj Rajkomar: mauritiustnode@fanrpan.org

Mozambique

Eduardo Mondlane University, Faculdade de Agronomia e Engenharia Florestal

<http://www.uem.moz>

Bruno De Araujo: mozambiquenode@fanrpan.org

Namibia

Namibia Economic Policy Research Unit (NEPRU)

<http://www.nepru.org.na>

Dr. Fanual Tjingaete: namibianode@fanrpan.org

South Africa

National Agricultural Marketing Council

<http://www.namc.co.za>

Simpiwe S Ngqangweni: southafricanode@fanrpan.org

Swaziland

Coordinating Assembly of NGOs (CANGO)

<http://www.cango.org.sz>

Emmanuel Ndlangamandla: swazilandnode@fanrpan.org

Tanzania

Economic and Social Research Foundation (ESRF)

<http://www.esrftz.org>

Dr. Bohelo Lunogelo: tanzanianode@fanrpan.org

Zambia

Agricultural Consultative Forum (ACF)

<http://www.acf.org.zm>

Hyde Haantuba: zambianode@fanpan.org

Zimbabwe

Agricultural Research Council

<http://www.arc.co.zw>

Dr. Isaiah Mharapara: zimbabwenode@fanrpan.org

FANRPAN partnerships:

To date, FANRPAN has signed Memorandum of Understanding's (MoU) with 47 organizations grouped under the following stakeholder sectors:

- Regional Economic Communities (REC): 1
- Government: 3
- Sub-Regional Organisations: 1
- Farmer Organisation: 2
- Private Sector: 1
- University: 10
- Civil Society Organisations (CSO): 10

- International Organisation and CGIARs: 19

List of FANRAPN MoUs with Partner Organisations:

- Southern African Policy and Economic Series Trust, Zimbabwe, 2002
- Government of the Republic of Zimbabwe, 2002
- International Food Policy research Institute (IFPRI)
- International Crops Research Institute for the Semi-Arid Tropics (ICRSAT), 2002
- Technical centre for Agricultural and Rural Cooperation (CTA), 2002
- Host Agreement and Diplomatic Status, Government of the republic of Zimbabwe, 2002
- Directorate of research and Unit Development, University of Botswana, 2002
- Agriculture Policy Research Unit, University of Malawi, 2002
- Economic and Social research Foundation, Tanzania (ESRF), 2002
- Namibian Economic Policy Research Unit, Namibia (NEPRU), 2002
- Department of Agricultural Economics and Extension: University of The North, South Africa, 2002
- Department of Agricultural Economics, University of Zambia, 2002
- Department of Agricultural Economics, Extension and Rural Development, University of Pretoria, South Africa, 2002
- Department of Agricultural Economics, Michigan State University, 2004
- International Fertilizer Development Center (IFDC), 2004
- Overseas Development Institute (ODI), London, UK, 2004
- Civil Society Agriculture Network, FANRPAN Malawi Node, 2005
- Agricultural Research Council (Memorandum of Agreement of Lease), 2005
- Southern African Confederation of Agricultural Unions (SACAU), 2005
- Agricultural Consultative Forum, FANRPAN Zambia Node, 2005
- International Water Management Institute (IWMI), 2005
- Host Agreement with the South African Government, 2006
- CropLife International, 2006
- Faculty of Agronomy and Forestry Engineering, Eduardo Mondlane University, Mozambique, 2006
- Global Environmental Change and Food Systems (GECAFS), 2006
- National Agricultural Marketing Council (NAMC), 2006
- Common Market for Eastern and Southern Africa (COMESA), 2006
- Competing Claims on Natural Resources Programme, Wageningen University, 2007
- Agricultural Research Centre, South Africa (ARC), 2007
- International Centre for Research in Agroforestry (ICRAF), 2007
- Ministry of Agriculture and Rural Development, Angola, 2007
- Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), 2007
- Economic Social Research Foundation (ESRF), 2008

	<ul style="list-style-type: none"> ▪ Botswana Institute for Development Policy Analysis (BIDPA), 2008 ▪ Agricultural Consultative Forum (ACF), 2008 ▪ National University of Lesotho, Institute of Southern African Studies (ISAS), 2008 ▪ Coordinating Assembly of NGOs (CANGO), 2008 ▪ Eduardo Mondlane University. Faculdade de Agronomia e Engenharia Florestal, Mozambique, 2008 ▪ Department of Agricultural Production and Systems, School of Agriculture University of Mauritius, 2008 ▪ African Network for Agriculture, Agroforestry and Natural Resources Education (ANAFE), 2008 ▪ Oxfam America, 2008 ▪ Swiss Agency for Development and Cooperation (SDC), 2008 ▪ Forum for Agricultural Research in Africa (FARA), 2008 ▪ International Livestock Research Institute (ILRI), 2009 ▪ Pan African Agribusiness Consortium (PanAAC), 2009 ▪ Eastern Africa Farmers Federation (EAFF), 2009 ▪ University of Venda, 2009 ▪ World Vision International, 2009 ▪ Namibian Economic Policy Research Unit (NEPRU), 2009 ▪ The Food and Agriculture Organization of the United Nations to the SADC Food, Agriculture and Natural Resources Policy Analysis Network, Pretoria, South Africa (LoA), 2010 ▪ Panos Southern Africa, 2010 ▪ Citizens Network For Foreign Affairs (CNFA), 2010
Year started	2002
Programme description	<ul style="list-style-type: none"> ▪ Network organisation that promotes food, agriculture and natural resources (FANR) policies through research, analysis and dialogue at the national, regional and global levels. ▪ works through a network of national nodes in thirteen countries in Southern Africa. ▪ Each country node has members comprising stakeholders from government, private sector, farming unions, policy research institutions and non-governmental organisations. ▪ combines activities such as capacity building, research and information dissemination. ▪ core programmes encompass HIV-AIDS, Food Systems, Agricultural Systems, and Natural Resources and Environment.
Programme aims and objectives	<p>The aim of FANRPAN is to ensure a food secure southern Africa free from hunger and poverty through promoting effective Food, Agriculture and Natural Resources (FANR) policies by:</p> <ul style="list-style-type: none"> ▪ facilitating linkages and partnerships between government and civil society, ▪ building the capacity for policy analysis and policy dialogue in southern Africa, and ▪ supporting demand-driven policy research and analysis. <p>In order to achieve the above aim, FANRPAN has the following objectives:</p> <ul style="list-style-type: none"> ▪ Promote appropriate agricultural policy in order to reduce poverty, increase food security and enhance sustainable agricultural

	<p>development in the SADC region.</p> <ul style="list-style-type: none"> ▪ Improve policy analysis, research and formulation of priority SADC agricultural research themes. ▪ Develop human and institutional capacity for co-ordinated dialogue among stakeholders. ▪ Improve policy decision-making through the generation, exchange and use of policy related knowledge and information. <p>FANRPAN achieves these objectives through</p> <ul style="list-style-type: none"> ▪ Commissioned policy research ▪ Multi stakeholder dialogues - National/Regional ▪ Policy training and information/knowledge exchange
Outputs	<p>Selected climate change and food security outputs:</p> <p><i>Year of publication: 2010</i></p> <ul style="list-style-type: none"> • Seed regulation deal may aid Africa's response to climate change, 29 April 2010, Lindiwe Majele Sibanda <p><i>Year of publication: 2009</i></p> <ul style="list-style-type: none"> • Fifteenth United Nations Climate Change Conference (COP15) Copenhagen, 7 - 18 December 2009 • Video clip: Dr Lindiwe Sibanda, CEO of FANRPAN, on agriculture and climate change, December 2009 • FANRPAN Participates at the African Ministerial Conference on the Environment (AMCEN) Special Session on Climate Change 25 - 29 May 2009 • FANRPAN to Participate at the Southern African Development Community (SADC) Climate Change Meeting, 12 - 15 May 2009 • 17th session of the UN Commission on Sustainable Development – Side Event: Climate Change, Agriculture and Food Security 6 May 2009, Thomas Rosswall <p><i>Year of publication: 2008</i></p> <ul style="list-style-type: none"> • Poznan Climate Change Conference - Common Market for Eastern and Southern Africa (COMESA) Side Event: Launching the Reducing Emissions from Deforestation and Degradation (REDD) - Agriculture, Forestry and Land Use (AFOLU) Coalition 1 - 12 December 2008 • Launching the Africa Climate Solution - A Reducing Emissions from Deforestation and Degradation (REDD) - Agriculture, Forestry and Sustainable Land Use (AFOLU) Bio-carbon Coalition, 10 December 2008 • Poznan Climate Change Conference - Common Market for Eastern and Southern Africa (COMESA)/FANRPAN banners December 2008 • FANRPAN Chief Executive Officer (CEO) among 50 eminent thinkers at Climate Change Global Roundtable, 1 August 2008 • Strategies for adapting to climate change in rural sub-Saharan Africa: Targeting the most vulnerable, 23 - 25 June 2008 • Press release IV: FANRPAN convenes climate change meeting for senior policy makers, 23 June 2008

Programme title	Food Insecurity and Vulnerability Information and Mapping Systems FIVIMS
Programme type	UN inter-agency working group
Contact details/ key personnel	<p><i>FIVIMS Secretariat:</i> Viale delle Terme di Caracalla 00153, Rome Italy Email: FIVIMS@fao.org (+39) 06 57053354 (+39) 06 57056172</p> <p><i>FIVIMS-ZA:</i> Jimmy Weir Smith + 27 82 805 4231</p>

Country/ies	<p><i>FIVIMS is used in the following SADC countries:</i></p> <p>Madagascar Mozambique Namibia South Africa</p>
Agencies involved/ partnerships	<p>In the course of its existence FIVIMS has worked with a large number of institutions, both at global level and for the development of food security and vulnerability analysis capacity at country and regional level. The various institutions FIVIMS has worked with include donors, the United Nations, international NGOs, regional organisations, academic institutions and international research organisations.</p> <p>FIVIMS projects in Africa receive financial assistance from the European Commission and the Government of the Royal Kingdom of the Netherlands.</p> <p>In the Southern Africa region, the FIVIMS Secretariat, in close collaboration with its partners in the region such as FEWS-NET, SC-UK, WFP and FAO have provided support to the SADC Directorate for Food, Agriculture and Natural Resources (FANR), and more specifically to the Regional Vulnerability Assessment Committee (RVAC). The RVAC is seen as the proper vehicle for promoting and implementing the FIVIMS principles around the region.</p> <p><i>Specific partners in SADC countries:</i></p> <p><i>Mozambique:</i> SETSAN (Technical Secretariat for Food Security and Nutrition). SETSAN is an inter-ministerial secretariat charged with the coordination of technical activities on food security and nutrition in Mozambique. Partners that collaborate in SETSAN include:</p> <ul style="list-style-type: none"> ▪ Government departments (Agriculture and Rural Development; Health; Public Works; Foreign Affairs; Water; Social Welfare; Planning and Finance) ▪ UN Agencies (FAO; WFP; UNICEF; UNAIDS; OCHA) ▪ Donors (USAID FEWSNET; DFID; Irish Aid; Spanish Cooperation) ▪ NGOs (SC-UK; GTZ; VETAID and CARE) <p><i>Namibia:</i> Directorate of Planning Ministry of Agriculture, Water and Rural Development (MAWRD) FAO</p> <p><i>South Africa:</i> Department of Agriculture World Food Programme Human Sciences Research Council</p>

	Stats-SA
Year started	Madagascar Mozambique - 2001 Namibia – 2000 South Africa – October 2006
Programme description	<p>The FIVIMS initiative was set following World Food Summit in 1996 in a drive to provide decision-makers with more reliable information about geographic areas and particular population groups that suffer hunger and malnutrition.</p> <p>A food insecurity and vulnerability information and mapping system is any system or network of systems that assembles, analyses and disseminates information about people who are food-insecure or vulnerable to food insecurity: who they are, where they are located, and why they are food-insecure or vulnerable to food insecurity. FIVIMS is therefore an information management system – an arrangement of people, data, processes, information analysis and presentation, and information technology. These interact to support and improve daily operations of organisations engaged with the complex cross-sectoral dimensions of food insecurity and vulnerability, and helps facilitate more effective planning and decision-making.</p> <p>The FIVIMS principles are:</p> <ul style="list-style-type: none"> ▪ Recognition that needs differ across countries ▪ Identification and response to users' information needs ▪ Building on existing information systems and avoiding/reducing duplication ▪ Emphasis on networking and information exchange ▪ Integration of household level analysis and gender disaggregated information into national and sub-national policy making ▪ Promotion of institutional sustainability ▪ Promotion of cost effectiveness; and ▪ Appropriate use of new technologies ▪
Programme aims and objectives	<ul style="list-style-type: none"> ▪ Raise awareness about food security issues ▪ Improve the quality of food security related data and analysis ▪ Facilitate integration of complementary information ▪ Promote better understanding of users' needs and better use of information ▪ Improve access to information through networking and sharing
Outputs	At national, and regional levels FIVIMS helps countries carry out a more careful characterization of the food insecure and vulnerable population groups, improving understanding through cross-sectoral analysis of the underlying causes, and using evidence-based information and analysis to advocate for the formulation and implementation of policies and programmes enhancing food security and nutrition. Strengthened and more integrated food insecurity and vulnerability information systems at national and sub-national levels can provide better and more up-to-date information to the policy-makers and members of civil society concerned with food security issues at all levels in the country.

At the global level, FIVIMS promotes coordinated action among partner agencies in support of best practices in the development of national and regional food insecurity and vulnerability information and mapping systems to strengthen understanding of who the food insecure and vulnerable people are, how many, where and why people are food insecure or vulnerable. Better information and knowledge on the underlying causes must lead to targeted action to ensure eradication of extreme poverty and hunger.

In Madagascar:

Situation analysis of food insecurity: community focus groups' perceptions

An analysis of the food insecurity situation in Madagascar was carried out in 2004 with the resources provided by the EC under Project GCP/INT/741/EC and the technical support of the FIVIMS Secretariat. The analysis draws from all available information sources to seek to answer key questions for decision-making: How many people are affected by food insecurity? Who are they? Where are they? Why are they affected? How to improve their condition?

The analysis relies heavily on the data from the Commune Census (CC) carried out in 2001. In the CC, the incidence of food insecurity is self-assessed by the community focus groups. Estimates are therefore based on people's perception and not on objective measurement.

In summary, the analysis showed that:

- More than half the population of Madagascar, i.e. about 10 million people, are affected by chronic or seasonal FI
- FI is widespread in rural areas, in particular in the provinces of Fianarantsoa and Antananarivo, but is also present in urban areas, especially in the capital;
- FI is concentrated in remote and less productive areas;
- Some characteristics associated with vulnerability are common across the country (e.g. size of cultivated areas, productivity, demographic attributes) and vulnerable groups often include: small producers, landless dwellers, some producers of export products, households with high dependency ratios, etc. Across all these categories, women and children are the most affected by FI;
- According to 60% of the focus groups, variations in producer prices in the markets is the main cause of deteriorating living standards over the last 5 years;
- Coping strategies frequently include credit and diversification of sources of income where development projects could play an important role. But their impact is currently limited by the fact that they tend to be implemented in the most accessible parts of the country while vulnerable groups are most often concentrated in remote and isolated areas.

The report suggests various ways to reduce FI including:

(a) develop appropriate mechanisms to react faster to natural disasters, (b) eliminate traditional customs and taboos which contribute to FI,

(c) strengthen road network and credit institutions, (d) give FI groups better access to education, (e) build support from more privileged groups of the population to implement appropriate social policies, fostering by solidarity but also because they are essential to economic growth. The report finally insists on the need to target the most vulnerable groups and adopt truly participative approaches to respond to their priorities, strengthen their livelihoods and diversify their productive activities.

Four policy briefs have been prepared for decision makers on subjects directly relevant to FI:

- Well being and food security: Post crisis perception of communal focus groups in rural areas;
- Risks, agriculture production and poverty in Madagascar;
- Agriculture labour and poverty in Madagascar;
- Sources of income of households and poverty.

In Mozambique:

Some key SETSAN activities:

In the years since its original creation, SETSAN has achieved high levels of technical competency and credibility, in terms of monitoring Mozambique's ever-changing FSN situation. The information published in its bi-annual Vulnerability Assessments form the basis of many different types of interventions, ranging from disaster-mitigation to economic and social development. Specifically, these assessments are utilized by the National Disaster Management Institute (INGC), UN Agencies, and other large food and relief-distribution implementing partners.

Throughout 2005, SETSAN developed and launched a successful decentralization plan, in accordance with the Government of Mozambique's decentralization policy, attempting to transfer technical and decision-making capacity to SETSAN-P in each of the country's ten provinces. In each province SETSAN Focal Points were selected and, in total, over 200 representatives were trained on the integrated FSN approach, to ensure that, in the process of decentralization, the multi-sectoral and holistic vision of SETSAN would be retained and applied at a Provincial level.

As a result of the aforementioned processes, SETSAN has achieved a much higher degree of public and political visibility. It is regularly cited in major newspaper articles and, based on its technical credibility, has begun to effect important FSN-related policies at the highest levels of government. In 2005, for example, a successful lobbying attempt by SETSAN, FAO and GTZ resulted in the inclusion of FSN as a cross-cutting theme in the PARPA and its matrix utilized by Donors, UN Agencies and the Government of Mozambique to evaluate the progress of the country's Poverty Reduction Strategy Paper (PARPA). Specifically, low weight-for-age of children under 5 years (MDG#1) has now been adopted as one of two key indicators, to be monitored under the PARPA framework during bi-annual reviews.

In Namibia:

Programme is experiencing delays.

In South Africa:

FIVIMS uses AGIS (Agricultural Geo-referenced Information System) – offers a one-stop information service for the agricultural sector in South Africa. Using interactive WEB-based applications, AGIS provides access to spatial information (maps), industry specific information and decision support tools.

National FIVIMS launched in the Republic of South Africa

In 2004/5 FIVIMS South Africa conducted a pilot survey in the Greater Sekhukhune District Municipality. The FIVIMS survey allowed for a wide-ranging analysis of livelihoods, poverty, food insecurity and vulnerability, the results of which were plotted on the “Food Insecurity in Sekhukhune” (2005) map. The pilot activity was found to be a useful tool that can improve targeting of food insecure and vulnerable areas and groups, based on facts.

Building on the successful Sekhukhune experience, the South African Government proceeded with field testing and rollout of FIVIMS in the country and formally established a National food security and Vulnerability Information Management System in October 2006. FIVIMS in South Africa is a management or decision-making support tool that through a systematic process assembles, analyses and disseminates basic information on chronic and transitory food insecurity in the country. Components include a structural baseline on food insecurity and vulnerability, a food security model, reporting capability, and a simple monitoring system, complementing existing early warning systems.

Within this context, FIVIMS-ZA envisions to provide planners and decision makers at all levels with viable, relevant and credible information for planning effective food security interventions and allocating resources, as well as monitoring the impact of existing government programmes. Hence, it is crucial that the system uses standardized definitions, key indicators and analytical tools, models and measurement indexes and scales, which will allow Government to make comparisons between different provinces and communities and allocate funds to the neediest areas.

To sustain FIVIMS over the longer term, Government Departments at national, provincial and municipality level will need to take ownership of FIVIMS-ZA and appropriate institutional, human and financial resources will need to be in place. Efforts are now underway in developing the mechanisms, institutions and national capacity needed for future work.

Two Districts Vulnerability Profiles

The South African Department of Agriculture (DoA) with support from World Food Programme, Human Sciences Research Council and Stats-SA, has produced two district vulnerability profiles. The profiles aim to provide an overview of the different food security components in selected rural areas, mostly former homelands under apartheid. The profile covers essential statistics in areas such as production (potential), access – poverty, income/ grants, % expenditure on food items; and utilization - malnutrition rates, and experiences of chronic hunger. DoA – AGIS and the Food Security Directorate, HSRC and WFP jointly selected the indicators based on available data from Stats-SA, AGIS – DoA and HSRC. The main surveys used in the exercise include the 2001 Census, the Labour Force Survey, the General Household Survey and the National Food Consumption Survey. The posters of OR Tambo and Umkhanyakude

	districts have proven to be helpful in explaining what food security is, they have helped highlight the various problems, and at the same time have identified the worst off nodal areas, which may warrant special attention.
Programme title	Global Environmental Change and Food Systems (Southern Africa) GECAFS-SAF
Programme type	Integral component of GECAFS (international, interdisciplinary, research programme).
Contact details/ key personnel	<p>GECAFS International Project Office (IPO) Environmental Change Institute School of Geography and the Environment Oxford University South Parks Road Oxford, OX1 3QY UK Tel: +44 1865 285176 Fax: +44 1865 285534 E-mail info@gecafs.org</p> <p>Polly Ericksen Science Officer Tel: +44 1865 285196 Fax: +44 1865 285534 Email: polly.ericksen@eci.ox.ac.uk</p> <p>John Ingram Executive Officer Tel: +44 1865 285175 Fax: +44 1865 285534 Email: john.ingram@eci.ox.ac.uk</p> <p>Anita Ghosh GECAFS IPO Manager Tel: +44 1865 285176 Fax: +44 1865 285534 Email: anita.ghosh@eci.ox.ac.uk</p> <p>GECAFS-SAF Regional Steering Committee (established June 2007)</p>

	<p>Richard Mkandawire, NEPAD Agriculture Advisor (chair) Martin Bwalya, NEPAD Scott Drimie, University of Witwatersrand / IFPRI - RENEWAL Pauline Dube, University of Botswana Charles Mataya, Malawi Polytechnique Cris Muyunda, COMESA Sospeter Muhongo, ICSU-Africa (<i>ex officio</i>) Lindiwe Sibanda, FANRPAN (<i>ex officio</i>) John Ingram, GECAFS IPO (<i>ex officio</i>)</p>
Country/ies	<p>Angola Botswana Lesotho Malawi Mozambique Namibia South Africa Swaziland Zambia Zimbabwe</p>
Agencies involved/ partnerships	<p><i>Of GECAFS-SAF:</i> ICSU-ROA FANRPAN (Food, Agriculture and Natural Resources Policy Analysis Network) SADC NEPAD</p>
Year started	<p>10 year project started in 2001</p>
Programme description	<p><i>Of GECAFS:</i></p> <ul style="list-style-type: none"> ▪ focused on understanding the links between food security and global environmental change ▪ programme aims to improve understanding of the relationship between food systems and the Earth System to deliver science-based tools for analysing the socioeconomic and environmental consequences of adaptation strategies. ▪ Strategies will be designed to help policy-makers and managers evaluate the best options for reducing vulnerability of food systems to global environmental change while minimising further environmental degradation. ▪ goal of the programme is to determine strategies to cope with the impacts of global environmental change on food systems and to assess the environmental and socio-economic consequences of adaptive responses aimed at improving food security. ▪ goal will be achieved by improving understanding of the interactions between food systems and the Earth System's key socioeconomic and biogeophysical components. ▪ research agenda is specifically targeted towards delivering the new science necessary to underpin policy formulation for

	<p>improving food security in the face of global environmental change.</p> <p><i>Of GECAFS-SAF:</i></p> <ul style="list-style-type: none"> ▪ an integrated research endeavour on the links between southern African food security and Global Environmental Change (GEC). ▪ involved a diverse group of regional researchers, and regional and international organisations and donors, and culminated in the preparation of a plan for a GECAFS southern Africa project (GECAFS-SAF)
<p>Programme aims and objectives</p>	<p><i>Of GECAFS:</i></p> <ul style="list-style-type: none"> ▪ Investigate how global environmental change affects food security at regional scale; ▪ Determine options to adapt regional food systems to cope with both global environmental change and changing demands for food; ▪ Assess how potential adaptation options will affect the environment, societies and economies; ▪ Engage the international global environmental change and development communities in policy discussions to improve food security. ▪ GECAFS will delivering a number of science-based products to help achieve the long-term aims <p><i>Of GECAFS-SAF:</i></p> <ul style="list-style-type: none"> ▪ provides a strategy to deliver policy-relevant information about the interactions between GEC and the food systems that underpin food security. ▪ contribute to a number of major food security initiatives in the region and support both local interests and those of major regional activities (e.g. NEPAD, FARA, COMESA and SADC-FANR). ▪ identify the social and geographical distribution of the vulnerability of the region’s food systems to GEC in the context of other stresses. ▪ collaborative research with regional stakeholders will evaluate how, when and where adaptations to food systems can be instituted to reduce their vulnerability to GEC while also being in line with long-term national and regional developmental goals. ▪ assess the long-term social and environmental consequences of different potential adaptation measures designed to enhance regional food security. ▪ GECAFS-SAF will be implemented over five years. It will be based on <ol style="list-style-type: none"> 1. selected case studies across the region, each addressing the food systems questions relating to GEC vulnerability and impacts, adaptation options and feedbacks; 2. Regional Scientific Networking (in collaboration with ICSU-ROA), to link case study research with other relevant research in the region and internationally; and 3. a Science-Policy Interface (in collaboration with FANRPAN), linking national researchers with policymakers, the private sector, civil society and representatives of regional food security programmes.

	<ul style="list-style-type: none"> ▪ Research will be organised into defined phases with clear outputs at each stage. When integrated, outputs will provide policy-relevant information at both local and regional levels with the communications strategy underpinned by stakeholder engagement at all research stages. ▪ Research capacity will be developed by collaborative research within the international GECAFS project. ▪ A GECAFS-SAF Regional Fund is being established to cover case study research (via regional calls for proposals), regional networking activities, and the science-policy interface and research management. ▪ A GECAFS-SAF Regional Steering Committee http://www.gecafs.org/research/documents/GECAFSSAFRSCMembersandToR.pdf(RSC) has been established to provide scientific oversight and manage the Fund. A GECAFS-SAF Regional Coordinator will be appointed. The "Food, Agriculture and Natural Resources Policy Analysis Network" (FANRPAN) will serve as the regional host institution. ▪ Has developed further information, see the GECAFS Southern Africa and Science Plan Implementation Strategy which has been developed in consultation with SADC, and endorsed by FANRPAN, FARA, ICSU-Africa and NEPAD.
Outputs	<p><i>Papers:</i> Governing Food Systems in the Context of Global Environmental Change, IHDP UPDATE Governance as a Crosscutting Theme in Human Dimensions Science, Issue 3, pp59-64, 2009. D.M. Liverman, P.J. Ericksen, J.S.I. Ingram.</p> <p>Food Security and Environmental Change: Linking science, development and policy. Special issue of Environmental Science and Policy on "Food Security and Environmental Change", vol 12, iss 4, Ericksen, P. J., J.S.I. Ingram, D.M. Liverman (eds) 2009.</p> <p>A collection of papers presented at a conference held at the University of Oxford in April 2008 on "Food Security and Environmental Change: linking science, development and policy for adaptation".</p> <p>Food security and global environmental change: emerging challenges. Special issue of Environmental Science and Policy on "Food Security and Environmental Change", vol 12, iss 4, Ericksen, P. J., J.S.I. Ingram, D.M. Liverman 2009.</p> <p>Policy responses to GEC impacts on food availability and affordability in the Caribbean community, Trotman, A., R. M. Gordon, S. D. Hutchinson, R. Singh and D. McRae-Smith, Special issue of Environmental Science and Policy on "Food Security and Environmental Change", vol 12, iss 4, Ericksen, P. J., J.S.I. Ingram, D.M. Liverman (eds) 2009.</p> <p>Integrating pests and pathogens into the climate change/food security debate. Journal of Experimental Botany (vol 60, no 10, pp2827-2838, 2009) P.J. Gregory, S.N. Johnson, A.C. Newton and J.S.I. Ingram</p> <p>Climate change and the current 'food crisis' CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources (vol 3, no 099, 2008) P.J. Gregory and J.S.I. Ingram</p>

What is the vulnerability of a food system to global environmental change? Published in Ecology and Society (Volume 13, Number 2, Article 14, 2008) P.J. Ericksen

Checklists for assessing research-policy interactions Integration Insights, Number 11, July 2008. Bammer, G. (Compiler)

The role of agronomic research in climate change and food security policy Published in Agriculture, Ecosystems & Environment (Volume 126, Issues 1-2, June 2008, Pages 4-12) J.S.I. Ingram, P.J. Gregory and A.-M. Izac

Conceptualizing food systems for global environmental change research Published in Global Environmental Change (Volume 18, Issue 1, Pages 234-245, February 2008) P.J. Ericksen

Linking scenarios across geographical scales in international environmental assessments Published in Technological Forecasting & Social Change (2007) Zurek, M and T Henrichs

Climate Change and Food Security Published in Philosophical Transactions of The Royal Society B (2005) 360, 2139-2148 P.J. Gregory, J.S.I. Ingram, M. Brklacich (January 2006)

Adapting food systems of the Indo-Gangetic plains to global environmental change: key information needs to improve policy formulation Published in Environmental Science and Policy (Volume 7, Issue 6, Pages 487-498) P.K. Aggarwal, P.K. Joshi, J.S.I. Ingram and R.K. Gupta (December 2004)

Environmental Consequences of Alternative Practices for Intensifying Crop Production Published in Agriculture, Ecosystems and Environment (2002) 88, 279-290. Gregory PJ, JSI Ingram, R Andersson, RA Betts, V Brovkin, TN Chase, PR Grace, AJ Gray, N Hamilton, TB Hardy, SM Howden, A Jenkins, M Meybeck, M Olsson, I Ortiz-Monasterio, CA Palm, T Payn, M Rummukainen, RE Schulze, M Thiem, C Valentin and MJ Wilkinson.

Global Environmental Change and Food Systems (GECAFS) A new, interdisciplinary research project
Published in Die Erde 113, 427-435. 2002. Ingram JSI and M Brklacich.

Reports:
GECAFS Report No. 3: GECAFS Southern Africa Science Plan and Implementation Strategy (September 2006)

GECAFS Report 1 / ESSP Report 2: GECAFS Science Plan and Implementation Strategy (April 2005)

Global Environmental Change and Food Provision in Southern Africa: *Explorations for a possible GECAFS research project in southern*

Africa (May 2004)

Global Environmental Change and Food Provision: A New Role for Science. (August 2002) Paper prepared for the WSSD Johannesburg

Working Papers:

GECAFS Working Paper 5: Global environmental change and the dynamic challenges facing food security policy in Southern Africa R.T. Mano, J. Arntzen, S. Drimie, P. Dube, J.S.I. Ingram, C. Mataya, M.T Muchero, E. Vhurumuku and G. Ziervogel (July 2007)

GECAFS Working Paper 4: On the Role of Scenarios in GECAFS Decision-Support T. Henrichs (August 2006)

GECAFS Working Paper 3: Assessing the vulnerability of food systems to global environmental change: a conceptual and methodological review P. J. Ericksen (July 2006)

GECAFS Working Paper 2: Conceptualising Food Systems for Global Environmental Change (GEC) Research P. J. Ericksen (June 2006)

GECAFS Working Paper 1: A Short Review of Global Scenarios for Food Systems Analysis M. B. Zurek (March 2006)

Brochures/Posters:

Southern Africa Brochure (June 2009)

GECAFS Pamphlet (November 2007)

GECAFS Poster (November 2007)

GECAFS Brochure (March 2006)

http://www.gecafs.org/publications/Publications/GECAFS_Prospectus.pdf GECAFS Prospectus (January 2003)

Other:

Adapting African Food Systems to a 4°C+ World. Presented by P.J. Ericksen at 4 Degrees and Beyond, an international climate conference, Oxford, 28-30 September 2009.

Will the global food price crisis cause us to rethink food systems? ON LINE opinion website forum P.J. Ericksen (June 2008)

Global Environmental Change & Food Security Published in Global Change Newsletter (No. 71, Pages 10, 15-16) P. J. Ericksen (May 2008)

The Role of International Project Offices (IPOs) in Delivering the Global Environmental Change Programmes, Manuel Barange, David Carlson, Howard Cattle, Jeff Hare, John Ingram & Dave Raffaelli (October 2007)

	<p>Poster: "Scenarios to Aid Regional Food Security Policy Formulation" Presented at IPCC TGICA meeting on "Integrating Analysis of Regional Climate Change and Response Options: Expert Meeting on Regional Impacts, Adaptation, Vulnerability, and Mitigation", Nadi, Fiji, June 20-22, 2007 (June 2007)</p> <p>Envisioning Earth System Science for Societal Needs: The development of Joint Projects and the Earth System Science Partnership (ESSP)_(background paper prepared as part of ICSU review of ESSP) Ingram JSI, WL Steffen and J Canadell (2007)</p> <p>SEI Oxford/GECAFS Vulnerability Bibliography. (June 2004)</p> <p>GECAFS Summary on the World Bank Development Gateway Food-Secure Future for Those Vulnerable to Environmental Stress. (June 2004)</p> <p><i>SEI Oxford/GECAFS Methodological Briefs:</i> Resilience and Vulnerability Vulnerability, Global Environmental Change and Food Systems Agent Based Modelling of Vulnerability Vulnerability Indicators and Mapping Choosing Methods in Assessments of Vulnerable Food Systems Political Ecology of Vulnerability Aspects of Vulnerability Research http://www.gecafs.org/publications/Publications/Franklin_GECAFS_EHB_presentation.ppt</p>
Programme title	International Council for Science – Regional Office for Africa ICSU – ROA
Programme type	Non-governmental organisation
Contact details/ key personnel	<p>Executive Director (Acting): Dr. Rocky Skeef (rocky@nrf.ac.za)</p> <p>Programme Specialist in Biological Sciences: Dr Andrew Achuo Enow (a.enow@icsu-africa.org)</p> <p>Programme Specialist in Physics, Mathematics and Engineering Sciences: Dr Daniel Nyanganyura (d.nyanganyura@icsu-africa.org)</p> <p>Liaison Officer:</p>

	<p>Mr Bongani Mahlalela (b.mahlalela@icsu-africa.org)</p> <p>Office of the Regional Director: Kathy Potgieter (k.potgieter@icsu-africa.org)</p> <p>For additional information contact the secretariat: E-mail address: secretariat@icsu-africa.org Telephone: +27 12 481 4090 Fax: +27 12 481 4273</p>
Country/ies	Sub-Saharan Africa
Agencies involved/ partnerships	<p>ICSU has developed and will continue to foster relationships with the following strategic partners:</p> <ul style="list-style-type: none"> ▪ Third World Academy of Sciences (TWAS) ▪ UNESCO ▪ International Social Science Council (ISSC) ▪ World Federation of Engineering Organizations (WFEO) and the Council of Academies of Engineering and Technological Sciences (CAETS) ▪ Inter-Academy Panel (IAP) and Inter-Academy Council (IAC) <p>ICSU-ROA partners:</p> <ul style="list-style-type: none"> ▪ NEPAD ▪ National Research Foundation of South Africa (ICSU-RAO host)
Year started	2005
Programme description	<p>In order to strengthen international science for the benefit of society, ICSU mobilizes the knowledge and resources of the international science community to:</p> <ul style="list-style-type: none"> • Identify and address major issues of importance to science and society; • Facilitate interaction amongst scientists across all disciplines and from all countries; • Promote the participation of all scientists-regardless of race, citizenship, language, political stance, or gender-in international scientific endeavour; • Provide independent, authoritative advice to stimulate constructive dialogue between the scientific community and governments, civil society, and the private sector.
Programme aims and objectives	<ul style="list-style-type: none"> • To assist ICSU and its members in their strategic planning for activities in Africa and ensure that their plans and activities are well linked to the science community in the region, relevant networks and organisations and reflect Africa's priorities; • To facilitate the expansion and active membership of ICSU to institutions in the African countries, where ICSU does not yet

	<p>exist.</p> <ul style="list-style-type: none"> • To provide support and help with co-ordination, if needed, to scientific networks in the region and initiate new networks, where this has been identified as a regional priority; and assist the ICSU family in identifying scientists for membership of committees; • To facilitate the free flow of scientists and scientific knowledge across the borders; and promote the participation of African scientists in activities of the ICSU family and its associated partners such as UNESCO, TWAS and NEPAD; • To ensure efficient information transfer from ICSU and its family members to the scientific community in Africa; and the collection and dissemination of any valuable scientific information for Africa; • To promote and facilitate capacity building in Africa, including support for post-graduate training programmes for young scientists; and the procurement of educational and research facilities; • To promote and facilitate the mobility of African scientists within the continent; including organization of regional and international interdisciplinary science programmes; conferences; and the exchange of professional visits; • To promote and facilitate the development of indigenous and traditional knowledge and skills; • To promote and facilitate the formation of scientific societies and academies within the continent; sub-regional partnerships on the continent; and the establishment of a database of African experts in all science fields; • To promote the principle of universality of science and science ethics; and • To promote and facilitate the application of science for accelerated socio-economic development of the African continent.
Outputs	<p><i>Publications:</i> Global response to climate change, June 2005</p> <p><i>Conferences organised:</i> International Workshop of Experts on Global Environmental Change in sub-Saharan Africa The ICSU Regional Office for Africa (ICSU ROA), in collaboration with the National Research Foundation (NRF) and its partners is organizing an international workshop of experts on Global Environmental Change (including Climate Change and Adaptation) in sub-Saharan Africa. The workshop will be held in Pretoria, South Africa, on 9 - 11 February 2009.</p> <p>Specific Scientific programmes A variety of programmes are being proposed for the Regional Office. The strategic activities mentioned above and the list below is not exhaustive, but these are representative of the type of interventions needing urgent attention.</p> <ul style="list-style-type: none"> • African capacity building in science and technology • Development partners for African science and technology capacity building and utilisation. • That the African continent does not remain a victim of the digital divide • S&T inputs into agriculture, farming, land reform, for example • Adding value to African capacity and resources utilisation

	<p>African S&T partnerships in reducing global threats of human activity and climate change</p> <ul style="list-style-type: none"> • Managing Africa's wealth responsibly to reduce poverty • Monitoring and combating natural disasters on the African continent • African contribution to Global Initiatives • Africa's sustainable development and the Global Environment.
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Programme title	International Food Policy Research Institute IFPRI
Programme type	Research institute
Contact details/ key personnel	<i>Head Quarters:</i> 2033 K Street, NW

	<p>Washington, DC 20006-1002 USA Phone: +1 202-862-5600 Fax: +1 202-467-4439 Email: ifpri@cgiar.org</p> <p>Malawi Office PO Box 31666 Lilongwe 3 Malawi</p> <p>Room 111 Ministry of Agriculture and Food Security headquarters Capital Hill Phone: +265-1-789747 Email: IFPRI-Lilongwe@cgiar.org</p> <p>Mozambique Office c/o ICRISAT Av. Das FPLM No. 2698 Edifício de Química 1º andar IIAM Maputo Mozambique Phone: +258 21-46-27-76</p>
Country/ies	<p><i>SADC countries:</i> Angola Botswana Democratic Republic of the Congo Lesotho Madagascar Malawi Mauritius Mozambique</p>

	Namibia South Africa Swaziland Tanzania Zambia Zimbabwe
Agencies involved/ partnerships	IFPRI is one of 15 centres supported by the Consultative Group on International Agricultural Research (CGIAR), an alliance of 64 governments, private foundations, and international and regional organizations.
Year started	1975
Programme description	The International Food Policy Research Institute (IFPRI) seeks sustainable solutions for ending hunger and poverty.
Programme aims and objectives	<p>IFPRI's mission is to provide policy solutions that reduce poverty and end hunger and malnutrition</p> <p>IFPRI's mission focuses on:</p> <ul style="list-style-type: none"> ▪ identifying and analyzing alternative international, national, and local policies in support of improved food security and nutrition, emphasizing low-income countries and poor people and the sound management of the natural resource base that supports agriculture; ▪ contributing to capacity strengthening of people and institutions in developing countries that conduct research on food, agriculture, and nutrition policies; and ▪ actively engaging in policy communications, making research results available to all those in a position to apply or use them, and carrying out dialogues with those users to link research and policy action.
Outputs	<p>IFPRI's climate change research focuses on the assessment of, adaptation to, and mitigation of these risks. Strategic, cost-effective, and pro-poor policy reforms that enhance human welfare in equitable and sustainable ways form the core of IFPRI's Global Change Program. The Program analyzes the complex interrelations between climate change and agricultural growth, food security, and natural resource sustainability.</p> <p><i>Selected outputs include:</i></p> <ul style="list-style-type: none"> ▪ Global Change: Impacts on Water and Food Security. C. Ringler, A. K. Biswas and S. Cline, April 2010 ▪ Climate change implications for water resources in the Limpopo River Basin (IFPRI Discussion Paper) April 2010 ▪ Climate Change and Hunger. M. Parry, A. Evans, M. W. Rosegrant and T. Wheeler, December 2009 ▪ Climate change: Impact on agriculture and costs of adaptation (Food Policy Reports), September 2009 ▪ Mapping South African farming sector vulnerability to climate change and variability (IFPRI Discussion Paper), August 2009 ▪ Economywide impacts of climate change on agriculture in Sub-Saharan Africa (IFPRI Discussion Paper), July 2009 ▪ Agriculture and climate change (IFPRI Briefs), June 2009 ▪ Agriculture and Climate Change: Overview (IFPRI Briefs), March 2009

	<ul style="list-style-type: none"> ▪ Climate change in Africa: Key facts and Findings (IFPRI Briefs), March 2009 ▪ Climate Change (General Information), January 2009 ▪ Climate Vulnerability and Maize Yields in South Africa (IFPRI Discussion Paper), January 2009 ▪ The Impact of Climate Change and Adaptation on Food Production in Low Income Countries (IFPRI Discussion Paper), December 2008 ▪ Climate Variability and Maize Yield in South Africa: Results from GME and MELE Methods (IFPRI Discussion paper), December 2008. ▪ Vulnerability and the Impact of Climate Change in South Africa's Limpopo River Basin (IFPRI Discussion Paper), October 2008 ▪ The Impact of Climate Variability and Climate Change on Water and Food Outcomes: A Framework for Analysis (IFPRI Discussion Paper), October 2008 ▪ Impact of Climate Change and Bioenergy on Nutrition, Marc J. Cohen, Cristina Tirado, Noora-Lisa Aberman, and Brian Thompson (IFPRI and FAO), May 2008. ▪ Food Prices, Biofuels, and Climate Change,. Joachim von Braun , February 2008 ▪ Climate Change (2020 Focus Brief), January 2008 ▪ The World Food Situation: New Driving Forces and Required Actions. Joachim von Braun. (IFPRI Food Policy Report), December 2007
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Programme title	International Institute for Environment and Development: Climate Change Group IIED
Programme type	Independent international research organisation
Contact details/ key personnel	<p>Postal address: Climate Change International Institute for Environment and Development 3 Endsleigh Street London WC1H 0DD United Kingdom Telephone: +44 (0) 20 7388-2117 Fax: +44 (0)20 7388-2826</p> <p>Key personnel: Simon Anderson Head, Climate Change Group simon.anderson@iied.org</p> <p>Hohit Gebreegziabher Group Administrator, Climate Change hohit.gebreeg@iied.org</p> <p>Muyeye Chambwera Researcher, Sustainable Markets and Climate Change groups, Environmental Economics muyeye.chambwera@iied.org</p> <p>David Dodman Researcher, Human Settlements and Climate Change Groups david.dodman@iied.org</p> <p>Achala Chandani Researcher, Climate Change Group achala.chandani@iied.org</p> <p>Ced Hesse Principal Researcher, Climate Change Group ced.hesse@iied.org</p>

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Country/ies	Developing countries
Agencies involved/ partnerships	<p>IIED's CLACC (Capacity Stengthening of Least Developed Countries for Adaptation to Climate Change) partners - a group of international fellows working on adaptation to climate change in least developed countries.</p> <p><i>In Southern Africa:</i></p> <ul style="list-style-type: none"> ▪ African Centre for Technology (ACTS): a Nairobi-based international intergovernmental science, technology and environmental policy think-tank that generates and disseminates new knowledge through policy analysis, capacity building and outreach. ▪ Environmental Protection Management Services (EPMS): based in Tanzania is dedicated to enhancing environmental management and sustainable development through encouraging wise use of the available knowledge, facilitating access to relevant information, training, research and investment opportunities as well as through hands on projects

	<ul style="list-style-type: none"> ▪ Environmental Action in the Third World (ENDA) ▪ ZERO Regional Environment Organisation coordinates, catalyses, facilitates and evaluates all types and levels of development projects in the Southern African region. Its vision is global paradigm shift, changing minds and promoting prosperity for all. ▪ Energy and Environmental Concerns Zambia (EECZ) ▪ Coordination Unit for the Rehabilitation of the Environment (CURE) is an independent Non- Governmental Organisation established in March 1994, in an effort to provide technical support and improve networking amongst NGOS, the Government of Malawi, donors and other organizations or individuals working in the area of environment. ▪ The action Group for Renewable Energies and sustainable Development (GED) is a non-profit making NGO established in 2002 in Maputo, Mozambique, with a view to fill the gap in the field of energy and climate change issues in the country.
Year started	2001
Programme description	<p>Climate change disproportionately affects the poorest people in the world, who not only have the least capacity to respond and adapt to such rapid environmental change, but are historically the least responsible for its causes. In conjunction with partners, the IIED: Climate Change Group seeks to secure an equitable deal for the poorest communities in developing countries who are exposed to increasingly severe and unpredictable weather events that can devastate communities, destroy livelihoods and exacerbate poverty.</p> <p>Priority themes of the programme are:</p> <ul style="list-style-type: none"> ▪ Enhancing adaptation capacity in developing countries; ▪ Climate Change and sustainable livelihoods linkages in developing countries; ▪ Capacity strengthening in developing countries; ▪ Information dissemination; ▪ Promoting equitable and southern-based solutions to climate change; ▪ Enhancing opportunities for developing countries to take advantage of opportunities offered for Carbon Trading.
Programme aims and objectives	<p>Main aims include:</p> <ul style="list-style-type: none"> ▪ Improving the understanding of climate change impacts for developing countries including both policy makers and poor groups; ▪ Improving the decision making capacities in vulnerable developing countries to cope with impacts of climate change; ▪ Improving the negotiating capacities of developing countries in the international climate change negotiations through analysis of issues relevant to them; ▪ Improving the sustainable livelihoods opportunities of poor communities in developing countries in light of climate change impacts. <p>The focus and approach of the programme is:</p> <ul style="list-style-type: none"> ▪ To work in collaboration with partner organisations and individuals in developing countries; ▪ To work in partnership with collaborating institutions and individuals in the developed countries for advocacy on behalf of the poor communities in developing countries; ▪ To ensure that lessons learned from research and analysis are transmitted effectively to policy makers in developing as well as

	<ul style="list-style-type: none"> developed countries; ▪ To mainstream climate change concerns into national strategies and policies in relevant sectors; ▪ To ensure both south-south and north-south flows of relevant information.
Outputs	<p>Cities and Climate Change</p> <p>To date, discussions of how to address climate change have focused far more on mitigation (reducing greenhouse gas emissions) than adaptation (coping with the storms, floods, sea-level rise and other impacts that climate change will bring). The limited discussions on adaptation have also given little attention to cities. But many cities in Africa, Asia and Latin America and the Caribbean are at high risk from climate change.</p> <p>IIED aims to help develop – with partners in Africa, Asia and Latin America – a better basis for designing and implementing urban climate change adaptation programmes that build resilience to current and future impacts of climate change, that are pro-poor, and that complement local development. This will be achieved through focussing attention on three key areas: urban institutions and governance for building climate resilience; community-based adaptation strategies for cities in low- and middle-income countries; and mapping vulnerability to climate change impacts with groups at risk as the foundation for adaptation planning.</p> <p><i>Cities and Climate Change: Projects and Articles</i></p> <p><i>CLACC Cities Studies:</i> These studies provide a set of city level maps showing risks and vulnerability to climate change related extreme events and gradual changes.</p> <p><i>Climate change and cities:</i> why urban agendas are central to adaptation and mitigation: Cities have a bad reputation for being the epicentre of pollution, but could in fact hold the key to slowing and eventually stopping global warming.</p> <p><i>Adapting Cities to Climate Change:</i> To date, discussions of how to address climate change have focused far more on mitigation (reducing greenhouse gas emissions) than adaptation (coping with the storms, floods, sea-level rise and other impacts that climate change will bring). This page brings together material on adapting cities to climate change in low and middle-income nations.</p> <p>Community Based Adaptation</p> <p>At the community level, people have few savings, few alternative livelihood opportunities, no insurance and are already close to or even below the poverty line. So when a climate change related disaster strikes, there is seldom a safety net to fall back on. Many also live in particularly vulnerable areas. This perpetuates cycles of poverty which can be hard to escape.</p> <p>Low adaptive capacity is exacerbated, particularly in dryland Africa, by development policies that fail adequately to consider climate change. Rather, governments are pursuing policy agendas based on the modernisation of the agricultural sector through greater intensification, foreign investment and the privatisation of key resources such as land. Technical large-scale investments (e.g. irrigation) rather than institutional, market and livelihood flexibility to enable rapid response to changing circumstance are seen as the answer.</p> <p><i>Community Based Adaptation: Projects and Articles</i></p> <p><i>Community Based Adaptation Exchange (CBA-X):</i> The Community-Based Adaptation Exchange Network (CBA-X) is an online resource set up by IIED, and hosted by IDS, to share resources supporting the exchange of up-to-date information about community-based</p>

adaptation to climate change.

Pastoral livelihoods and climate change: For many years, pastoralists in the Sahel have lived in a context of environmental uncertainty and have developed a diverse range of strategies, institutions and networks to minimise this unpredictability and risk.

Pastoralism and climate change: Policies dispossessing pastoralists of their land – especially their best lands on which risk and resilience depends – and converting it to conservation or irrigated often commercial agriculture are perpetuating a vicious cycle of increasing poverty, resource conflict and environmental degradation that reinforces the very preconceptions and misunderstandings surrounding pastoralism as a livelihood system.

Community Based Adaptation - Key components for success: Giving poor country governments money does not mean that it will reach the most vulnerable

Community Based Adaptation - IIED Briefing: It is important now to support as many CBA activities as possible and to share the experience and knowledge gained.

Evaluating Climate Change Adaptation

The inter-governmental panel on climate change (IPCC) fourth assessment report clearly states the overwhelming scientific consensus that anthropogenic climate change is happening and that the negative trends in terms of temperature rise, volatility in rainfall changes, sea level rise and extreme weather events will escalate over time.

Adaptation to climate impacts must, therefore, be seamlessly integrated into all development planning and policy. These projects seek to work alongside stakeholders and decision makers to find out what works, building up a picture of successful adaptation initiatives, in order to scale up community based adaptation where appropriate, share good practice and raise awareness about adaptation needs.

Evaluating Climate Change Adaptation: *Projects and Articles*

Supporting Adaptation to Climate Change: What role for Official Development Assistance?: The United Nations Framework Convention on Climate Change has instigated several funding mechanisms in an attempt to meet adaptation needs in developing countries, however these funds have been heavily criticised by both the development and academic communities for being both fiscally and technically inadequate.

Sustainable Development Opinion Biodiversity, climate change and poverty: exploring the links: Biodiversity, poverty and the impacts of climate change are inextricably linked. This paper explores the connectivity and shows how conserving biodiversity can help natural systems and vulnerable people cope with a shifting climate. Translated into Spanish and French.

Up in Smoke: www.upinsmokecoalition.org. The Up in Smoke coalition is a unique and diverse network of development and environment organisations collaborating in one Working Group. Its central message is that solving poverty and tackling climate change are intimately linked and equally vital, not either/ors.

Climate change and development: a consultation on key researchable issues: The project team is conducting a consultation exercise to identify priority research and policy issues for the most vulnerable countries and communities in different regions in the South.

Climate Negotiations Capacity Building

The international negotiations held throughout the calendar year culminate every December at the Conference of the Parties (COP) to

the United Nations Framework Convention on Climate Change (UNFCCC), the governing treaty which provides the legal framework in which to regulate the emission of harmful greenhouse gasses. The very nature of the climate change problem – that greenhouse gasses produced in one place can alter the climate thus affecting communities living round the other side of the world – requires nations to come together to negotiate a global solution. And the most effective platform on which nations can do this is the UNFCCC.

An equitable outcome at the UNFCCC COP15 is therefore a key step towards ensuring a fair solution to the climate change problem at the international level. Tackling climate change is also important at national and local levels, but the problem must first be dealt with at its root cause before the symptoms can be treated elsewhere. Activities at the national or local level could be completely undermined if strong commitments are not made to reduce greenhouse gas emissions and help poorer nations cope with climate change impacts at the international level.

Climate Negotiations Capacity Building: Projects and Articles

Capacity Strengthening in Least Developed Countries for Adaptation to Climate Change (CLACC): Established in 2003, CLACC is a growing network of Fellows and international experts from Africa and Asia who work under the auspices of IIED to support Least Developed Countries (LDCs) to adapt to climate change

European Capacity Building Initiative (ECBI): ECBI enhances negotiating capacities in targeted groups of developing countries while increasing the understanding of developing country positions among European negotiators and decision-makers.

COP-15 Development-and-Climate-Change-Days: COP15 Development and Climate Change took place from 11-14 December in DR Byen, Copenhagen. The event had a high attendance gathering approximately 800 participants including representatives from government, international organisations, academia and research institutes, business and non-governmental organisations. The event also brought together more than 70 speakers and various extended discussions and questions and answers sessions were featured. A summary of the event is available on the IISD Reporting Services website. As in the past years, this year's D&C days provided opportunities to share information on negotiations and development adaptation issues.

Economics and Equity of Adaptation

Our focus is primarily on the economics of adaptation, providing decision makers with tools and options for effective adaptation. Our economics work seeks to provide decision-support with information researched and collated from working with our partners from these changing environments. At IIED we deal in 'real-world' politics and recognise that key decisions on the environment made at international, national and local levels more often than not involve various trade-offs and necessitate the allocation of scarce resources to competing needs, over various time periods. These influential decisions require objective information and options that reflects the individual characteristics of specific developing countries where adaptation is primarily required.

Economics and Equity of Adaptation: Projects and Articles

Our focus is primarily on the economics of adaptation, providing decision makers with tools and information to make decisions for effective adaptation. Adaptation is going to be costly, and decisions will need to be made about how best to allocate limited funding. The case also needs to be built up to ensure developing countries receive the help they need to cope with climate change - costing adaptation will strengthen this argument.

Economics of climate change adaptation in least developed countries: This project aims to build capacity in the least developed countries (LDCs) in the economic analysis of climate change to inform policymaking. Robust analyses of the impacts of climate change impacts and the costs and benefits of climate change adaptation at local and national levels will be undertaken to feed into local and national policy-making and negotiating positions.

AdMit: This pilot project presents a new alternative to carbon offsetting that addresses many of the doubts about and weakness of voluntary carbon trading.

Relevant Publications:

- Climate Change in Africa, Camilla Toulmin, Nov 2009, Book/Report - Zed Books
- Cultivating success: the need to climate-proof Tanzanian agriculture, Muyeye Chambwera, James MacGregor, Sep 2009, Briefing - IIED
- Counting the cost of climate change in Namibia, Hannah Reid, James MacGregor, Linda Sahlén, Jesper Stage, Dec 2007, Briefing – IIED
- The economic impact of climate change in Namibia, Hannah Reid, Linda Sahlén, Jesper Stage, James MacGregor, Nov 2007, Book/Report – IIED
- Africa and Climate change: An update 2006, Camilla Toulmin, Saleemul Huq, Oct 2006, Book/Report – II
- Africa and Climate Change, Camilla Toulmin, Saleemul Huq, Johan Rockström, Oct 2005, Book/Report - IIED
- Adapting to climate change in East Africa: A strategic approach, Victor A. Orindi, Laurel A. Murray, Mar 2005, Book/Report - IIED

Programme title	The International Center for Water Economics and Governance in Africa IWEGA
Programme type	A fully specialized research and training program on water economics and governance.
Contact details/ key personnel	<p>Prof. Stefano FAROLFI CIRAD, Joint Research Unit G-Eau</p> <p>Scientific Director IWEGA</p> <p>Universidade Eduardo Mondlane</p> <p>Caixa Postal n. 3647, Maputo - Mozambique</p>

	<p>Tel: ++258 21 49 18 82 Cell: ++258 84 53 43 538 Fax: ++258 21 49 19 04</p>
Country/ies	SADC countries
Agencies involved/ partnerships	<ul style="list-style-type: none"> ▪ Based at the University Eduardo Mondlane in Maputo ▪ evolved from a concept note developed by a consortium of three research and training institutions: The University Eduardo Mondlane (UEM), the Center for Environmental Economics and Policy in Africa (CEEPA) at the University of Pretoria, and the French Agricultural Research Center for International Development (CIRAD) – UMR G Eau. ▪ receives core funding from the Government of Mozambique, through the UEM, and from CIRAD. ▪ Seed funding is provided by the South African Department of Water Affairs (DWA). <p>Within the Universidade Eduardo Mondlane, IWEGA plays a crucial role in terms of catalyzing and coordinating research and training activities on water economics and governance issues.</p> <p>IWEGA establishes links with the main National Departments concerned with water management issues in Mozambique and in the SADC region, as well as with regional and international organizations through their regional offices.</p> <p>IWEGA is one of the NEPAD Water Centers of Excellence and aims at being part of WaterNet, the regional network of 56 education and knowledge Institutes in Southern and Eastern Africa offering joint education, training and research in the field of Integrated Water Resources Management. UNESCO-IHE is one of the founding members of WaterNet and provides academic backstopping and advice to the Network.</p> <p>IWEGA is establishing collaboration with international research centers and universities. This collaboration will allow IWEGA to interact with other researchers, develop dialogue on issues related to their disciplines, and apply internationally for funding. Internationally renowned scientists will be invited to do research, present seminars, teach courses and supervise students. Steps in this directions have already been made and Memorandums of understanding (MOUs) have been discussed or will be initiated soon with the following institutions:</p> <ul style="list-style-type: none"> ▪ Water Science and Policy Center (WSPC) of the University of California Riverside; ▪ French Agricultural Research Center for International Development (CIRAD) (MOU signed); ▪ Joint Research Unit G-Eau (MOU signed); ▪ Center for Environmental Economics and Policy in Africa (CEEPA) at the University of Pretoria; ▪ Australian National University (ANU) Water Initiative (within the proposal for a UNESCO Chair in Water Economics and Transboundary Water Governance).
Year started	May 2009

Programme description	IWEGA's mission is "to enhance the capacity of African researchers to conduct water economics and governance inquiry of relevance to African problems and increase the awareness of environmental and economic managers and policy makers about the role of water economics and governance for sustainable development".
Programme aims and objectives	<p>The organisation strives to achieve and provide:</p> <ul style="list-style-type: none"> ▪ Specialized high quality degree and non-degree training and excellence in research in the field of water economics and governance; ▪ Increased awareness among water managers, planners and policy makers in public and private sectors of the role of water economics and governance in the design and implementation of policies for sustainable water resource use and development; ▪ Increased collaboration and exchange of experiences for cross-fertilization, augmentation of capacity and reduced professional isolation of peer academics in regional universities.
Outputs	<p>Events</p> <ul style="list-style-type: none"> ▪ <i>"Water Economics and Governance in Africa. Basic Issues and Operational Tools"</i> 1st National Training Workshop for Water Professionals Maputo, 11-13 November 2009. ▪ <i>Economic and Financial Instruments Implementation for Sustainable Water, Hygiene and Sanitation Programmes (WASH).</i> Waternet/CapNet/NUL/IWSD/IWEGA Workshop Maseru, Lesotho, 22-26 March 2010. ▪ <i>Water Economics and Governance in South Africa. Basic Issues and Operational Tools.</i> 2nd National Training Workshop for Water Professionals organized in collaboration with the Learning Academy of DWA-South Africa. Pretoria, RSA, 14-16 September 2010. <p>Projects</p> <ul style="list-style-type: none"> ▪ IWEGA is from 2009 the coordinating institution of the project "New Water Governance Over Water Resources for Sustainable Rural Development: Research on Social, Economic and Institutional Aspects" (SAFeWater ARISE). website: http://www.ceepa.co.za/arise.html ▪ Assessing and testing water allocation for catchment management strategies in South Africa. A collaborative project between AWARD South Africa, UMR G Eau, CEEPA and IWEGA. 2008-10. ▪ Water governance decentralization in Africa: a framework for reform process and performance analysis.

Programme title	Regional Climate Change Programme RCCP
Programme type	Regional programme for southern Africa funded by DFID
Contact details/ key personnel	Postal address: One World Sustainable Investments PO Box 8359 Roggebaai

8012
South Africa

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Country/ies	Angola Botswana Democratic Republic of the Congo Lesotho Madagascar Malawi Mauritius Mozambique Namibia Seychelles South Africa Swaziland Tanzania Zambia Zimbabwe
Agencies involved/ partnerships	Funded by DFID. Implemented by One World Sustainable Investments. Is envisioning sub-regional node offices (3-4).
Year started	August 2007
Programme description	The Regional Climate Change Programme aims to be a SADC-wide regional programme funded by DFID to facilitate the strengthening of adaptive capacity and resilience to climate change across the region. This is particularly relevant insofar as climate change impacts on progress towards the MDGs of water, agriculture, health and energy.
Programme aims and objectives	RCCP's purpose is to ensure that appropriate adaptation to climate change by government, business and civil society in southern Africa is enabled by the provision of useful information based on integrated analysis and adaptive management. The RCCP is designed to enable and support processes to assist in the development of a regional platform that can lobby and access funds for transboundary climate change adaptation, in proportion to the extent of the problem: ☐ <ul style="list-style-type: none"> • By making available integrated scientific analysis on climate change risks and responses, to improve adaptive management. • By validating and using indigenous knowledge in scientific assessments. • By identifying viable, stakeholder-led, transboundary-relevant climate adaptation options and presenting these to funders. • By strengthening transboundary relationships for responding to climate change and influencing climate policy. ☐ <p>A regional programme centre has been established in Cape Town, South Africa, with a support office in Dar es Salaam, Tanzania. Up to</p>

	<p>three other subregional nodes are still to be established elsewhere in the region, where data will be housed, analysed and disseminated. The nodes will cooperate with established lobbying institutions as well as the private sector.</p> <p>A central information clearinghouse will provide synthesised climate information as well as key facts and figures, maps and reports.</p> <p>The RCCP provides indispensable support for advisors to top-level officials in governments, civil society and the private sector.</p>
Outputs	<ul style="list-style-type: none"> • Documentary: <i>Too Many Degrees: Human Security and Climate Change</i>

Programme title	Regional Hunger and Vulnerability Programme RHVP
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Programme type	Regional programme for southern Africa funded by DFID and AusAID
Contact details/ key personnel	<p>Postal address: Postnet 307 Private Bag x30500 Houghton Johannesburg 2041 South Africa</p> <p>Physical address: 3rd floor, North Park, 20 Girton Road Parktown Johannesburg 2193 South Africa Tel: +27 11 642 5211</p> <p>Key personnel: Katharine Vincent (responsibility for climate change) katharine@rhvp.org</p> <p>Josee Koch (responsibility for HIV/AIDS) josee@rhvp.org</p> <p>Philip White (responsibility for agriculture links) Philip@rhvp.org</p>
Country/ies	SADC member states
Agencies involved/ partnerships	<p>Funded by DFID and AusAID. Implemented by MASDAR, Overseas Development Group and Out of the Office.</p> <p>Working partners include:</p> <ul style="list-style-type: none"> • Africa Centre for Food Security (ACFS), University of KwaZulu Natal • Centre for Social Protection at the Institute of Development Studies (UK) • Economic Policy Research Institute (EPRI)

	<ul style="list-style-type: none"> • Grow Up Free From Poverty coalition • Southern African Development Community (SADC)
Year started	2005-2010
Programme description	The Regional Hunger and Vulnerability Programme (RHVP) supports policy makers and practitioners concerned with food security, social protection and vulnerability in southern Africa. In doing so, it has specific focus on social protection and more particularly social transfers (cash, inputs, food, agricultural subsidies).
Programme aims and objectives	<p>In its first phase (2005-2008), the programme had three interlinked components:</p> <ul style="list-style-type: none"> • Building evidence. Through the Regional Evidence Building Agenda (REBA), RHVP identified, consolidated and analysed evidence on social transfers and other aspects of social protection. This helped to define lessons and best practices for instruments, systems and policies. The REBA aimed to learn from existing evidence from southern Africa and beyond, and from new investigative work in the region to support and substantiate key advocacy messages. • Building capacity. RHVP worked with the Southern African Development Community, the Regional Vulnerability Assessment Committee (RVAC), and individual national Vulnerability Assessment Committees (VACs) to improve the quality, relevance and affordability of vulnerability assessment and analysis (VAA). The focus was on the design and impact evaluation of social protection and other policies and instruments to address hunger and vulnerability. • Building advocacy. RHVP supported evidence-based awareness and advocacy on key social protection issues, policies and instruments in tackling hunger and vulnerability in the region. The programme sponsored the website www.wahenga.net and produced a range of communication materials and media initiatives aiming to facilitate broad-based access to the current debate on hunger and vulnerability in the region. <p>In its second phase (2008-2010), the programme has three interlinked components:</p> <ul style="list-style-type: none"> • Component 1: Vulnerability Assessment and Analysis Tools Output: VAA tools at national and regional levels in place and in use to monitor levels of hunger and vulnerability and recommend responses • Component 2: Hunger and Vulnerability Skills Development Output: Skills in VAA and in hunger and vulnerability policy formulation available on a sustainable basis from regional training programmes • Component 3: Hunger and Vulnerability Knowledge Output: Knowledge from policy analysis on hunger and vulnerability provided to national and regional policymakers
Outputs	<p>Among RHVP's outputs from its first phase are:</p> <ul style="list-style-type: none"> • National inventories of social protection programmes in Lesotho, Malawi, Mozambique, Swaziland, Zambia and Zimbabwe • 18 case studies of specific social protection programmes from across the region

- 6 thematic case studies relating to social protection across the region
- 6 institutional and policy context briefs relating to Lesotho, Malawi, Mozambique, Swaziland, Zambia and Zimbabwe
- 6 short case study films profiling social protection across the region
- A synthesis documentary on the role of cash transfers in reducing vulnerability to hunger
- A set of policy briefs on social transfers (a collaborative effort with partners)
- A variety of briefs and comments on topical issues, including biofuels and the food price crisis in 2008

Outputs from the second phase:

Frontiers of Social Protection (FoSP) Briefs

This series of briefs aims to summarise the main findings of the respective FoSP studies in a concise and accessible format that will be appreciated by policymakers and practitioners concerned with hunger, vulnerability and social protection in the Southern African Development Community (SADC) countries, and that will support RHVP's policy dialogue activities and other dissemination events.

The FoSP studies aim to ensure that the knowledge from policy analysis on hunger and vulnerability that RHVP provides to policymakers remains relevant and reflects advances on a number of key social protection frontiers. The studies build on the research activities of RHVP's first phase (2005-08), in particular the Regional Evidence Building Agenda (REBA), which involved 20 commissioned case studies of social protection programmes in southern Africa and a series of cross-cutting thematic analyses. Like the REBA, the FoSP work is demand-led, focusing on a number of 'hot topics' prioritised by stakeholders across the region and incorporating new evidence that is continually emerging on the practicalities and impacts of delivering large scale social protection.

- Brief Number 1: Fertiliser subsidies and social cash transfers, September 2009
- Brief Number 2: Poverty targeting, October 2009
- Brief Number 3: Electronic delivery of social cash transfers, February 2010
- Brief Number 4: Food prices and markets in an era of global instability, March 2010
- Brief Number 5: Dependency and graduation, March 2010
- Brief Number 6: Policy options for reducing risk and instability in staple food markets, April 2010

Programme title	Southern Africa Regional Poverty Network SARPAN
Programme type	Regional network/independent NGO (currently undergoing strategic review)
Contact details/ key personnel	<p>Postal address: Private Bag x41 Pretoria 0001 South Africa</p> <p>Physical address: Human Sciences Research Council 134 Pretorius Street Pretoria South Africa</p> <p>Key personnel: Richard Humphries rhumphries@hsrc.ac.za info@sarpn.org.za</p>
Country/ies	SADC member states
Agencies involved/ partnerships	Funded by DFID, Ford Foundation, IDRC, Southern Africa Trust, Swiss Agency for Development and Cooperation, W.K. Kellogg Foundation
Year started	2001 (as a project of the Human Sciences Research Council); in 2004 became an independent regional entity
Programme description	<p>The Southern African Regional Poverty Network is a non-profit organisation that promotes debate and knowledge sharing on poverty reduction processes and experiences in southern Africa.</p> <p>It began as a project of the Human Sciences Research Council in South Africa, and in 2004 became an independent regional entity, supported by a board of 20 regional policy makers, academics and civil society members. In 2009 it is currently undergoing a strategic reorientation following a decision by its Board to redefine its status and focus as an independent NGO.</p>

<p>Programme aims and objectives</p>	<p>SARPN aims to contribute towards the effective reduction of poverty in the countries of the Southern African Development Community (SADC) through creating platforms for effective pro-poor policy, strategy and practice.</p> <p>SARPN achieves this goal through widening participation, bringing people together across the region to exchange ideas, and disseminating information to deepen understandings of poverty issues and improve policy and practice.</p> <p>Key objectives:</p> <ul style="list-style-type: none"> • Knowledge management <ul style="list-style-type: none"> ○ Collecting and disseminating information ○ Undertaking commissions/studies ○ Providing commentaries • Building linkages <ul style="list-style-type: none"> ○ Developing directories and databases of stakeholders ○ Coordinating networks/discussion groups ○ Linking stakeholders • Promoting debate <ul style="list-style-type: none"> ○ Convening events/debates that examine issues of policy relevance ○ Facilitating the participation of marginalised groups in discussions ○ Promoting discussion across conventional barriers – including borders, institutional frameworks, and sectors
<p>Outputs</p>	<p>SARPN programmes include:</p> <ul style="list-style-type: none"> • Economic dimensions <ul style="list-style-type: none"> ○ International and regional trade policy ○ Resource flows and use ○ Macroeconomic and global initiatives (PRSPs, MDGs) • Political dimensions <ul style="list-style-type: none"> ○ Democracy and governance ○ Regional integration ○ Land reform • Social dimensions <ul style="list-style-type: none"> ○ Food security and hunger ○ Livelihoods and vulnerability ○ Social safety nets and social protection <p>As a network, the SARPN website acts as a portal, listing and providing online access to publications from other sources under thematic areas, including food security, environment and climate change, agriculture, HIV and AIDS, water and sanitation.</p>

	<p>SARPN publications include: annual poverty reports, briefs, an MDG watch, research papers and staff papers.</p> <p>Of particular interest to DDRN are:</p> <p>Background Paper - Food security in Southern Africa: Current status, key policy processes and key players at regional level Fred Kalibwani, Southern African Regional Poverty Network (SARPN), Overseas Development Institute (ODI), Food and Natural Resources Policy Analysis Network (FANRPAN), Oct 2005</p> <p>Poverty eradication and linking micro level impacts to macroeconomic policies and frameworks Southern African Regional Poverty Network (SARPN) , 21 Nov 2006</p> <p>Features of the key prevailing Macroeconomic Policy Frameworks Southern African Regional Poverty Network (SARPN), 21 Nov 2006</p> <p>HIV/AIDS, hunger and vulnerability in Southern Africa Southern African Regional Poverty Network (SARPN), Concern World Wide, Oxfam International , 29 May 2006</p> <p>Civil society and regional food security: The role of SADC Southern African Regional Poverty Network (SARPN), Overseas Development Institute (ODI), Food and Natural Resources Policy Analysis Network (FANRPAN), 8 Nov 2005</p> <p>Civil society and regional food security Southern African Regional Poverty Network (SARPN), Overseas Development Institute (ODI), Food and Natural Resources Policy Analysis Network (FANRPAN), 8 November 2005</p>
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Programme title	Southern African Development Community - Regional Vulnerability Assessment Committee SADC-RVAC
Programme type	Multi-agency, regional, committee
Contact details/ key personnel	Duncan Samikwa Programme Manager Regional Vulnerability Assessment and Analysis Programme FANR Directorate SADC Secretariat P/Bag 0095 Gaborone, Botswana Tel: +267 318 7324 Fax: + 267 318 7315 Cell: +267 72112031 Email: dsamikwa@sadc.int
Country/ies	All SADC member states
Agencies involved/ partnerships	The RVAC programme falls under the SADC FANR (Food, Agriculture and Natural Resources) Directorate and is supported by AIMS (Agricultural Information Management Systems). Key partners include: <ul style="list-style-type: none"> ▪ the World Food Programme (WFP), ▪ the Food and Agriculture Organisation (FAO), ▪ the Famine Early Warning System Network (FEWS NET), ▪ Oxfam, ▪ UN Office for the Coordination of Humanitarian Affairs (OCHA) and

	<ul style="list-style-type: none"> ▪ UNICEF.
Year started	1999
Programme description	<p>In order to address the underlying causes of chronic vulnerability in the region, and to make progress towards the Millennium Development Goals, it is recognised that there is a need to broaden and improve early warning information and vulnerability assessments at national and sub national levels. To achieve these aims, SADC established the Regional Vulnerability Assessment Committee (RVAC), a multi-agency committee that has spearheaded critical improvements in food security and vulnerability analysis at regional and country level.</p> <p>At the Member State level, National Vulnerability Assessment Committees (NVACs), coordinate vulnerability assessments. NVACs are multi-sectional committees led by relevant government ministries with wide ranging membership which includes different government ministries and departments, non-governmental organisations (NGOs) and international organisations involved in the poverty and the socio-economic sector.</p> <p>In 2006, SADC Secretariat with its partners began implementing the Regional Vulnerability Assessment and Analysis (RVAA) Programme. Since its' inception, there has been important institutional and conceptual achievements, building understanding and strategies that integrate short-term responses to food emergencies with broader, longer-term approaches to chronic poverty, food insecurity and livelihood vulnerability.</p> <p>Building on the diverse experience and steady progress of the past decade, SADC intends to continue with its Regional VAA work towards the sustainability of VAA institutions and systems at both national and regional levels. A continued focus will be placed on building sustainable VAA information systems which are integrated with early warning, monitoring, assessment and analysis, in support of action that spans urgent short-term responses to food deficits and longer-term programmes to redress the chronic poverty that makes people vulnerable to such deficits and to related livelihood crises. The future RVAA strategy will continue to contribute directly to the overarching priority in SADC's integration agenda, which is to combat poverty.</p>
Programme aims and objectives	<p>Mission Statement: "The RVAC will work to strengthen national and regional vulnerability analysis systems in order to inform policy formulation, development programmes and emergency interventions that will lead to a reduction of vulnerability in the SADC region."</p> <p>Terms of Reference <i>General:</i></p> <ul style="list-style-type: none"> ▪ Acquaint and keep abreast with initiatives and issues in the area of vulnerability analysis at all levels: globally, regionally, nationally, and sub-nationally. ▪ Develop and maintain an inventory and database of institutions currently involved in any form of vulnerability analysis in the SADC region. ▪ Disseminate information of interest to the member states and other stakeholders, including vulnerability analysis reports and

	<ul style="list-style-type: none"> products from the countries themselves. ▪ Advocate and raise awareness for the increased use of vulnerability analysis products in policy formulation, development programmes and emergency interventions. <p><i>Support to NVACs:</i></p> <ul style="list-style-type: none"> ▪ Facilitate the institutionalisation of national VACs, including for those countries where they do not already exist and facilitate in strengthening links with other sectors for those countries where national VACs exist, as requested by member states. ▪ Develop and maintain a toolkit of the different methodologies / approaches for undertaking vulnerability analysis. ▪ Develop and facilitate a modular approach to vulnerability analysis that can be adopted at national and regional levels. ▪ Provide resources for training and analysis as a repository of best practices and facilitation for cross-country learning. ▪ Develop training programmes to enhance the technical capacity of human resources through to policy and decision-making levels, in collaboration with appropriate institutions within SADC. ▪ Support partnership building and resource mobilisation activities for the benefit of increased vulnerability analysis work at national and regional levels. ▪ Facilitate conducting of special sector studies, policy studies and harmonization of information systems across countries, ▪ Facilitate training needs assessments and coordinate and monitor implementation of national VAC activities <p><i>Support to SADC:</i></p> <ul style="list-style-type: none"> ▪ Perform monitoring activities in line with the SADC RISDP (Regional Indicative Strategic Development Plan) and the Extra-Ordinary Summit Declaration on Agriculture and Food Security, with regards to food security, HIV/AIDS and poverty, in particular. ▪ Advise the SADC Secretariat as appropriate on any relevant matter. <p><i>Support to collaborating partners (practitioners):</i> Explore ways and means of enhancing collaboration and coordination among the relevant institutions with a view to harmonising definitions and methodologies for comparability, sharing of data and improved analysis.</p>
Outputs	<p>RVAA programme:</p> <p><i>Programme Documents:</i></p> <ul style="list-style-type: none"> • Kariba NVAC Formation 2001 • SADC RVAA Five Year Programme, June 2005 • SADC RVAA Five Year Programme - a Synthesis • SADC RVAA Five Year Programme Log Frame, June 2005 • 2nd Phase RVAA Programme, March 2008 • SADC RVAA Programme Review, March 2008 <p><i>NVAC Country Reports</i></p>

At the Member State level, National Vulnerability Assessment Committees (NVACs), coordinate vulnerability assessments. NVACs are multi-sectional committees led by relevant government ministries with wide ranging membership which includes different government ministries and departments, non-governmental organisations (NGOs) and international organisations involved in the poverty and the socio-economic sector.

- Angola
- Botswana
- Lesotho
- Malawi
- Mauritius
- Mozambique
- Namibia
- Swaziland
- Tanzania
- Zambia
- Zimbabwe

NVAC Annual Organisation Meetings

Regional Dissemination Meetings

Technical Working Groups and Capacity Building

Southern African Livelihoods Zones Map and Information

Special Studies and Papers:

- OXFAM Zambia Market Report October 2006
- IPC review 2006
- FEG Global Prices Local Realities
- ODI Rising Food Prices
- UN Press Statement Rising Food Prices
- Joint UN Paper - Rising Food Prices
- Rising Food Prices 2006
- Rising Food Prices - RHVP brief
- Rising Food Prices - Drivers & Implications

	<ul style="list-style-type: none"> • CVAA comment 2006 • The Links between HEA and the IPC 2006 • VAC Predictive Performance Review 2005 • Final Triggering Factors 2006 • SENAC MSU Markets Desk Review • Food Aid, Food Production and Food markets in Lesotho 2006 • VAC Methodology Review • Tanzania Singida Social Protection Paper <p><i>Reviews:</i></p> <ul style="list-style-type: none"> • Review of the SADC RVAA, March 2008 • VAC Predictive Performance Review 2005 • Consultation Reports
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Programme title	Southern African Vulnerability Initiative SAVI
Programme type	Regional research programme and network
Contact details/ key personnel	www.gechs.org/savi savi@gechs.org
Country/ies	Southern Africa
Agencies involved/ partnerships	<p>Funded by the International Council for Science (ICSU) and the International Human Dimensions Programme on Global Environmental Change (IHDP), with contributions from the Research Council of Norway and the National Research Foundation of South Africa</p> <p>SAVI is an initiative of the Global Environmental Change and Human Security (GECHS) project, carried out in collaboration with the Global Environmental Change and Food Systems (GECAFS) project and the International Geographical Union (IGU).</p> <p>Members include: GECHS (Professor Karen O'Brien)</p>

	<p>ReVAMP Research Group, University of the Witwatersrand (Prof Coleen Vogel) UKZN HEARD (Prof Tim Quinlan) University of Cape Town (Dr Gina Ziervogel) Carleton University, Ottawa, Canada (Dr Mike Brklacich) CICERO (Dr Siri Eriksen) Institute for Ethnology, Germany (Dr Michael Schnegg)</p>
Year started	2003
Programme description	International research network/programme
Programme aims and objectives	<p>SAVI is an initiative of the Global Environmental Change and Human Security (GECHS) project, carried out in collaboration with the Global Environmental Change and Food Systems (GECAFS) project and the International Geographical Union (IGU). SAVI is funded by the International Council for Science (ICSU) and the International Human Dimensions Programme on Global Environmental Change (IHDP), with supporting contributions from the Research Council of Norway and the Research Council of South Africa.</p> <p>SAVI aims to consolidate different facets of vulnerability research in order to develop an integrated framework for understanding vulnerability within the context of multiple stressors in southern Africa. Their main objective is to develop a proposal for a self-sustaining, longer-term project which integrates vulnerability research with policy formulation. Furthermore, they hope to build a coalition among researchers and practitioners in the region to implement a vulnerability research program.</p>
Outputs	<p>Scoping paper and several workshops to discuss vulnerability in southern Africa The SAVI framework for assessing vulnerability through multiple stresses Quinlan, T., G. Ziervogel and K. O'Brien. (undated). Assessing vulnerability in the context of multiple stressors: the Southern African Vulnerability Initiative. Available online at http://www.egs.uct.ac.za/~gina/Quinlan_SAVI_IFPRI.pdf (accessed 28th January 2009)</p>

Table summarising university/research institute/NGO with research capacity participation in research programmes in section 6a.

Country	Research institute/ university/ NGO with research capacity	Contact persons/ department
Botswana	University of Botswana	Opha Pauline Dube (School of Environmental Science)
		Prof Isaac Mazonde
		Directorate of Research and Unit Development
Lesotho	University of Lesotho	Thope Matobo
Madagascar	Universite d'Antananarivo	Lilia Rabaharisoa
Malawi	Coordination Unit for the Rehabilitation of the Environment (CURE)	
	Civil Society Agriculture Network (CISANET)	Victor Mhoni
	Malawi Polytechnique	Charles Mataya
	University of Malawi	Agricultural Policy Research Unit
Mauritius	University of Mauritius	Balraj Rajkumar
Mozambique	Centro Nacional de Cartografica e Teledeteccao	Manuel Ferrao
	Action Group for Renewable Energies and Sustainable Development	
	Eduardo Mondlane University	Department of Agricultural Economics
Namibia	Namibia Economic Policy Research Institute	Klaus Schade
South Africa	Council for Scientific and Industrial Research (CSIR)	Robert Scholes
	Economic Policy Research Institute (EPRI)	
	University of Cape Town (Climate Systems Analysis Group)	Bruce Hewitson Peter Johnston Mark Tadross Gina Ziervogel
	University of the Free State	Daniel Barend Louw
	University of KwaZulu Natal	Africa Centre for Food Security Prof Tim Quinlan (Health Economics and HIV/AIDS Research Division)
	University of Limpopo	Department of Agricultural Economics and Extension
	University of Pretoria	Department of Agricultural Economics, Extension and Rural Development
	University of the Witwatersrand	Prof Coleen Vogel Scott Drimie
Swaziland	University of Swaziland	Micah Masuku
Tanzania	Economic and Social Research Foundation	Hoseana Lunogelo
	Environmental Protection and Management Services	
	Institute for Resource Assessment	Amos Majule
	Sokoine University of Agriculture	Prof Henry Fatael Mahoo

Zambia	Energy and Environmental Concerns for Zambia	
	Agricultural Consultative Forum (ACF)	Hyde Haantuba
	University of Zambia	Department of Agricultural Economics
Zimbabwe	Midlands State University	Prof Francis Themba Mugabe
	ZERO Regional Environmental Organisation	
	University of Zimbabwe	Paul Mapfumo
		Reneth Mano
	Department of Agricultural Economics and Extension	

REFERENCES

- Adger, W. Neil, and P. Mick Kelly. 1999. Social vulnerability to climate change and the architecture of entitlements. *Mitigation and Adaptation Strategies for Global Change* 4:253-266.
- Alene, Arega D., and Ousmane Coulibaly. 2009. The impact of agricultural research on productivity and poverty in sub-Saharan Africa. *Food Policy* 35(2):198-209.
- Archer, Emma R.M. 2003. Identifying underserved end-user groups in the provision of climate information. *Bulletin of the American Meteorological Society* 84 (11):1525-1532.
- Arnell, Nigel W. 1999. Climate change and global water resources. *Global Environmental Change* 9 (Special Issue):S31-S49.
- Beg, Noreen, Jan Corfee Morlot, Ogunlade Davidson, Yaw Afrane-Okesse, Lwazikazi Tyani, Fatma Denton, Youba Sokona, Jean Philippe Thomas, Emilio Lebre La Rovere, and Jyoti K. Parikh. 2002. Linkages between climate change and sustainable development. *Climate Policy* 2 (2-3):129-144.
- Belbase, Krishna, and Richard Morgan. 1994. Food security and nutrition monitoring for drought relief management: The case of Botswana. *Food Policy* 19 (3):285-300.
- Bohle, Hans G., Thomas E. Downing, and Michael J. Watts. 1994. Climate change and social vulnerability: Toward a sociology and geography of food insecurity. *Global Environmental Change* 4 (1):37-48.
- Burton, Ian, and Maarten K. Van Aalst. 2004. Look before you leap: a risk management approach for incorporating climate change adaptation in World Bank operations. Washington DC: World Bank.
- Christensen, H., and B. Hewitson. 2007. Regional Climate Projections. In *Climate Change 2007, The Physical Science Base, Contribution of Working Group 1 to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by S. Solomon. Geneva: WMO.
- Dana, Julie, Christopher L. Gilbert, and Euna Shim. 2006. Hedging grain price risk in the SADC: Case studies of Malawi and Zambia. *Food Policy* 31 (4):357-371.
- Davidson, Ogunlade, Kirsten Halsnaes, Saleemul Huq, Marcel Kok, Bert Metz, Youba Sokona, and Jan Verhagen. 2003. The development and climate nexus: the case of sub-Saharan Africa. *Climate Policy* 3 (Supplement 1):S97-S113.
- Desanker, Paul, and Christopher Magadza. 2001. Africa. In *Climate Change 2001: Impacts, Adaptation and Vulnerability*, edited by I. P. C. C. Change. Geneva: IPCC.
- Devereux, Stephen, and Jenny Edwards. 2004. Climate change and food security. *IDS Bulletin* 35 (3):22-30.
- DFID. 2006. Eliminating world poverty: making governance work for the poor. London: HMSO.
- Dilley, Maxx. 2000. Reducing Vulnerability to Climate Variability in Southern Africa: The Growing Role of Climate Information. *Climatic Change* 45 (1):63-73.
- Du Toit, Andries, and Gina Ziervogel. 2004. Vulnerability and food insecurity: Background concepts for informing the development of a national FIVIMS for South Africa.
- Easterling, W.E., P.K. Aggarwal, Batima. P., K.M. Brander, L. Erda, S.M. Howden, A. Kirilenko, J. Morton, Soussana. J.-F., J. Schmidhuber, and F.N. Tubiello. 2007. Food, fibre and forest products. In *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden and C. E. Hanson. Cambridge, UK: Cambridge University Press.
- Eele, Graham. 1994. Indicators for food security and nutrition monitoring: A review of experience from Southern Africa. *Food Policy* 19 (3):314-328.
- Ehrhart, C, and M Twena. 2006. Climate change and poverty in Tanzania: realities and responses. Atlanta: CARE.
- Eide, Asbjorn. 2008. The right to food and the impact of biofuels (agrofuels). Rome: FAO.

- Ericksen, Polly J. 2008. Conceptualizing food systems for global environmental change research. *Global Environmental Change* 18 (1):234-245.
- . 2008. What is the vulnerability of a food system to global environmental change? *Ecology and Society* 13 (2):14.
- Eriksen, Siri, and Lars Otto Naess. 2003. Pro-poor climate adaptation: Norwegian development cooperation and climate change adaptation - an assessment of issues, strategies, and potential entry points. Oslo: CICERO.
- Evans, Alexander. 2008. Rising food prices: drivers and implications for development. London: Chatham House.
- FAO. 2002. *The state of food insecurity in the World 2001*. Rome: FAO.
- Fischer, G., M. Shah, and H. van Velthuisen. 2002. Climate Change and Agricultural Vulnerability, report prepared by the International Institute for Applied Systems Analysis for the World Summit on Sustainable Development, Johannesburg. Laxenburg: International Institute for Applied Systems Analysis.
- Gentilini, Ugo, and Patrick Webb. 2008. How are we doing on poverty and hunger reduction? A new measure of country performance. *Food Policy* 33 (6):521-532.
- Gigli, Simone, and Shardul Agrawala. 2007. Stocktaking of progress on integrating adaptation into development cooperation activities. Paris: OECD.
- Gregory, P. J., J. S. I. Ingram, and M. Brklacich. 2005. Climate change and food security. *Philosophical Transactions of the Royal Society B* 360:2139-2148.
- Hendriks, Sheryl. 2005. The challenges facing empirical estimation of household food (in)security in South Africa. *Development Southern Africa* 22:103-123.
- Hulme, Mike, Ruth Doherty, Todd Ngara, Mark New, and David Lister. 2001. African climate change: 1900-2100. *Climate Research* 17:145-168.
- Ingram, J. S. I., and M. Brklacich. 2002. Global Environmental Change and Food Systems – GECAFS: A New Interdisciplinary Research Project. *Die Erde* 132:S427-435.
- Ingram, J. S. I., P. J. Gregory, and A. M. Izac. 2008. The role of agronomic research in climate change and food security policy. *Agriculture, Ecosystems & Environment* 126 (1-2):4-12.
- IPCC. 2001. Climate Change 2001: Impacts, Adaptation and Vulnerability. Geneva: IPCC.
- . 2007. Climate Change 2007 Synthesis Report: Summary for Policymakers. Geneva: WMO.
- Jayne, T. S., Ballard Zulu, and J. J. Nijhoff. 2006. Stabilizing food markets in eastern and southern Africa. *Food Policy* 31 (4):328-341.
- Klein, Richard J.T. 2001. Adaptation to climate change in German official development assistance - an inventory of activities and opportunities, with a special focus on Africa. Eschborn, Germany: Deutsche Gesellschaft für Technische Zusammenarbeit.
- Leichenko, Robin M., and Karen L. O'Brien. 2002. The dynamics of rural vulnerability to global change: the case of Southern Africa. *Mitigation and Adaptation Strategies for Global Change* 7:1-18.
- Lobell, David B, Marshall B. Burke, Claudia Tebaldi, Michael D. Mastrandrea, Walter P. Falcon, and Rosamond L. Naylor. 2008. Prioritizing climate change adaptation needs for food security in 2030. *Science* 319:607-610.
- Marsland, Neil. 2004. Development of Food Insecurity and Vulnerability Information Systems in southern Africa: The experience of Save the Children UK. London: Save the Children.
- Martens, P., R. S. Kovats, S. Nijhof, P. de Vries, M. T. J. Livermore, D. J. Bradley, J. Cox, and A. J. McMichael. 1999. Climate change and future populations at risk of malaria. *Global Environmental Change* 9 (Supplement 1):S89-S107.
- Mendelsohn, R., A. Dinar, and A. Dalfelt. 2000. Climate Change Impacts on African Agriculture. Yale University.
- Misselhorn, Alison A. 2005. What drives food insecurity in southern Africa? a meta-analysis of household economy studies. *Global Environmental Change Part A* 15 (1):33-43.

- Norse, D. 1994. Multiple threats to regional food production: environment, economy, population? *Food Policy* 19 (2):133-148.
- O'Brien, Karen L., Tim Quinlan and Gina Ziervogel. 2009. Vulnerability interventions in the context of multiple stressors: lessons from the Southern African Vulnerability Initiative (SAVI). *Environmental Science and Policy* 12:23-32.
- O'Brien, Karen L., and Robin M. Leichenko. 2000. Double exposure: assessing the impacts of climate change within the context of economic globalisation. *Global Environmental Change* 10:221-232.
- . 2003. Winners and Losers in the Context of Global Change. *Annals of the Association of American Geographers* 93 (1):89-103.
- Parry, M. L., C. Rosenzweig, A. Iglesias, M. Livermore, and G. Fischer. 2004. Effects of climate change on global food production under SRES emissions and socio-economic scenarios. *Global Environmental Change* 14(1):53-67.
- Parry, Martin, Cynthia Rosenzweig, Ana Iglesias, Guenther Fischer, and Matthew Livermore. 1999. Climate change and world food security: a new assessment. *Global Environmental Change* 9 (Special issue):S51-S67.
- Patt, Anthony, Pablo Suarez, and Chiedza Gwata. 2005. Effects of seasonal climate forecasts and participatory workshops among subsistence farmers in Zimbabwe. *PNAS* 102 (35):12623-12628.
- Pelling, Mark. 2000. Natural disasters? In *Social nature: theory, practice and politics*, edited by N. Castree and B. Braun. Oxford: Blackwell.
- Poulton, Colin, Jonathan Kydd, Steve Wiggins, and Andrew Dorward. 2006. State intervention for food price stabilisation in Africa: Can it work? *Food Policy* 31 (4):342-356.
- Quinlan, T., Gina Ziervogel, and Karen O'Brien. undated. Assessing vulnerability in the context of multiple stressors: the Southern Africa Vulnerability Initiative (SAVI).
- Quinn, Victoria J., and Eileen Kennedy. 1994. Food security and nutrition monitoring systems in Africa: A review of country experiences and lessons learned. *Food Policy* 19 (3):234-254.
- Reilly, John, Neil Hohmann, and Sally Kane. 1994. Climate change and agricultural trade : Who benefits, who loses? *Global Environmental Change* 4 (1):24-36.
- Schipper, Emma Lisa Freya. 2004. Exploring adaptation to climate change: a development perspective, School of Development Studies, University of East Anglia Norwich.
- Schmidhuber, Josef, and Francesco N. Tubiello. 2007. Global food security under climate change. *Proceedings of the National Academy of Sciences of the United States of America* 104 (50):19703-19708.
- Sen, Amartya. 1981. *Poverty and famines: an essay on entitlement and deprivation*. Oxford: Clarendon Press.
- Simms, Andrew. 2005. *Africa: Up in Smoke?* London: NEF.
- Simms, Andrew, John Magrath, and Hannah Reid. 2004. *Up in Smoke? Threats from, and responses to, the impact of global warming on human development*. London: IIED.
- Tubiello, F.N., J.A. Amthor, K. Boote, M. Donatelli, W.E. Easterling, G. Fisher, R. Gifford, M. Howden, J. Reilly, and C. Rosenzweig. 2007. Crop response to elevated CO₂ and world food supply. *European Journal of Agronomy* 26:215-223.
- van Lieshout, M., R. S. Kovats, M. T. J. Livermore, and P. Martens. 2004. Climate change and malaria: analysis of the SRES climate and socio-economic scenarios. *Global Environmental Change*
- Vogel, Coleen, and Katharine Vincent. 2008. Adaptation to climate change and variability in southern Africa: actors, constraints and opportunities, edited by DEWPoint. Blisworth.
- Ziervogel, Gina. 2006. UNRAVEL: Understanding Resilient and Vulnerable Livelihoods in Malawi, South Africa and Zambia. Cape Town: DiMP, University of Cape Town.
- Ziervogel, Gina, and Rebecca Calder. 2003. Climate variability and rural livelihoods: assessing the impact of seasonal climate forecasts in Lesotho. *Area* 35 (4):403-417.

- Ziervogel, Gina and Anna Taylor. 2008. Feeling stressed: integrating climate adaptation with other priorities in South Africa. *Environment* 50(2):33-41.
- Ziervogel, Gina, Anton Cartwright, Adriaan Tas, James Adejuwon, Fernanda Zermoglio, Moliehi Shale, and Ben Smith. 2008. Climate change and adaptation in African agriculture. Stockholm: SEI.
- Ziervogel, Gina, Anna Taylor, Frank Thomalla, Takeshi Takama, and Claire Quinn. 2006. Adapting to climate, water and health stresses: insights from Sekhukhune, South Africa. Stockholm: SEI.

APPENDIX: A SELECTION OF OTHER IMPORTANT REGIONAL ACTORS WITH REGARD TO CLIMATE CHANGE AND/OR FOOD SECURITY

