AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Discussion Draft
July 9, 2006

Managing Drought in Sub-Saharan Africa: Policy Perspectives[1]

Madhur Gautam
Africa Region
The World Bank
Washington, D.C.

Abstract

Drought is a recurring reality in many parts of the Sub-Saharan Africa, where agriculture continues to be a major sector of most economies, and being predominantly rain-fed, is highly prone to drought. Drought thus gives challenges to economic management at all levels, from households, to governments at all levels, other concerned agencies, local NGOs, external donors, and international organizations involved in disaster relief provision. Dealing with drought has long been a key element of policy making in SSA but the poor outcomes of drought experience in many situations mean that there is yet far to go in refining drought management to avoid the suffering from hunger and starvation. Much contemporary effort is being focused novel instruments that may enrich the policy agenda and mainstream drought preparedness in the broader development strategy. It is important to adopt a comprehensive drought risk management strategy, and shift from a crisis management mode to ex-ante strategic interventions.

---

[1] Invited paper prepared for an Invited Panel Session on Drought: Economic Consequences and Policies for Mitigation, at the IAAE Conference, Gold Coast, Queensland, Australia, August 12-18, 2006.

The views, findings, interpretations and conclusions expressed in this paper are those of the author. They do not necessarily represent the view of the World Bank, its Executive Directors, or the countries they represent.

Managing Drought in Sub-Saharan Africa: Policy Perspectives

The vast majority of the poor in Sub-Saharan Africa (SSA) are dependent on agriculture, with 85% deriving at least a part of their livelihood from the sector. Poverty is also largely a rural phenomenon, with 83% of the poor living in rural areas. With only 4% of the farmed area having access to irrigation (World Bank 2006a), the poor are particularly subject to the vagaries of weather. Rainfall variability thus has a large impact on the livelihoods of the poor as well as the economies of most of the countries that still heavily depend on agriculture for a large part of their economy.

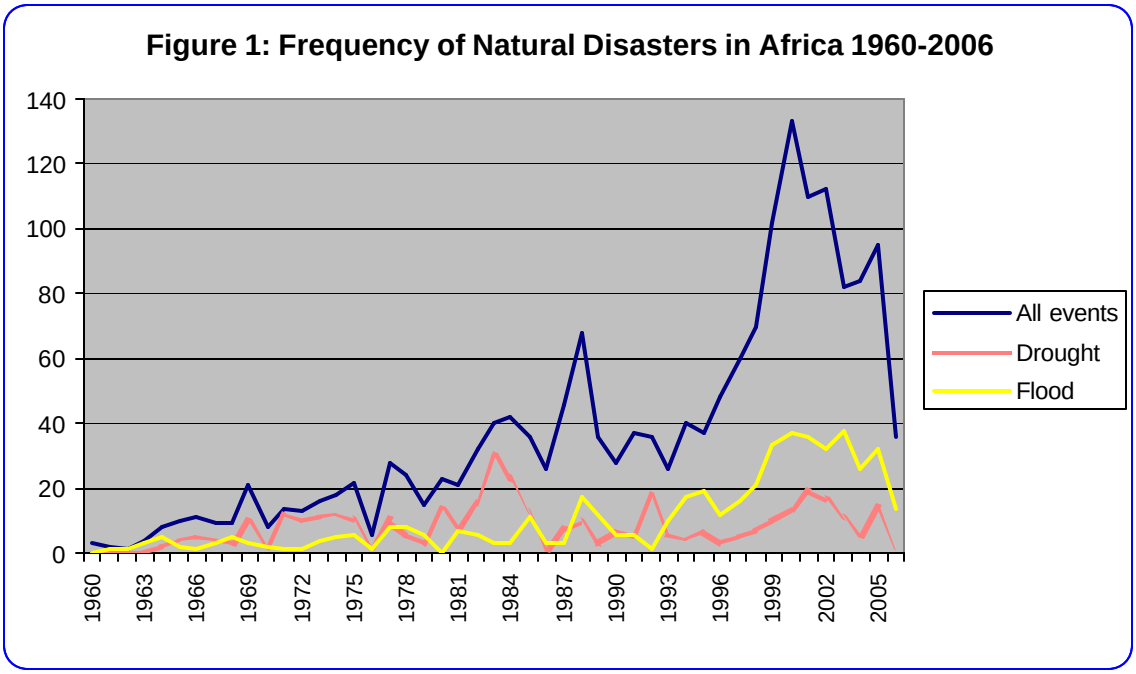
There is a growing perception that natural disasters are increasing – both in terms of frequency and severity (Von Braun, Vlek and Winner, 2002). Certainly the reported number of disasters is increasing globally, from less than 100 in 1975 to over 400 in 2005 (World Bank 2006b). Some of this is likely due to better reporting, especially of smaller events; some due to the fact that there is better tracking by specialized agencies of the incidence and impact of natural disasters (including better reporting of weather events); and some of this may be due to climate change, for example, as a result of rising sea temperatures, which may be partly cyclical (World Bank 2006b Box 1.1 and references cited therein).

There is also increasing realization that natural disasters are likely to get worse in the future. The scientific community is convinced that climate change is a reality. The Johannesburg Declaration on Sustainable Development noted that "…natural disasters are more frequent and more devastating and developing countries are more vulnerable." Whether or how climate change has contributed to weather patterns in the past is still being debated. The likely impact of future climate change, which seems inevitable considering current human activity, is also a subject of debate, but it is likely to be substantial considering for the vast majority of the poor in the lower latitudes whose livelihoods depend on natural resources. It is widely recognized that there will be a need for significant adaptation to these changes, but to understand what the strategies might be to deal with such changes requires significantly more research (Mendelsohn and Dinar 2005).

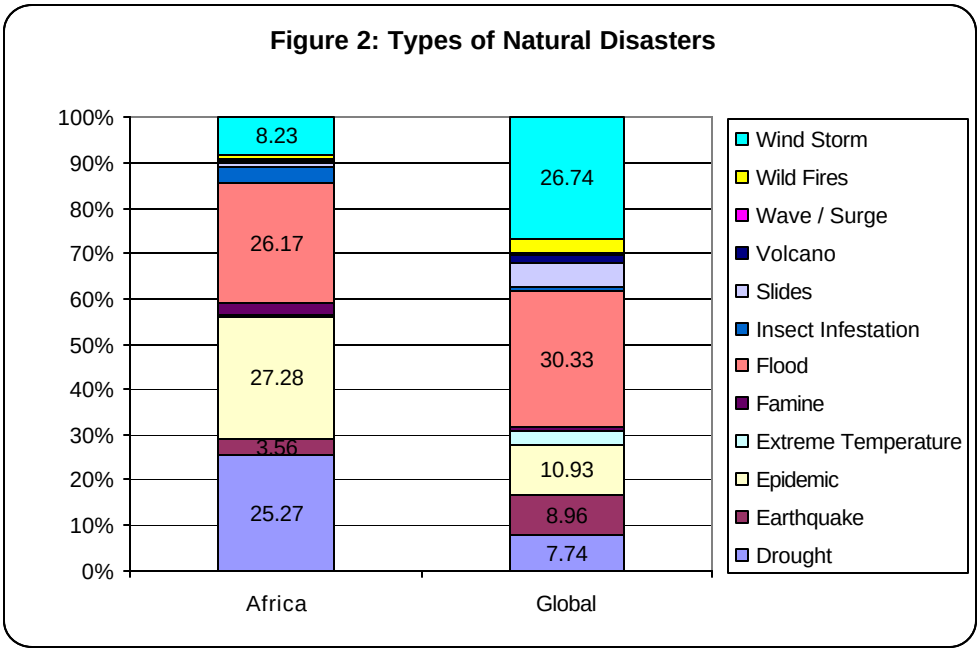
Droughts and Africa

The global trends apply to Africa as well (Figure 1). The trend in all natural disasters shows a definite increase, but the trend in droughts is not readily discernible. Nevertheless, while droughts account for only 8% of natural disasters globally, they are a significantly greater hazard in Africa, accounting for 25% of all natural disasters on the continent occurring between 1960 and 2006 (Figure 2). And while the focus of this paper is on droughts, it is important to note that for Africa, the other extreme of climatic variability, i.e., floods, are an equally important threat and appear to be increasing in frequency faster than droughts.[2]

[2] Globally, floods are much more frequent than droughts.



Source: EM-DAT: The OFDA/CRED International Disaster Database
www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium

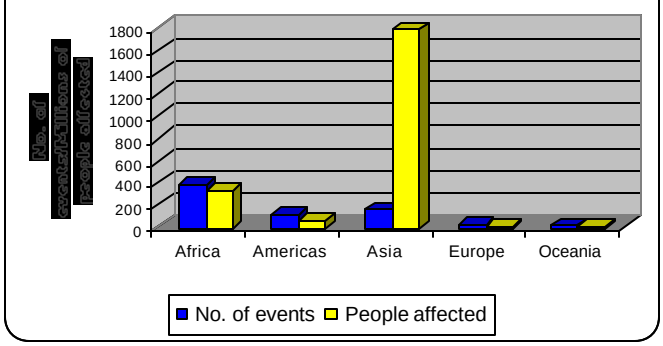


Source: EM-DAT: The OFDA/CRED International Disaster Database
www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium

Globally, Africa stands out in terms of the *frequency* of droughts over the 1960-2006 period with a total of 382 reported drought events, more than double the incidents in

region, with the next highest frequency in Asia with 165 (Figure 3).[3] Yet the *impact*, in terms of the total number of people affected by droughts, is significantly higher in Asia (1.8 billion) than in Africa (326 million). This highlights one of the key issues in considering the appropriate response to droughts, that is, the frequency of droughts may not necessarily be the best indicator of its impact or the scale of response required. Asia, being more densely populated, suffers more when a drought does strike. Africa, on the other hand, suffers persistent and debilitating droughts. In the past, with a relatively lower population density, it has fared relatively better in terms of the absolute numbers of people affected. However, with a rapidly growing population and limits to extensification of agriculture, the impact of future droughts is highly likely to be much more significant than in the past. *The first policy issue thus is to tackle population control, especially in drought prone areas.*

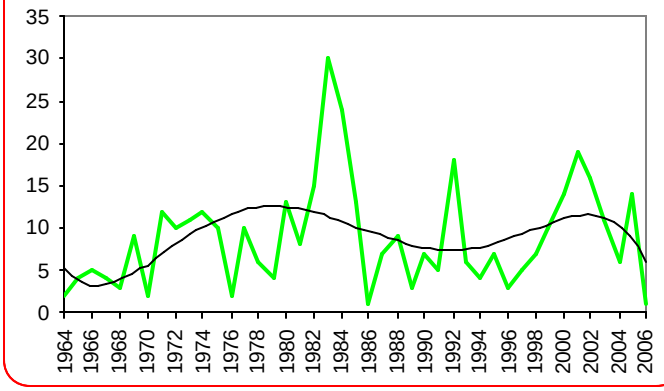
Figure 3: Frequency and Impact of Droughts 1960 2006



Source: EM-DAT: The OFDA/CRED International Disaster Database www.em-dat.net-Université Catholique de Louvain - Brussels - Belgium

Within Africa, there are two important points that need to be borne in mind while considering how to deal with droughts. First, an important characteristic of droughts, which renders informal risk management arrangements ineffective, is its covariate or widespread nature. This phenomenon is likely to extend beyond national boundaries. Figure 4 shows the regional incidence of droughts (i.e., number of countries affected by droughts each year), with the majority of them occurring in East and West Africa. The Africa-wide trend in the number of droughts is essentially flat; however, the frequency of droughts has increased steadily in East Africa and declined in West Africa.

Figure 4: Number of Countries Affected in Africa 1960-2006



Source: EM-DAT: The OFDA/CRED International Disaster Database www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium

[3] As defined as in the EM DAT: the OFDA/CRED database, 47 countries in Africa reported a drought in this period and in Asia 31 countries suffered a drought. On a per reporting country basis, the frequency of droughts in Africa is still double that in Asia.

Figure 4 also shows that regionally, drought shocks co-vary across a number of countries, with the worst years being 1983-1984, when 30 countries were hit with droughts.

Second, another notable feature is that even though there is not a clear-cut long term trend in the frequency of droughts, the number of people affected shows a definite increasing trend (Figure 5). Estimates of economic costs associated with these drought events is not available, but it is a safe bet that the economic costs are rising as well, as the humanitarian assistance for the rising numbers of people affected increases.

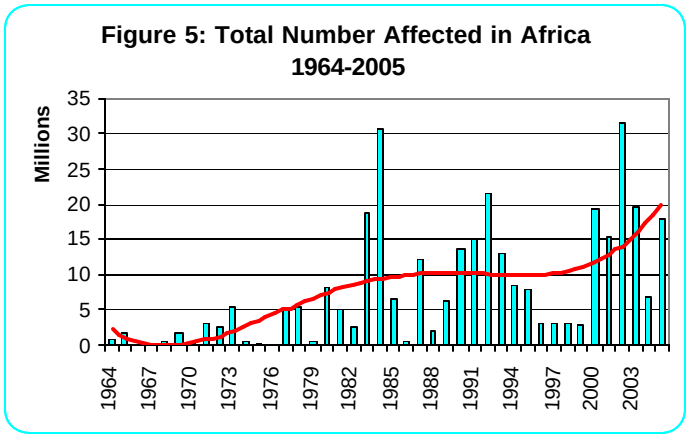
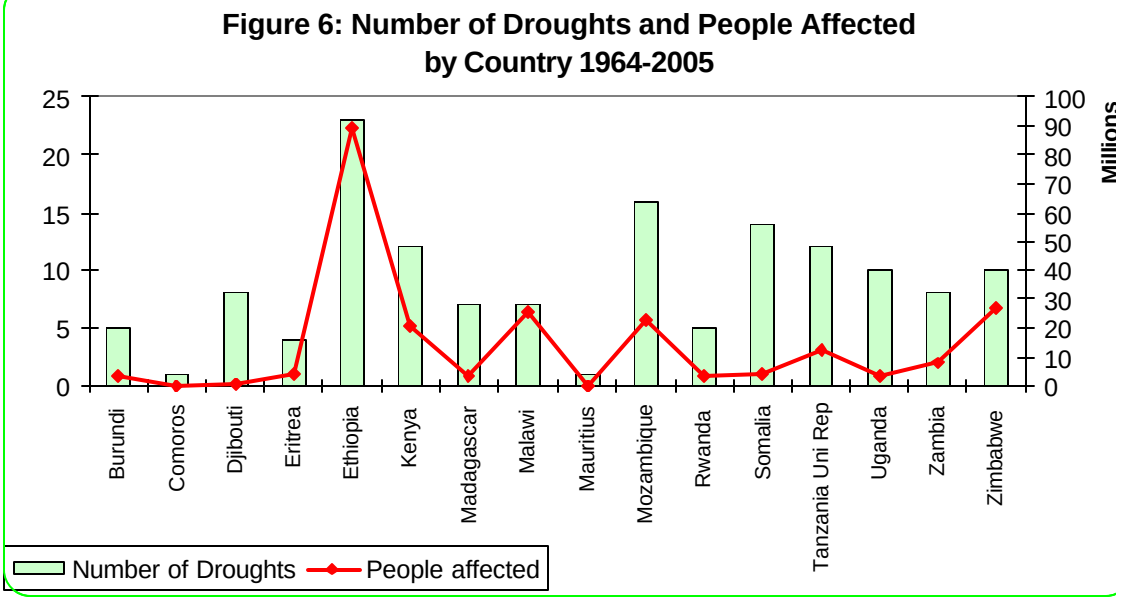


Figure 5: Total Number Affected in Africa 1964-2005

Source: EM-DAT: The OFDA/CRED International Disaster Database www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium

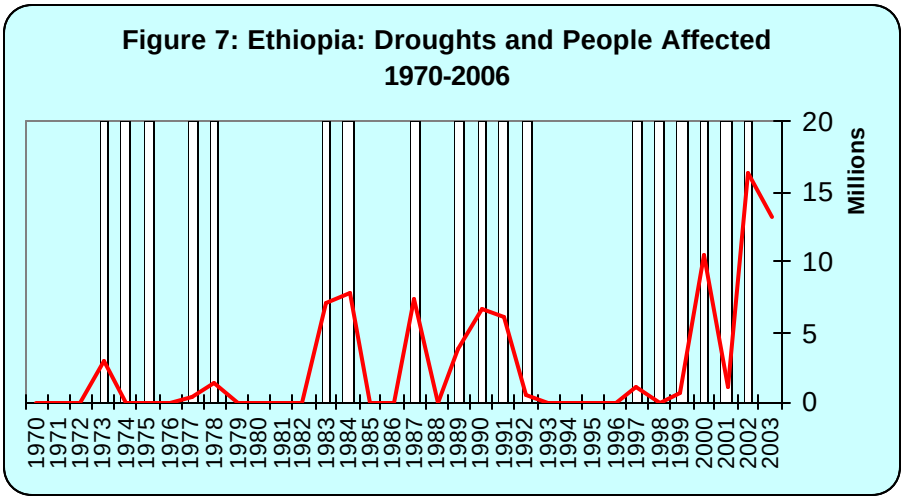
These trends have potentially important policy implications, as clearly the frequency of droughts needs to be distinguished from their increasing impact. This suggests that either the intensity of droughts is increasing or that, given a rapidly rising population, a deteriorating natural resource base, and other structural constraints, the social and economic impacts are becoming much greater than before. *Depending on the underlying characteristic of individual circumstances, policy response has to be tailored to each incident and country. An important lesson emerging from past experience is that the appropriate response to droughts requires a review of the development strategy with a view to incorporating drought management as a strategic and pre-emptive response, especially in areas where droughts occur with regularity.*

Sub-regionally, East Africa accounts for over 70% of the total affected people from 1964-2006. And within East Africa, Ethiopians have suffered the most (39% of all affected). Zimbabwe, Malawi, Mozambique, and Kenya all account for 9-12% of the total affected. Figure 6 shows that across countries as well there is a need to distinguish between the incidence of drought and its impact in terms of human suffering.



Source: EM-DAT: The OFDA/CRED International Disaster Database
www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium

Ethiopia poses one of the most significant development challenges in Africa, and one of the main obstacles to growth is the regular battering from droughts. The impacts of droughts in Ethiopia are perhaps the most widely publicized given their severity and frequency (Figure 7). Recent studies on Ethiopia document the significant impacts of hydrologic variability on overall growth (World Bank 2005a), and the long term negative welfare consequences for households (Dercon 2004). On the one hand, extreme weather (severe rain storms) contributes to land degradation, and rapidly rising population, limited availability of land and severely degraded land increase the impact of droughts.



Source: EM-DAT: The OFDA/CRED International Disaster Database
www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium

Ethiopian experience exemplifies the challenge faced across most of Sub-Saharan Afica. With a rapidly growing population and limited availability of arable area, land is increasingly coming under pressure. The decline in the natural resource base has manifold negative consequences, including exacerbating the impact of meteorological droughts (water shortage). Recent studies on Ethiopia show alarming rates of soil depletion and loss, land degradation and deforestation (World Bank 2006c). *The intensity and impact of droughts (and floods) is aggravated by environmental degradation, such as deforestation of hillsides and erosion or compaction of topsoil. This experience is also emerging from other countries in Africa* (World Bank 2001).

Managing Drought

Rainfall variability is "natural" and a normal part of life. Conceptually, drought is a deficiency of precipitation over an extended period of time. However, there is no universal definition of "drought" because its characterization is impact- and application-specific (World Bank 2006d). It is important to distinguish between a meteorological drought and other characterizations of drought. A meteorological drought may be frequent or may persist for some time but yet have varied intensity and impact. The economic impacts are more direct from an agricultural drought, defined as deficiencies in soil moisture, or a hydrological drought, defined as deficiencies in surface and sub-surface water supplies (World Bank 2006d).

An important characteristic that distinguishes droughts from other natural disasters is that while most have a sudden and widespread devastating effect, droughts are a slow-onset, creeping phenomenon with wide-ranging economic, environmental and social consequences (World Bank 2006d). This can be both an advantage and a disadvantage (relative to other forms of natural disasters): the slow onset, often detectable early on, should set in motion actions to help cope with the likely impacts better than for other sudden onset disasters. It can be a disadvantage if bureaucracies do not grasp the magnitude or the severity of the event and its impacts and hence may be slow to react. In practice, the delayed impacts have helped avoid major humanitarian disasters, but the delayed response has also not been optimal from a long term development perspective.

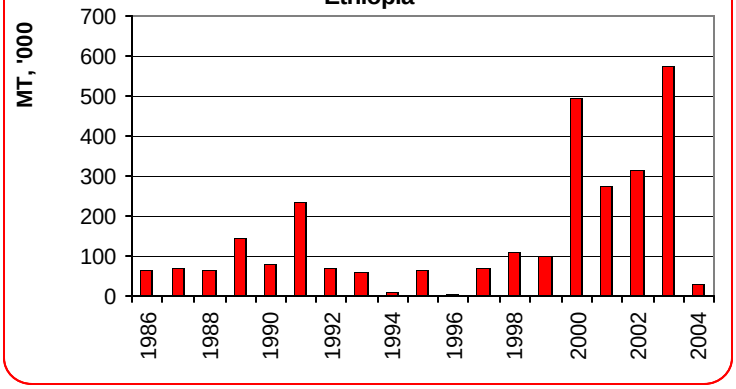
Past responses

A significant amount of assistance has been given for past droughts. The World Bank alone has provided a large amount of investment and non-lending services to help countries affected by droughts. Over the past 30 years, over 113 World Bank projects have addressed droughts in SSA to some degree, with an investment of about $9 billion. Most of the drought related projects are concentrated in Africa, focusing on agriculture and water resources management (e.g., irrigation, livestock, research on drought resistant crops), and natural resource management (Esikuri 2005, World Bank 2006b).

A recent evaluation of the World Bank portfolio finds that drought related projects or interventions have shown flexibility and innovativeness, and have performed better, both relative to other World Bank interventions as well as relative to other natural disaster

projects. However, it also concludes that past responses to droughts have been ex-post, essentially reactive and tactical rather than proactive and strategic (World Bank 2006b). Most of these projects are highly correlated with drought incidence, and are often short-term interventions (often 3 years or less), whereas disaster mitigation calls for longer-term planning and investments. Early projects were in the class of emergency recovery loans, although the orientation of more recent projects is changing, as discussed below.

A major part of the global response to droughts (as with other natural disasters) has been disaster relief, often in the form of food aid. These too have been successful in averting major humanitarian disasters, particularly famine related deaths. But responses have very often been inefficient and untimely, involving long drawn out appeals processes to mobilize relief (Alderman and Haque 2006). The persistence and a growing portfolio of such relief is a cause for concern. This conventional response is also criticized for creating adverse incentives to adopt appropriate management practices, development policies and institutional reforms, thus adding to future vulnerability (World Bank 2006b). The continued extended and increasing reliance on externally financed relief operations, as in the case of Ethiopia (Figure 8), runs the risk of institutionalizing an unsustainable practice, an indication of increased dependency on external aid (Word Bank 2006b, 2006d). While emergency operations are necessary, they do little to minimize the vulnerability of communities and countries to subsequent droughts (Esikuri 2005).



Source: Data from WFP, 2004

Some strategic considerations in drought mitigation

Given the devastating effects droughts can have on lives, especially of the poor, the need to respond to short term emergencies in the short-term is not up for debate. Yet responding to recurrent droughts also requires a strategic response. Droughts need to be viewed as a long-term development issue, and as such it is important to recognize that droughts require a multi-sectoral response, involving agriculture and rural development, and environmental and water resources management (Esikuri 2005). Recent analysis in the African context (of drought shocks in Zimbabwe, Owens, Hoddinott and Kinsey 2003), mirroring lessons from Asian and Latin American countries, concludes that switching from ex-post reactions and coping mechanisms to ex-ante risk reduction and mitigation activities is likely to be welfare enhancing and poverty reducing (Skoufias 2003). *It is essential to adopt a long-term strategic framework to manage drought risks*

and guide investments in all aspects of a comprehensive risk based management approach targeting risk-reduction, mitigation and coping activities.

Climate change: For the long term, mitigating risks associated with climate change is an important priority. A meteorological drought is a natural phenomenon, and untill recently, considered beyond the scope of human intervention. Of late, however, given the growing body of evidence (noted above) that human actions are having an adverse impact on nature leading to climate changes, the realm of policy has to expand to address human behavior and actions that might be responsible for this. This remains an area for much more research, and is not dwelled upon further in this paper, other than to note that one *important policy implication with very long term consequences for drought (and indeed more broadly natural disaster) management is to support the necessary research to better understand climate change, factors that might be causing it, and how best to deal with the consequences.*

In the short to medium term also there is a need for much greater *investment in meteorological data collection, research and weather prediction capabilities.* Many policy options currently on the table, primarily insurance based options, legitimately assume that the underlying distribution of the states of nature is exogenously given and constant, or at least not changing drastically or with any secular trends. This is a critical assumption as it provides the actuarial basis for assessing the viability for any insurance scheme (and other policy options). To the extent that the underlying distribution is changing in ways unknown at present, it has serious implications for the market based approaches that are conceptually more appealing (Varangis, Larson and Anderson, 2003).

Irrigation: A second and rather obvious *long term measure is water resources management.* Water storage capacity and irrigated area in Africa are the lowest of any region in the world. Yet one of the critical constraints to growth, poverty reduction and reduced vulnerability is the adverse impact of rainfall shocks on agriculture and livelihoods. The current low level of development of irrigation infrastructure is an outcome of the experience of the 1970s and 1980s when most irrigation investments failed. More recently, water projects are showing more acceptable rates of returns. Critical to improved performance are lower per hectare costs, market access, and more intensive production systems. The new generation of well-designed and implemented irrigation projects is less costly and more viable: better project selection, farmer managed schemes, higher farmer contribution, and costs matched to expected revenue stream. Applying these principles, it is also possible to "turn around" some of the earlier interventions, as demonstrated by modernization of a large scale irrigation scheme in Mali (Box 1).

One constraint to greater development of water resources in Africa has also been its high level of transboundary resources, which requires agreement on use and investment. Current processes are emphasizing cooperative and mutually beneficial development (World Bank 2006a). The Nile Basin Initiative is one such effort to make more effective use of the waters of the Nile River (see Box 2).

Box 1: Successful public Large Scale Irrigation in Mali: the Office du Niger

The Office du Niger (ON) in Mali is one of oldest and largest smallholder irrigation schemes in sub-Saharan Africa. When development of the scheme began in 1932 it had been intended to develop about 1 million ha over a period of 50 years. By 1982, however, only 60,000 ha had been developed, of which part had become non-functional (owing to poor maintenance) and had been abandoned. Cotton production had ceased, and average paddy yields had slumped to 1.6 t/ha. Attempts to rehabilitate the scheme proved successful when physical investments to improve water security were matched with institutional reforms. An impressive turnaround has been achieved: in addition to the existing 50,000 ha, about 10,000 ha of previously abandoned land was reclaimed and put to productive use, and average paddy yields have increased to 6 t/ha. Operations &Maintenance cost recovery has reached 97%.

These results are attributable to a combination of factors, including:

- irrigation system improvement and modernization
- improved water control and management
- adoption of improved technologies - high-yielding varieties, fertilizers, husbandry practices
- liberalization of paddy marketing and processing, and an improved macro-economic climate
- improved land tenure security
- institutional restructuring, including: privatization of most commercial functions, contracting out of maintenance works to the private sector, downsizing of the management agency and concentration on its core activities of bulk water supply, land administration and agricultural extension
- more participatory approaches that engage farmers in management decisions

Underpinning this success were the long term commitment of government and managers , and the sustained support of external partners. The work at ON is not yet complete: there is more to be done on strengthening farmers' organizations, improving land tenure security and making the agency more accountable to farmers.
Source: Adapted from World Bank 2006a

Box 2: The Nile Basin - a Unique and Shared Resource

Launched in February 1999, the Nile Basin Initiative (NBI) is a regional partnership of Nile basin countries united for the long-term development and management of Nile waters. Ten countries share the Nile - Burundi, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda. The Nile River Basin serves as home to an estimated 160 million people within the boundaries of the Basin, while almost twice that number, roughly 300 million, live within the ten countries that share the Nile waters. Despite the extraordinary natural endowments and rich cultural history of the Nile Basin, its people face considerable challenges. Today, the Basin is characterized by poverty, instability, rapid population growth, environmental degradation and frequent natural disasters. Some of the countries are among the world's poorest with annual per capita income of less than $250.

Recognizing the need to take concrete steps to realize the development potential of the Nile, the riparian countries took a historic step towards cooperation in establishing the Nile Basin Initiative. Launched in February 1999, the NBI provides an agreed basin-wide framework to fight poverty and promote economic development in the region. The Initiative is a transitional arrangement until a permanent framework will be in place. It is guided by a shared vision "*to achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile Basin water resources.*"
Source: World Bank website on the Nile Basic Initiative

Environmental protection: The distinction between agricultural and meteorological droughts and their impacts discussed earlier also highlight the need to broaden the scope of policy response to areas often not associated with drought management. The apparent increase in the intensity and impact of droughts could be symptomatic of environmental degradation (World Bank 2001). As the moisture retention capacity of soils is depleted, (e.g., as a result of prolonged land degradation, deforestation on hillsides, soil erosion, removal or non-replenishment of biomass, and soil compaction), the impact of even relatively small deviations of rainfall may have a large agricultural impact.

Among the possible underlying causes for soil degradation are: poor agricultural practices; lack of incentives to adopt appropriate soil management practices as a result of tenure insecurity; and lack of alternative sources of energy. The specific issues are location and context specific, calling for in-depth analytical work to understand these processes and inter-linkages better. The optimal policy response accordingly may be quite different than the insurance option. For example, in the case of Ethiopia, evidence suggests land tenure security is likely resulting in a lack of medium to long term investments in land or in the adoption of soil management practices (World Bank 2006e, Deininger et al 2003). Insurance in such circumstances is not likely to be viable or desirable, lest it perpetuate the impacts (symptoms) without addressing the causes of the increased intensity of droughts. Similarly, tenure insecurity and land policy may be preventing migration of labor to off-farm activities or to other less vulnerable areas. Clearly in such circumstances, *the policy response needs to address the underlying policies and institutions that determine the incentive structures faced by the poor that might be exacerbating the impacts of droughts.* These might include land policy, tenure security, constraints to labor mobility, and mainstreaming environmental sustainability as a priority in combination with other policy options (such as safety nets or insurance) or even ahead of them.

Migration/Livelihood diversification: Rising population pressures are forcing people onto susceptible marginal lands. This pressure is directly contributing to environmental degradation. Even without population pressures, there are areas where droughts are a recurring phenomenon with high frequency, such that they can be predicted with a fair amount of certainty. In such cases, livelihoods based on natural resources may not be viable, requiring residents to either migrate to more secure areas or to change their livelihood activities. *It is important to identify what the constraints to migration or livelihood diversification are and take measures to address them.* For example, in Ethiopia, the Eastern highlands, where the majority of the chronically food insecure live, are subject to frequent droughts, but migration and labor mobility are discouraged by the current land policy (World Bank 2006e).

New ways of doing business: innovations targeting drought risk management

In recent years considerably efforts have been devoted to identifying and designing interventions that can overcome the drawbacks of the often myopic and inefficient options used in the past. Three areas where some success has been achieved, either in

terms of developing innovative design features for risk management or actually implementing a better drought management structure, are discussed.

Weather indexed insurance: The drawbacks of traditional insurance approaches related to information asymmetries are well documented and so are not repeated here (for the historical development of the thinking in this area see Varangis, et. al., 2004 and for the technical constraints to applying traditional risk transfer mechanisms, see World Bank 2005b). A important innovation in developing a more robust insurance instrument is the Weather Indexed Insurance. Index insurance has the advantage of the transfer of risk for low-probability high-impact events such as droughts using exogenous and objective means of verification thus overcoming many of the problems associated with traditional insurance. This type of insurance is being piloted with small farmers in several countries, including Nicaragua, Mexico, India, and Ukraine outside of Africa, and in Malawi and Ethiopia in Africa. Plans are being developed for additional pilots in Madagascar, Tanzania, Peru and Mongolia (see Box 3 for an example on Malawi).

Box 3: Proposals for Micro- and Macro-level Weather Indexed Insurance in Malawi

A proposal for weather indexed insurance in Malawi has two components: a micro-level insurance product that can be sold to individual farmers and a macro-level product that the government can use to obtain emergency funds to meet food security commitments in times of drought.

The micro-level product would:

- Focus on the important producing areas for the crop covered
- Construct a rainfall index that is highly correlated with maize yields
- Estimate the extent of financial loss per unit area associated with changes in the index
- Set the trigger level that determines the deductible on the insurance
- Require that farmers have access to credit so they can afford the premium

The macro-level product would:

- Focus on country-wide maize production
- Construct a rainfall index that is correlated with average maize yields
- Estimate the financial burden on the government food reserve agency in times of stress
- Structure the insurance to pay out according to agency needs as rainfall index declines
- Require that the exact nature of the agency's financial burden be specified

Source: Ibarra, et al, 2005

Weather indexed insurance has appeal over traditional micro-level insurance mechanisms beset by problems associated with information asymmetry (moral hazard and adverse selection). It can also be used at the meso- and macro-levels (Skees, et al 2004). At the meso level, institutions such as micro-finance or banking institutions could buy indexed insurance to hedge against default risk in the wake of a large covariate shock such as a drought. At the macro level, governments or agencies could insure their budgets against massive resource requirements to respond to catastrophic weather events. Very often disaster response is at the expense of other development activities, given the limited budget resources that governments can mobilize at short notice (World Bank 2006b). An example of a pilot use of a drought insurance mechanism at the macro level is the purchase of a Weather Insurance Derivative by the World Food Programme (WFP) to protect against drought in Ethiopia (see Box 4).

Box 4: WFP and International Weather Indexed Insurance

In 2006 the World Food Program (WFP) purchased a weather derivative to protect against drought in Ethiopia during the 2006 agricultural season from an international reinsurer. This pilot contract covers the payout in case of a severe drought in selected woredas (districts) in Ethiopia, as measured by weather stations located in these areas.

The objective of the pilot is to ascertain the feasibility of using such an insurance instrument to make emergency assistance timelier, since a payout would allow for assistance in November of any year in which assistance is needed, much sooner than generally possible with emergency appeals that require a government request (after rains have failed) followed by field assessments and donor response. Another objective of the pilot is to engage in price discovery to determine what contract prices will prevail. A total of five leading reinsurance companies participated in the WFP tender for the weather derivative contract in Ethiopia. AXA Re put forward the most competitive bid and was therefore award the first humanitarian aid derivative contract.

A rainfall deficit would trigger money to WFP and thereby Government of Ethiopia - the actual payouts to woredas and then beneficiaries are based on the drought contingency planning system Ethiopia has had in place since 2002. This pilot thus is an innovation on the financing mechanism for disaster relief, and importantly in timing of such response and that cash instead of food would be used for wages. To the extent that the program continues to use the traditional response mechanism to deliver the assistance, it will suffer from the same problems as the previous program. However, it does provide an opportunity to strengthen the new safety net program that aims to make disaster relief more productive and efficient.
Source: Adapted from Alderman and Haque, 2006.

While the advantages of weather indexed insurance are apparent, its weaknesses also need to be recognized. Ignoring for the moment the dynamic meteorological uncertainties (i.e., climate change causing large and unpredictable shifts in weather which would render actuarial analysis for any type of insurance difficult), the earlier discussion on the need for a distinction between different types of droughts brings to the fore the difficulty in designing weather indexed insurance options. The conceptual appeal of the original incarnation of the weather indexed insurance concept, namely rainfall lottery, which was literally a coupon costing the actuarially fair price plus administrative cost, with a payout based on a pre-specified level of precipitation, is quickly lost once the consideration of basis risk is introduced (i.e., the uninsured level of risk arising from the fact that a geographically based index may not be well correlated with individual shocks).

To a researcher this may represent "idiosyncratic" risk, but for the poor farmer in a particular micro-climate and with particular soil characteristics (never mind for the moment that some of this may be an outcome of his own doing) which determine the level of soil moisture retention and hence the extent of agricultural drought, this is very much a drought risk. Further, different crops may be impacted differently and as the impact varies and a portion of the uninsured loss rises, the conceptual simplicity of a meteorologically actuarial probability is likely to become a commercial liability.

There is thus a clear tradeoff between basis risk and transaction costs (for monitoring and administration). Designing an appropriate instrument to suit local circumstances that will appeal to small holders thus requires a considerable amount of information and analytical

effort to design a appropriate instrument. In many places this is hindered by the lack of good data on rainfall that is locally specific for precise actuarial modeling (to minimize the basis risk), better understanding of micro-climates and weather cycles, and the need for better weather forecasts. *Clearly, not only for the purpose of insurance, but also for better analytics, investment in meteorological information collection, processing and dissemination is an important item on the policy agenda.*

Countercyclical safety nets: The traditional relief responses and social public safety nets, in particular food aid based safety nets, have been essentially ad hoc, focused primarily on income transfer. As noted, these responses have often been slow, costly, inefficient and poorly targeted. The rationale for safety nets is much broader (Holzmann and Jorgensen 2000). But a well designed and implemented safety net can, in addition to the usual social protection function it is meant to serve, provide a crucial "insurance" function in times of droughts, when the primary source of income of a large number of rural poor suffers a severe shock. To serve this function, safety nets need to have a counter-cyclical budget so that they can be scaled as the need increases, as well as be subsequently scaled back.

By providing assistance in a timely and predictable manner, a counter-cyclical safety net can be an effective component of an ex-ante risk management framework – both at the household level and at the national or macro level. An example of an attempt to transform an appeals based traditional food aid distribution system to a more effective safety net that can also serve a productive function, in addition to the protection function of social safety net, is the Productive Safety Net Project in Ethiopia (Box 5).

Box 5: Ethiopia: Productive Safety Net Project

The Productive Safety Net Project for Ethiopia aims to assist the government to shift from a relief-oriented to a productive and development-oriented safety net by (i) providing predictable, multi-annual resources, (ii) replacing food with grants as the primary medium of support, and (iii) making resources available for critical capital, technical assistance, and administrative costs. The project has the following two components: Component (1) Labor-intensive public work will provide grants to households whose adults participate in public works sub-projects. Sub-projects to be undertaken as part of public works will be determined locally by the beneficiary communities through an annual, participatory planning process. Direct support will provide grants to households who are labor-poor and cannot undertake public works. Component (2) This component will focus on strengthening all aspects of program implementation, including (i) capacity building at community level to strengthen beneficiary identification and local level planning, financial management, procurement and technical training at woreda and regional level to ensure that all sub-projects are appropriately designed and rapid response mechanisms are in place to ensure smooth program implementation; (ii) support to the development of a monitoring and evaluation framework and a program MIS. This includes the implementation of a beneficiary survey, and a detailed program process survey after the first 12 months. It will also finance several additional studies as part of the shift to the second phase of the Adaptable Program Loan (APL); and (iii) procurement of essential goods and services.
Source: World Bank 2004.

One of the challenges of implementing a scalable safety net is the availability of financing when needed most. Towards this end, one option could be the use of weather indexed triggers for releasing budgetary resources, possibly backed by insurance as done

by WFP (Box 4) (Alderman and Haque 2006). This would provide the counter-cyclical financing for the safety net, and provide it in a relatively shorter time period and in a form that may be more effective than food aid. The design of the productive safety net, however, would still have to be appropriate to serve the desired insurance cum development functions. That is, there needs to be an appropriate targeting mechanism to reach the transient poor and a flexible implementation strategy that allows investment in community productive assets.

The program would also have to be mindful of past problems with programs. One is that it must be able to support market development in the long run, while protecting the poor in the short run. Many public works programs using food as the primary transfer resource have undesirable consequences of crowding out food markets, when innovative mechanisms could be used to help build markets even where they do not currently exist (World Bank 2006e). Finally, it is likely that at least a part of the safety net programs will have to be subsidized. Like any other subsidized transfer program, there is the risk of creating adverse incentives to adopt appropriate management practices or economic decisions (including migration), perpetuating vulnerability and increasing dependency on external financing. It will be important to minimize these risks and implement programs where it makes economic sense to do so.

Institutionalizing Drought Preparedness and Response: *Increasingly there is a move away from traditional emergency and recovery modes of operation toward mainstreaming drought management activities.* The focus on building infrastructure and capacity to manage disaster risks is increasingly also being undertaken in Emergency Recovery Loans, the main vehicle for delivering assistance to disaster hit countries by the World Bank. The drought mitigation portfolio, and in particular projects with drought management components, is focused on general agriculture, natural resource management, water resources sector, and general community development (Esikuri 2005). Many of these projects were triggered by drought emergencies, but now include forward-looking innovative designs and implementation arrangements that have been successful in mitigating the impact of droughts. One such intervention, now in the second phase of implementation, has been commendably successful in building the institutional capacity and the capacities of local communities to better manage droughts in the harsh arid and semi-arid pastoral regions of Kenya (see Box 6).

Among the notable outcomes and innovations from the Kenya project include: a coordinated drought early warning system; targeted unified famine relief distribution; market-oriented elements such as transport subsidies for traders to encourage livestock offtake in drought-stressed areas; borehole drilling in areas with abundant pasture; with wells then capped for emergency use; capacity and institution building at the local and national levels; articulation and implementation of natural resource management principles and plans at the local level through pastoral associations; and the establishment of a drought contingency funds at the district level (from Esikuri 2005). The project combines the functions discussed above of social protection, insurance and natural resource management to mitigate the impacts of droughts. An innovation in the project is the use of a readily available and objective indicator defined as the meat-to-grain price

ratio, instead of a weather indicator, as the early warning trigger to mobilize response to an oncoming drought.

Box 6: Kenya: Arid Lands Resource Management Project

The first Arid Lands Resource Management Project (ALRMP) was approved in 1995, and the second phase approved in 2003. The objective of the first phase was to build the capacity of communities in the Arid Districts of Kenya to better cope with drought. The second phase has three components: 1) The Natural Resources and Drought Management Component aims to mitigate the risk posed by drought and other factors by strengthening and institutionalizing natural resources and drought management systems. This in turn will reduce the vulnerability of the population in an area which is characterized by frequent, acute food insecurity related to drought. 2) The Community-Driven Development (CDD) component will foster development capacity at the community level and below to empower communities to take greater charge of their own development agenda and take responsibility for the development choices made. The component activities will build upon the significant capacity created during the first phase and strengthen existing institutions, as well as expand to other communities in the same districts to achieve broad coverage and to create new CDD implementation capacity. 3) The Support to Local Development Component aims to foster a conducive enabling environment in the arid lands to allow the population to break out of the prevalent survival-relief continuum into a positive development agenda leading to economic growth and reduced dependence on outside intervention. This will be achieved by improving the delivery of essential services, which will enable communities to diversify their economic activities and to develop sustainable strategies, and by promoting the interests of the arid lands at the national level to ensure that adequate consideration is given to arid lands development.

The project is supporting enhanced work on drought management, both preparedness and response, based on a better understanding of the production systems, the resilience of the ecosystem and the use of simple, widely applicable management responses. The objective is a more effective drought cycle management system, which will minimize the need for emergency intervention and enhance the response mechanisms for better action in acute drought emergencies.

Drought management activities are building upon the drought management system established in the first phase of the project. The system is based on three pillars:

1. An effective institutional and decision-making framework at the community, district and national level to coordinate and support drought monitoring, mitigation, response and recovery
2. Timely availability of reliable drought status information to aid decision-making at all levels
3. Capacity to plan and implement interventions in a timely, effective and efficient manner, including the timely availability of funding to finance mitigation and response interventions

Source: World Bank 2003.

Conclusions:

Droughts are normal part of life, more so in some areas of the world than others. While the debate can go on about whether droughts per se are increasing or not, it is clear that the number of people affected by them is rising rapidly.

It is important to adopt a comprehensive drought risk management strategy. Of particular importance is to understand the factors underlying the rise in the numbers of people affected, especially in areas where droughts are predictable (in their occurrence if not their precise timing). Addressing the underlying issues and incentives, and the associated policies and institutions (in particular land use and property rights), is likely to be much

more effective and efficient than taking actions that simply perpetuate the problem. A high priority area for policy action in many countries is the current unsustainable growth in population.

In general, there is need to shift from crisis management to ex-ante risk management strategies. Measures to mitigate long term drought risk will entail addressing problems of environmental degradation, irrigation, and a better understanding of what the likely impacts of climate change might be and how to deal with them. More broadly, drought risk management needs to be incorporated more comprehensively in the broader development strategy; otherwise it will remain either *ad hoc* or ineffective. It requires a multi-sectoral approach and needs an appropriate strategy to achieve this.

There are a number of promising innovative experiments ongoing in the area of drought risk management that need to be further researched and refined. This is an important agenda for the near future. In the meantime, there are a number of areas where investment will help better manage the response to droughts: investing in government capacity to develop and implement a drought management strategy; investment in early warning systems and improved weather information and forecasting; continued investment in agricultural research for drought resistant crops and water management; and improvements in water management infrastructure.

References:

Alderman, H. and T. Haque. 2006. "Insurance Against Covariate Shocks: The Role of Index-Based Insurance in Social Protection in Low-Income Countries of Africa." The World Bank. Processed.

Dercon, S. 2004. "Growth and Shock: Evidence from Rural Ethiopia." *Journal of Development Economics.* 74: 309-329.

Deininger, Klaus, S. Jin, H.S. Gebre Selassie, B. Adenew, and B. Nega. 2003. "Tenure Security and Land-Related Investment: Evidence from Ethiopia" *Policy Research Working Paper No. 2991*. The World Bank, Washington, D.C.

Esikuri, Enos E. 2005. 'Mitigating Drought – Long Term Planning to Reduce Vulnerability." Environment Strategy Notes, No. 13. Washington, D.C.

Holzmann, R. and S. Jorgensen. 2000. "Social Risk Management: A New Conceptual Framework for Social Protection and Beyond." The World Bank, Washington, D.C.

Ibarra, H., U. Hess, J. Syorka and A. Nucifora. 2005. "Use of Weather Insurance Markets for Managing Food Supply Risks: Malawi Case Study." Paper presented to the workshop on "Managing Food Price Instability in Low-Income Countries," The World Bank, Washington, D.C.

Mendelsohn, R. and A. Dinar. 2005. "Exploring Adaptation to Climate Change in Agriculture; The Potential of Cross-Sectional Analysis." Agriculture and Rural Development Notes, Issue 1, July. The World Bank, Washington, D.C.

Skoufias, E. 2003. "Economic Crises and Natural Disasters: Coping Strategies and Policy Implications." *World Development*, 31(7): 1087-1102.

Owens, T., J. Hoddinott, and B. Kinsey. 2003. "Ex-ante Actions and Ex-post Public Responses to Drought Shocks: Evidence and Simulations from Zimbabwe." *World Development*. 3197): 1239-1255.

Skees, J. W. Jack, A. Goes and K. Miriti. 2004. "Ethiopia: Analysis of Weather Risks and Institutional Alternatives for Managing those Risks." Report submitted to World Bank, Washington, D.C.

Varangis, P., D. Larson and J. Anderson. 2002. "Agricultural Markets and Risks: Management of the Latter, Not the Former." *Policy Research Working Paper No. 2793.* The World Bank, Washington, D.C.

Von Barun J, P.L.G. Vlek and A.Wimmer. 2002. *Disasters, conflicts and natural resource degradations: multidisciplinary perspectives on complex emergencies.* ZEF Bonn, Center for Development Research, Annual Report 2001/2002.

World Bank. 2001. *Making Sustainable Commitments – An Environment Strategy for the World Bank*. Washington, D.C.

World Bank. 2003. *Kenya: Arid Lands Management Project Phase Two.* Project Appraisal Document, Washington, D.C.

World Bank. 2004. *Ethiopia: Productive Safety Net Project*. Project Information Document. Washington, D.C.

World Bank. 2005a. *Managing Water Resources to Maximize Sustainable Growth: A Country Water Resources Assistance Strategy for Ethiopia.* The World Bank

World Bank 2005b. *Managing Agricultural Production Risk.* Agriculture and Rural Development Department. The World Bank, Washington, D.C.

World Bank. 2006a. *Investment in Agricultural Water for Poverty Reduction and Economic growth in Sub-Saharan Africa.* Forthcoming. AFTS2. Washington, D.C.

World Bank. 2006b. *Hazards of Nature, Risks to Development.* An IEG Evaluation of World Bank Assistance for Natural Disasters. Independent Evaluation Group. Washington, D.C.

World Bank. 2006c. *Ethiopia: Accelerating Equitable Growth.* Country Economic Memorandum Update. Washington, D.C.

World Bank. 2006d. "Investing in Drought Preparedness". Agriculture and Rural Development Notes. Issue 7. Prepared by Water for Food Team.

World Bank. 2006e. "Ethiopia: Policies for Pro-Poor Agricultural Growth." Washington, D.C.