odi

Overseas Development Institute

THE IMPACT OF DROUGHT ON SUB-SAHARAN AFRICAN ECONOMIES: A PRELIMINARY EXAMINATION

Charlotte Benson and Edward Clay

Working Paper 77

Results of ODI research presented in preliminary form for discussion and critical comment

ODI Working Papers

37: Judging Success: Evaluating NGO Income-Generating Projects, *Roger Riddell*, 1990, £3.50, ISBN 0 85003 133 8
38: ACP Export Diversification: Non-Traditional Exports from Zimbabwe, *Roger Riddell*, 1990, £3.50, ISBN 0 85003 134 6
39: Monetary Policy in Kenya, 1967–88, *Tony Killick and F M Mwega*, 1990, £3.50, ISBN 0 85003 135 4
40: ACP Export Diversification: Jamaica, Kenya and Ethiopia, *Christopher Stevens*, 1990, £3.50, ISBN 0 85003 136 2
41: ACP Export Diversification: The Case of Mauritius, *Matthew McQueen*, 1990, £3.50, ISBN 0 85003 137 0
42: An Econometric Study of Selected Monetary Policy Issues in Kenya, *F M Mwega*, 1990, £3.50, ISBN 0 85003 142 7
43: Differences in Econometric Performance between Franc Zone and other Sub-Saharan African Countries, *Christopher E Lane and Sheila Page*, 1991, £3.50, ISBN 085003 148 6
44: Monetary Policy Effectiveness in Indonesia, 1974–1900, *Christopher E Lane, David C Cole and Betty F Slade*, 1991, £3.50, ISBN 0 85003 150 8*
45: Monetary Control in Ghana: 1957–1988, *Nii Kwaku Sowa*, 1991, £3.50 ISBN 0 85003 152 4*
46: The IMF in the 1990s: Forward to the Past or Back to the Future, *Graham Bird*, 1991, £3.50, ISBN 0 85003 153 2*
47: What Can We Know About the Effects of IMF Programmes?, *Tony Killick, Moazzam Malik and Marcus Manuel*, 1991, £3.50, ISBN 0 85003 154 0*
48: Country Experiences with IMF Programmes in the 1980s, *Tony Killick with Moazzam Malik*, 1991, £3.50, ISBN 0 85003 155 9*
49: Evaluating the Impact of NGOs in Rural Poverty Alleviation: India Country Study, *Mark Robinson*, 1991, £5.00, ISBN 0 85003 157 5*
50: Evaluating the Impact of NGOs in Rural Poverty Alleviation: Bangladesh Country Study, *Sarah White*, 1991, £5.00, ISBN 0 85003 158 3*
51: Evaluating the Impact of NGOs in Rural Poverty Alleviation: Uganda Country Study, *John De Coninck*, 1991, £5.00, ISBN 0 85003 159 1*
52: Evaluating the Impact of NGOs in Rural Poverty Alleviation: Zimbabwe Country Study, *Ann Muir*, 1991, £5.00, ISBN 0 85003 160 5
53: Environmental Change and Dryland Management in Machakos District, Kenya: Environmental Profile, *edited by Michael Mortimore*, 1991, £4.00, ISBN 0 85003 163 X
54: Environmental Change and Dryland Management in Machakos District, Kenya: Population Profile, *Mary Tiffen*, 1991, £4.00, ISBN 0 85003 164 8
55: Environmental Change and Dryland Management in Machakos District, Kenya: Production Profile, *edited by Mary Tiffen*, 1991, £4.00, ISBN 0 85003 166 4
56: Environmental Change and Dryland Management in Machakos District, Kenya: Conservation Profile, *F N Gichuki*, 1991, £4.00, ISBN 0 85003 167 2
57: Environmental Change and Dryland Management in Machakos District, Kenya: Technological Change, *edited by Michael Mortimore*, 1992, £4.00, ISBN 0 85003 174 5
58: Environmental Change and Dryland Management in Machakos District, Kenya: Land Use Profile, *R S Rostom and Michael Mortimore*, 1992, £4.00. ISBN 0 85003 175 3
59: Environmental Change and Dryland Management in Machakos District, Kenya: Farming and Income Systems, *edited by Mary Tiffen*, 1992, £4.00, ISBN 0 85003 176 1*

WORKING PAPER 77

THE IMPACT OF DROUGHT ON SUB-SAHARAN AFRICAN ECONOMIES: A PRELIMINARY EXAMINATION

Charlotte Benson and Edward Clay

August 1994

ISBN 0 85003 212 1

Overseas Development Institute
Regent's College
Inner Circle, Regent's Park
London NW1 4NS

Preface

This paper is part of an on-going study by ODI on 'The Impact of Drought on Sub-Saharan African Economies and Options for the Mitigation of Such Impacts by National Governments and the International Community', with support from the Overseas Development Administration and the World Bank. Earlier versions of the paper were presented at a seminar on 'Mitigating Drought in Developing Counties: The Contribution of the UK Institutions', held at the Institute of Hydrology, Wallingford on 7 September 1993; the SADC Colloquium on 'Management of Drought in Southern Africa', Harare, 13-16 September 1993; at the Institute of Development Studies, University of Sussex at a workshop on Linking Relief and Development, 28 March 1994, and at work-in-progress seminars at ODI and in Washington, DC in June 1994. The paper has benefitted substantially from comments by participants at these meetings.

Summary

Whereas the physical aspects of drought, agricultural impacts, government and donor responses as well as household, coping and survival strategies in the event of drought have been well studied, there has been little research on either the non-agricultural or economy-wide macro-economic impacts in sub-Saharan Africa. This Working Paper reports provisional findings of an ODI study intended to fill this gap. A new framework is developed within which to understand the wider economic impacts of drought and explain why some economies are more susceptible to drought than others. Provisional findings of the study include:

- drought shocks have large, but highly differentiated economy-wide impacts. The likely frequency, scale and character of these impacts depends on the inter-action between economic structure and resource endowments, as well as more immediate short-term effects;

- counter-intuitively, relatively more developed economies in Africa may be more vulnerable to drought shocks than least developed or arid countries in terms of macro-economic aggregates and rates of economic recovery;

- different regions of Africa are experiencing different longer-term climatic trends which imply that sub-regional strategies are required for mitigation and relief of droughts;

- in the least developed countries, drought should be viewed and treated less as an exogenous shock, as is currently done, and more as a structural problem;

- although the existence of structural adjustment programmes can exacerbate adverse economic and humanitarian impacts of drought shocks, such programmes also provide a framework within which the broader economy-wide impacts may be more effectively contained.

Contents

Boxes

Figures

1. Introduction

1.1 Context of the study

Drought is Africa's principal type of natural disaster. Droughts, however defined,[1] are frequent and severe in many African countries as a result of the extreme rainfall variability in the extensive arid and semi-arid areas and the poor capacity of most African soils to retain moisture. Many sub-Saharan African (SSA) economies are widely perceived as being particularly vulnerable to the effects of drought as a result of the importance of rain-fed agricultural and livestock production in GDP, the limited infrastructure, and the low levels of per capita income. Moreover, parts of the Sahelian belt have recently been coping with an increasingly dry regime, with rainfall significantly below the norms of the period prior to the 1960s (Hulme, 1992; 1993). The presence of armed conflict in several countries greatly exacerbates the effects of drought and is frequently responsible for turning drought into famine. Since the 1980s, economic decline and structural adjustment problems have also made many SSA economies potentially more vulnerable to internal and external 'shocks' (Elbadawi *et al.*, 1992).

From an economic perspective, 'agricultural drought'[2] may be viewed as an

---

[1] Droughts are notoriously difficult to define and there is an extensive literature on their definition. For example, Glantz (1987) in a widely cited review, distinguishes meteorological, hydrological, agricultural and social drought. A general working definition of meteorological drought is 'a reduction in rainfall supply compared with a specified average condition over some specified period' (Hulme, 1993). In an African context this is typically a period of a year or more. Hydrological droughts pertain to the impacts of a reduction in precipitation on surface or sub-surface water shortfall and so may lag behind periods of agricultural or meteorological drought (Wilhite, 1993). Social drought relates to the impact of drought on human activities, including indirect as well as direct impacts. The difficult issue is that of establishing the basis of comparison because 'drought' as a concept is derived from recognition of impacts. But the relationship between rainfall variability and impacts depends on the specifics of a particular agro-ecological zone or the economy. An issue for investigation is, therefore, an economically useful definition of drought.

[2] Agricultural drought is defined as a reduction in moisture availability below the optimum level required by a crop during different stages of its growth cycle and resulting in impaired growth and reduced yields. It should be borne in mind that there are a number of other factors which also determine crop yields, such as reduced input of fertiliser, lack of weeding, the presence of pest and crop diseases, lack of labour at critical periods in the growth cycle, unattractive producer prices and overall market

exogenous, but internal, supply-side shock which is widely recognised as resulting directly in sharp reductions in agricultural production and employment, reduced export earnings, widespread losses of assets, and other losses associated with declines in rural income. In addition, meteorological drought may result in hydrological conditions that have a direct impact on non-agricultural production, including hydro-electric power generation, and on human water supply. The combination of these direct impacts, indirect linkages and multiplier effects implies that the economy-wide consequences of a drought shock could be considerable. There has been little research, however, on either the non-agricultural effects or the economy-wide macroeconomic impact of drought in SSA.[3]

In contrast, the physical phenomenon of drought and rural household coping mechanisms and survival strategies have been extensively studied. Most previous studies have examined physical aspects of drought, government and donor responses, or household coping and survival strategies.[4] These studies are important in contributing to a broader understanding of drought and to the design of more appropriate drought relief responses. They also have important implications at the aggregate level for the macroeconomic and financial impact. However, they do not directly address these latter issues of the economy-wide consequences of drought.

SSA governments and the international community have typically responded to droughts by mounting large-scale relief operations. These absorb substantial resources of the affected countries and of the aid programmes of donor organisations.[5] This primary objective has invariably been to minimise suffering and the loss of human life. Food aid, much of it for use in direct, free distribution programmes within the affected areas, has bulked large in the forms of assistance provided by the international community. For example, food aid, and commercial imports of grains by governments of affected countries, and associated logistical costs, totalled some US$4 billion in the response to the 1991/92 drought in

---

conditions. It may therefore be difficult to assess the relative impact of reductions in moisture from other factors.

[3] The comparative lack of research in this area was one of the main findings of a preliminary study by the World Bank (1991b).

[4] For example, Chen (1991), Downing *et al.* (1987), Drèze and Sen (1989), Glantz (1987), Sheets and Morris (1974).

[5] For instance 7.5% of the UK aid programme was expended on the response to the drought and famine crisis in Africa during the financial years 1984/5 and 1985/6 (Borton *et al.*, 1988).

Southern Africa.[6] In contrast, the importance in an emergency of non-food items, such as for water schemes, essential drugs, livestock preservation and provision of agricultural inputs, has apparently not been fully recognised (Thompson, 1993; DHA, 1992). Moreover, efforts designed expressly to mitigate the impacts of droughts prior to their onset have generally been accorded even lower priority.

The response to the 1991/92 drought in Southern Africa was somewhat different. Some members of the international donor community displayed far greater willingness to provide balance-of-payments support in response to that crisis than following any previous drought.[7] However, this may reflect less a change in attitude than concern about the continuance of structural adjustment programmes being implemented in several countries in the region. Many donor responses to the crisis continued to overlook or give only limited attention to the impacts of droughts on the economy in general, for instance on foreign-exchange availability and government expenditures.

1.2 Objectives of the ODI study

The current ODI study aims to examine in more detail the issues relating to the macro or economy-wide and financial impact of drought. More specifically, the objectives of the study are to:

i) assess the impact of droughts on the economies of SSA at the national level, on the implementation of structural adjustment programmes and also on the provision of services by national and local governments;

---

[6] This approximate estimate of the food-related costs of the drought response first appeared in UN *Africa Recovery Briefing Paper* No. 9, subsequently restated in WFP, 1993: 22. The costs of drought-related maize and other cereal imports by governments and as food aid was approximately US$2.5 billion in 1992/3.

[7] For example in 1992 the World Bank approved a $150m. Emergency Recovery Loan to Zimbabwe and made additional drought-related modifications to credits of $50m. for Malawi and $100m. for Zambia. The UK ODA provided both Zambia and Zimbabwe with £10m. (approximately $18m.) in balance-of-payments support for drought-related imports between March and June 1992. Some donors, for example Germany, modified existing financial assistance to allow these funds to be used for procurement of drought-related food and other imports. The United States also organised large 'blended' packages of support for food imports including export credits, food aid credits and grants to Zambia and Zimbabwe to address the direct balance-of-payments aspect of the drought. Other food aid donors also provided a combination of programme aid to relieve balance-of-payments pressures as well as conventional relief for distribution to affected populations.

ii) discern the ways and extent to which economies attempt to adapt to the drought 'shock', since this is essential to understanding the consequences of drought and for the formulation of appropriate policies;

iii) review the means by which national governments and the international community currently respond to the impact of drought on the affected economies and on government service provision and to estimate the financial costs of such responses; and

iv) identify those measures open to national governments and the international community which are best able to increase the ability of economies to weather the impact of drought whilst remaining sympathetic to the objectives of structural adjustment programmes supported by the international community.

The 1991/92 drought in southern Africa, which affected economies in the process of implementing substantial structural adjustment programmes and in which donor agencies have significant commitments, has thrown the issue of the economic impact of droughts into sharper focus than was perhaps the case in earlier droughts in the Sahel and the Horn of Africa. It has underscored the need for a higher level of contingency planning. Fuller understanding of the economic impacts of droughts and the availability of tested policy models or approaches for rapidly assessing the implications of potential drought-induced economic shocks would make drought contingency planning and responses more effective.

1.3 Method of study

There are considerable methodological difficulties in isolating the impact of a particular exogenous shock from underlying trends, as well as from other internal and external factors influencing economic performance, such as movements in prices of major imports and exports, changes in government economic policy, booms and slumps in the world economy or effects of civil or international conflict. It was therefore decided to adopt an eclectic approach for the purposes of this study, using a mixture of quantitative and qualitative analysis. The quantitative analysis is partial, involving a combination of regression analysis and examination of movements around trends, 'before-and-after' impacts of drought and forecasts versus actual performance of key economic indicators. Other relevant studies are drawn upon, including those which have entailed the construction of Computable General Equilibrium (CGE) models, input-output tables and social accounting matrices. However, the ODI study does not itself entail the construction of such models. In part, this is because, as discussed below, it was decided to examine the impact of drought on a number of SSA economies, limiting the time available for the analysis of any one country. Furthermore, a number of the impacts of drought are qualitative and not easily captured within the framework of a formal model.

It was decided to examine the macroeconomic and financial impact of drought in a number of countries in the Sahel, East Africa and Southern Africa in order to try to ensure that the findings of the study were broadly applicable in all drought-prone SSA countries. Countries engaged in external or internal conflict were generally excluded because of the additional disruption this caused to the public and private sectors and to the collation of reliable economic data. The most detailed case study prepared as part of the study is of Zimbabwe's experience of drought since independence in 1980 (Benson and Clay, 1994; Robinson, 1993). Zimbabwe was chosen for four reasons. First, it has experienced three major droughts since independence in 1980. Second, it is relatively developed in comparison with most other sub-Saharan economies, in terms of intersectoral linkages and significant flows of funds. This implies that the impacts of drought are less obvious, thus warranting study. Furthermore, there may be important lessons for other SSA economies at earlier stages of development. Third, the 1992 drought relief operation was far broader than previous ones in much of SSA, entailing the provision of non-humanitarian as well as emergency food and other humanitarian relief supplies. Fourth, the data set pertaining to the country is relatively good, enabling statistical analysis of macro and sectoral aggregates.

Further desk-based statistical studies of the relationships between economic performance and variability in rainfall and rainfall-related agricultural activity were undertaken for five other countries - Burkina Faso, Ethiopia, Kenya, Senegal and Zambia. These countries were selected to provide a range of different agro-ecological zones and economic structures (Benson, 1994). Finally, case studies of specific policy areas were undertaken, including the interlinking issues of drought and market reform in Kenya (Thomson, 1994a) and drought and public expenditure in Namibia (Thomson, 1994b). As the study is concerned with the relationship between a physical phenomenon - variability in rainfall (precipitation) - and economic activity through an often complex set of possible relationships, a 'state of the art' review was also commissioned from a climatologist to look specifically at the regional incidence of drought including possible differences in the pattern of rainfall variability and drought risk, and whether these phenomena are changing over time (Hulme, 1993; 1994). It was felt that with speculative accounts in the media and elsewhere, for example following the drought of 1991/92, about long-term decline in rainfall in Southern Africa driven by global warming and associated with environmental degradation, economic and social research needs to be carefully related to a state of the art understanding of trends in natural phenomena.

2. Differences and Similarities: Potential Impacts of Drought on Sub-Saharan African Economies

There is a powerful, even dominant, conventional model of the drought phenomenon that constructs the policy agenda as one primarily of famine prevention and mitigation. At a level of visual images, drought implies withered crops, emaciated cattle and human hunger. The policy agenda is then to anticipate this impending natural disaster and to mitigate its effects by a combination of measures to reduce its impacts on agriculture, to improve grain storage and to implement famine relief measures. Perceived in these terms, the drought-famine syndrome is particularly a problem of the poorest economies and of rural people in marginal and arid areas.

The conventional view of factors which differentiate SSA and other economies in terms of vulnerability to drought would probably be encompassed by four factors:

- the 'level of development', for which GDP per capita is most widely used as a proxy;
- the share of rainfed agricultural and livestock production in both GDP and exports;
- agro-ecology in terms of the proportion of land area which is arid and semi-arid;[8] and
- levels of household self-provisioning.

The exploratory study that preceded this more in-depth exercise provisionally reflected that view:

> Most Sub-Saharan African (SSA) economies are highly vulnerable to the effects of drought owing to the importance of rain-fed agricultural and livestock production in GDP and exports and thus in the maintenance of food security. Limited

[8] For example, land areas are widely classified in terms of annual mean potential evapo-transpiration (PE) whilst also taking into account elevation and soil type (Le Houérou *et al.*, 1993). Semi-arid areas, in which cereal production is likely to be subject to limitations because of moisture availability, are defined in terms of annual rainfall falling below an average PE level of 0.65% (R<0.65 PE). Arid areas unsuitable for rainfed cereal cultivation under normal circumstances represent an agro-ecological zone defined by R<0.35PE (Hulme, 1994).

> infrastructure, and the low levels of per capita income also increase their vulnerability to droughts. (World Bank, 1991b)

A fifth factor in increasing vulnerability has been the process of economic change which has occurred broadly since the second oil price hike of 1979/80:

> Furthermore, since the 1980s, economic decline and structural adjustment problems have made many SSA economies potentially more vulnerable to any internal or external "shocks", including drought. (ibid.)

However, the review of drought impacts on selected African economies undertaken for the present study as well as, importantly, some of the policy analysis undertaken of the consequences of the Southern African drought of 1991/92, suggest a more complex perspective on the interaction of drought shocks with the economy. Some background 'state of the art' knowledge on these issues, including the preliminary results from this study which have been disseminated at various points over the past year, is therefore presented to provide a context for the subsequent more detailed discussion. Issues considered are environmental diversity, intersectoral linkages, intensity of water use in the economy, the role of financial systems, publicly managed productive and distributive systems and public revenue and expenditure.

Environmental diversity and the rural economy Environmental differences amongst countries are an obvious aspect of the interaction between drought and economic performance. Drought vulnerability cannot merely be viewed as approximately synonymous with aridity and, in agricultural terms, the problems of arid, agriculturally low-potential areas. Countries with greater environmental diversity appear less likely to be afflicted with country-wide agricultural or hydrological drought but may, nevertheless, be seriously affected by severe drought shocks. This notion of environmental diversity implies an interaction of scale (spatial area), elevation and prevailing air mass weather systems.

Those countries with large areas generally unsuited to rainfed cereal and other agricultural production are likely to experience frequent and severe drought, precluding significant rainfed production.[9] Predominantly semi-arid countries are likely to experience economy-wide droughts only as an extreme event, perhaps as in the case of Zimbabwe and Zambia in 1991/92. Other national economies, including possibly Ethiopia and Kenya, are, according to historical record, unlikely to experience a drought affecting the whole of their agricultural economy. Such differences in drought risks are likely to imply spatial differences in levels of socio-economic adaptation to drought. More developed coping mechanisms in more

[9] According to the FAO agro-ecological zoning classification, these are areas where the ratio of rainfall to potential evapo-transpiration (R/PE) is 0.35 and below. Botswana and Cape Verde would probably be in this category.

drought-prone areas imply that drought may, in fact, have a larger economic impact in less drought-prone regions. Systems exposed to high risk of drought adapt through investment and water-resource management practices to these marginal conditions. However, systems take some time to re-adapt to changing risk of drought shocks. This view of adaptation introduces the possibility of non-linearities, whereby only extreme, more improbable events involve significant economy-wide impacts. This hypothesis is explored below through a selection of case studies for countries in different environments.

The current status of research on climatic change indicates that certain regions of Africa have displayed differing climatic trends over the period since decolonisation, i.e. broadly since the early 1960s. Hulme (1994) compares three regions: the Sahel, East Africa and South-East Africa.[10] The Sahel has experienced a significant decline in average rainfall levels, defined in terms of a comparison between the three decades before and after 1960. In contrast, for over a century the South-East African region of austral rainfall has experienced a quasi 19-21 year cycle of one relatively wet and one relatively drier decade. The East African region is not affected by either significant trends or cyclical patterns in rainfall regime.

These distinct regional differences have potential implications for agriculture, water management more generally and the possible economic consequences of drought. The Sahelian economies have, in effect, been confronted with an increasingly unfavourable environment that requires and rewards adaptation through risk-reducing strategies in the rural economic systems.[11] The quasi-cycles of South-Eastern Africa may pose especially difficult problems of hazard management and investment decisions because of the non-random nature of drought. Decisions based on rainfall or hydrological information for only part of the full cycle, or which assume random distribution of drought years rather than taking account of the actual rainfall cycle, potentially increase the exposure to drought hazards.

Intersectoral linkages First, the effects of a drought shock will be amplified through the economy to the extent that the agricultural sector draws on intermediate goods and inputs from the non-agricultural sector and, similarly, to the extent that the non-agricultural sector is dependent on raw materials from the agricultural sector. Second, higher levels of non-agricultural sector products and services in the

[10] For purposes of statistical analysis of rainfall patterns, the Sahel is defined as the region lying between 9 and 15 degrees latitude and extending eastwards to the Somali border; East Africa is defined as Uganda, Kenya and Tanzania; and South-East Africa is defined as the region lying between -16 and -26 degrees latitude and east of the 23 degrees longitudinal line.

[11] For example, Davies, S. (1993) provides substantial evidence of such adaptation which, at the level of household and specific groups, may imply transitional stress and impoverishment.

final expenditure of the agricultural sector also imply larger second round effects of drought shocks.

Dualistic economies represent a special case. Such economies consist of a 'traditional' rural economy, entailing a high level of self-provisioning, which co-exists with a 'modern' economy involving an export-oriented, usually extractive sector, closely integrated with a service sector. Dualism is a characteristic feature of many SSA economies, including South Africa which has the highest per capita GDP. Drought will affect only part of a dualistic economy unless the export-oriented extractive sector is water-intensive. The implication is that drought impacts will depend on differences in economic structure that cannot simply be captured by GDP differentials and the share of agriculture in the national product. The relationship between the economic structure of a country, including its natural resource endowment, and the impact of a drought shock, are spelt out more fully in a typology of African economies presented below.

Intensity of water use in the economy Drought is primarily seen in a SSA context as a problem of agriculture and animal husbandry. However, drought as a hydrological phenomenon - with variability in rainfall affecting inter-temporal storage of water in natural and artificial surface and sub-surface storage systems, as well as surface flows - may have a wider impact, depending on the water intensity of other sectors. A high proportion of irrigated agriculture in SSA is dependent on intra-annual surface storage. Hydro-electricity is also an important source of energy in several African economies.[12] Some industries are relatively water-intensive users, with availability of potable supplies for their labour force also possibly affecting operations. Certain services such as tourism, especially of the scenic safari type, are potentially drought-vulnerable. Finally, an adequate and safe water supply is required for human use. Large urban populations are dependent on possibly drought-vulnerable storage and supply systems, and, depending on the balance between investment and maintenance of water supplies and growth in population, urban populations may become more vulnerable to hydrological drought over time. The vulnerability of rural populations to drought depends on the degree of adaptation of supplies drawn upon to variability in rainfall, hydrological flows and re-charge rates. The balance between growing demand for water from a wide range of users and supply which is dependent on investment, maintenance and management, including the water pricing regime, could imply considerable inter-country and intra-country differences in vulnerability (Winpenny, 1994).[13]

---

[12] These include Zambia, Zimbabwe, Ghana and a post-war Mozambique.

[13] For example, the former homelands in South Africa and communal areas in Zimbabwe had large concentrations of vulnerable people in 1992. In Zimbabwe, the Bulawayo and Mutare urban areas with concentrations of consumers and industry were also far more vulnerable than the capital, Harare.

Role of financial systems The level of evolution of financial systems is not linked in any simple linear way to levels of GDP. However, the size and structure of the private financial sector, involving banks, other intermediaries and elements of a private capital market, will have potentially significant implications for the way an economy adjusts to drought and other economic shocks and the response options available to public authorities. Following a drought shock, there may be reductions in rates of borrowing for investment and maintenance. Possible declines in private sector demand for imported raw materials and intermediate goods may also reduce demands on the financial system. However, affected enterprises are likely to face reductions in their financial balances and will therefore seek to increase their borrowings through extended lines of credit and so forth. Increased public sector budgetary pressures and parallel pressures on the public foreign-exchange account due to increased public sector imports could also place additional strains on the financial system, depending on how such gaps are financed. The options available to public authorities in meeting these gaps may also have implications for the impact of the drought shock on the economy.

Publicly managed productive and distribution systems At independence, most African economies inherited public enterprises for agricultural marketing, electricity, water supply, waste disposal and transport. Public institutions are also largely responsible for formal human resource development and social welfare provision through education, health and other social services. In addition, post-colonial Africa experienced, at least initially, additional public sector involvement in both agricultural and non-agricultural sectors. Subsequently economic reforms and the growth of both informal and regulated sectors have further modified, sometimes reducing, the role of the public sector in production and distribution of goods and provision of public services. In consequence, the implications of a drought shock will interact differentially both between countries, depending on economic structure, and within countries over time. Parastatal marketing depends to differing degrees on large-scale commercial production and the surpluses of small-scale self-provisioning peasant farmers. The effects of drought shocks may be amplified where marketing is dependent on the production surpluses of small-scale producers (see below).

Parastatal utilities in the area of water, power generation and transport are likely to be differentially affected in a drought by downward pressures on revenue and upward pressures on costs. Education and health services may be adversely affected by a reduction in the quantity and quality of water supplies. These impacts could also be more severe in areas where drought is a relatively uncommon event than in arid, more drought-prone areas where design standards for water supply are more likely to take account of drought risks.

The indirect consequences of droughts for public systems include impacts on demand for services and supply. There are increases in demand for marketed supplies of basic foodstuffs. Drought impacts also include increased demand for

social welfare and increased pressures on health services because of increased incidence of water- and nutritional-related diseases. In the education sector, a drought shock may involve a decline in demand for schooling, affecting school attendance and other performance indicators. Some children may be affected by nutritional and water-related health disorders. Others may be obliged to stay away from school to undertake other activities to help sustain household earnings. Law and order services may be put under pressure by an increase in crime during periods of stress which are associated with temporary unemployment, migration and so forth.

Importantly, the length and extent of these impacts will be affected by economic liberalisation and the associated reduction in the public provision of certain services and the shifting of costs from the public sector to beneficiaries.

Public revenue and expenditure On the revenue side, a drought shock will be expected to have a negative impact through a decline in the incomes and employment. The revenue of utilities will be adversely affected by the income impacts of the shock-induced recession on use and also increased non-payment. Revenues linked to export earnings are also likely to decline. On the expenditure side, governments may be confronted by increased relief and social welfare expenditure, health and water expenditure, consumption-related subsidies on food distribution and the logistical costs of drought-related imports. There are likely to be pressures for increased subsidies and credit to affected productive sectors.

In conclusion, the economic and public sector financial implications of a drought shock are dependent on a complex set of environmental and economy-specific factors. In addition, changes in African economies, rapid growth, especially in urban populations, and economic restructuring, possibly entailing a switch of production between sub-sectors or reduced public sector involvement, all imply that the impact of a particular shock may not replicate previous shocks.

There is insufficient appreciation of these complexities. Instead, the conventional view of the impact of drought and other exogenous shocks is that the most vulnerable are also the lowest-income economies. Such economies are characterised by high shares of agriculture in GDP, high degrees of self-provisioning by households and, geographically, relatively large arid zones which, it is held, together increase their vulnerability to drought.[14] This view implicitly entails a

[14] The concept of vulnerability is subject to many different constructions. The concept is used here to characterise the potential reduction in aggregate real GDP or sectoral product resulting from drought shocks. An approximate measure of the actual losses is the difference between the historic level of activity and hence the rate of growth and the level of activity that would have been expected to have occurred in the absence of the shock. The historical relationship between drought and actual activity

negative correlation between the impact of drought and the level of development, reflected in levels of GDP per capita or other more sophisticated indices.

However, a preliminary examination of GDP data combined with an initial review of the above issues for the purposes of this study suggested a more complex relationship between the level of economic development and the impact of drought. A second counter-intuitive relationship was also apparent, implying that in the early stages of development an economy may actually become more vulnerable to drought and therefore more severely impacted by drought shocks. As an economy develops, with related growth in financial and commodity markets, an expansion of the monetised consumption base, and, particularly, expansion of non-agricultural sectors, its vulnerability to drought shocks initially increases. This greater vulnerability is partly attributable to diversification into manufacture of technologically simple products utilising domestically produced raw materials. The multiplier effects of the expenditure of agricultural incomes on other domestic products also increases, although this should not be over-played in the SSA context.[15] Then in later stages of development, other mechanisms come into play effectively insulating an economy against the impact of drought, as discussed below.

The combination of these two relationships - namely the declining share of agriculture and increasing intersectoral integration - suggests an overall 'inverted-U' shaped relationship between the economic impact of drought and the stage of economic development of a country. Put differently, the economic impact of drought increases during the earlier stages of development before declining as an economy becomes more developed.

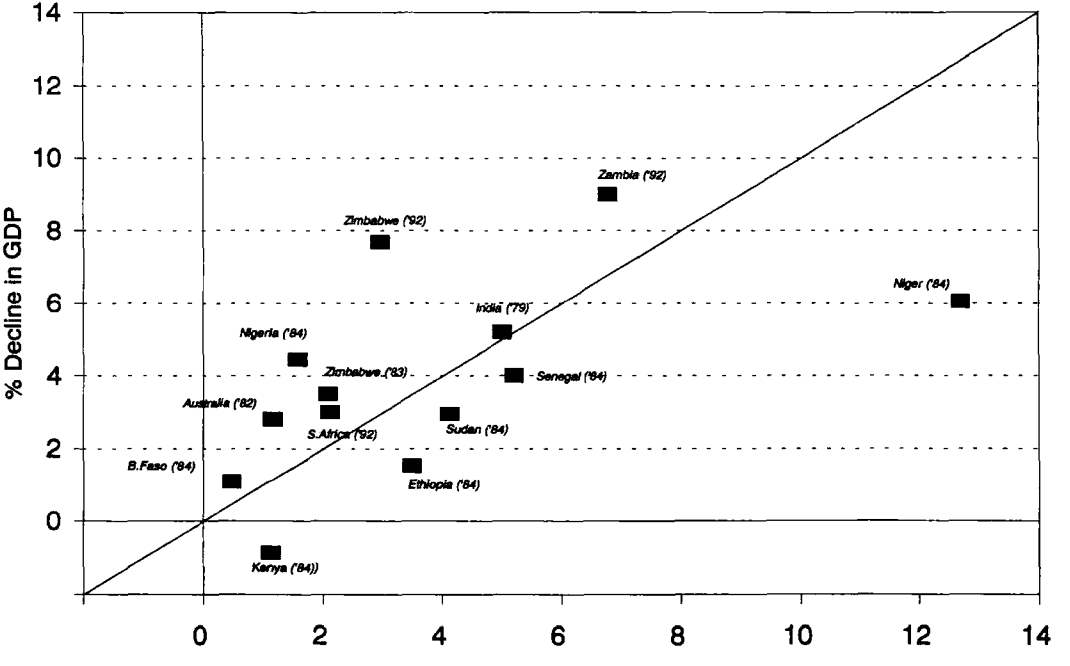
These relationships are illustrated by evidence from a range of countries at various stages of development (Figure 1). This figure plots the change in real GDP attributable to real change in the level of agricultural GDP against the total change in GDP, comparing the pre-drought with the drought year or years of most severe

---

provides an approximate estimate of the potential vulnerability of the economy for comparative purposes as in Figure 1. The potential vulnerability and also the reduction in losses that might result from measures to mitigate vulnerability may be inferred as in Box 5.

[15] Such multipliers are consistently lower in SSA than in Asia, apparently because of the relative inelasticity of supply of non-tradeables in SSA forcing up the relative prices of these goods (Haggblade *et al.*, 1991).

Figure 1: Impact of Drought Shocks on GDP and Agricultural GDP



drought for a selection of economies impacted by recent major drought events.[16] In theory, simple and dualistic economies would be expected to lie to the right of the 45° axis as drought is largely an agricultural phenomenon, with non-agricultural sectors possibly even expanding despite the drought and thus partly offsetting the overall decline in GDP. Intermediate economies would be expected to be situated to the left of the 45°axis, with drought not only adversely impacting on agriculture but also on other sectors. More developed, complex economies would also be expected to be situated to the left of the 45° axis, but closer to the origin, with drought having a relatively small impact on overall GDP. The sample of countries plotted in Figure 1 is consistent with the hypothesised relationships between economic structure and levels of resource endowment and the macroeconomic impact of droughts.

The resource endowment of an economy, including the ecological diversity of a country and its mineral and water resource base, will also influence the impact of a drought shock. The role of resource endowments in determining the impact of a drought shock may override the relationships between levels of economic development, economic structure and drought. These tentative hypothetical relationships are analysed more fully in Section 3 and the preliminary empirical evidence reported in Section 4.

[16] This visual illustration of the impact of drought shock is very approximate, looking at only the immediate impact in the worst drought year. As non-agricultural impacts, especially indirect effects, are likely to occur more slowly, the overall impact of a drought on the economy, and especially outside agriculture, is probably understated.

3. Theoretical Analysis of the Impact of Drought

3.1 Country typologies

It is self-evident from the above discussion that the impact of drought shocks of similar severity will vary between economies, depending substantially upon the structure of the economy and the nature of the linkages between sectors within the economy, as outlined above. We have therefore found it useful to differentiate between four types of economy in terms of the role of rainfed and irrigated agriculture, intersectoral linkages in production and final expenditure, intensity of water usage, levels of GDP per capita and natural-resource endowments, as a first step in analysing the economic impact of drought:[17]

i) *Simple economies* - predominantly rain-fed agricultural and livestock semi-subsistence economies with a limited functioning infrastructure, low levels of per capita income and high levels of self-provisioning in the rural population. To the extent that a modern sector exists, there are few links between this and the agricultural sector.

ii) *Intermediate economies* - more diversified economies with economic growth occurring via the development of labour-intensive, low-technology manufacturing sectors, typically dependent on domestically produced renewable natural resources and imported inputs and capital equipment, but with natural resources still representing a relatively important part of export earnings.

iii) *Complex economies* - developed economies with a relatively small agricultural sector and proportionately small forward and backward linkages between the agricultural sector and other water-intensive activities and the rest of the economy.

iv) *Dualistic economies* - economies with a large extractive, minerals sector, which is weakly linked to the rest of the economy and so is relatively immune to performance in other sectors of the economy. In such economies, a large proportion of the population continues to be based in the low (labour) productivity rural economy. Some African economies have achieved relatively high per capita levels of GDP through the development of such sectors, underlining the fact that there is no linear model of development.

---

[17] This typology builds on that initially presented in Nowlan and Jackson (1992). Those authors proposed a typology of subsistence, developing and complex economies as a way of explaining the need for different forms of international response required by drought-affected economies in Southern Africa in 1992.

In reality, this typology is highly oversimplified. There is, in fact, a continuum of cases, as specific characteristics are not unique to economies lying within a particular category. For example, Australia is a complex economy with a large mineral sector. India and Argentina, although falling into the second category, have substantial industrial sectors. Moreover, economies are dynamic, and change over time. Nevertheless, the typology is useful in focusing attention on how drought impacts on different types of economy.

Many of SSA's poorest economies fall into the first category, with a small number, including Nigeria and Zimbabwe, and, possibly, Kenya and Zambia, in the second. South Africa is in the third. Botswana, Namibia and Niger are in the ambiguous dualistic category. However, historical patterns of economic growth suggest that as less developed countries develop, they will initially diversify into manufacturing relatively simple products utilising domestically produced raw materials (Killick, 1993), thus transforming from simple to intermediate economies.

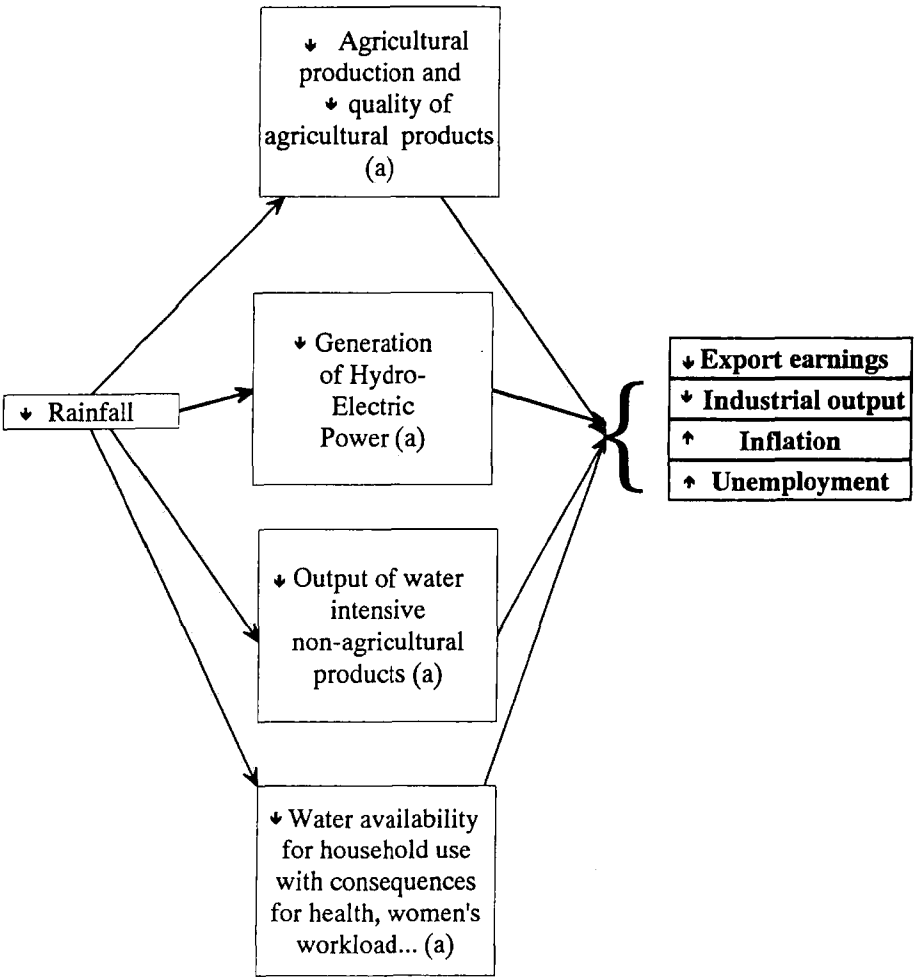
This typology, if broadly sound, also has potentially important policy implications for the drought responses of governments of affected countries and of the international community, which are discussed in more detail below. For example, in a relatively simple, low-income or a highly dualistic economy, measures to provide direct targeted relief, such as through food distributions or generation of income through rural works in disaster-affected rural areas, are likely to be superior to more generally expansionary anti-recession measures. In such a context, these measures are likely to be both more efficient in providing relief to affected populations and more cost-effective than indirect fiscal and monetary measures. In contrast, as impacts are more widely diffused through the economy, instruments for managing overall levels of expenditure and other economic aggregates become potentially more effective. In such economies, any change in the balance of drought management or response strategy, as well as levels of GDP, carries implications for the components of an appropriate international response.

3.2 Impact of drought on the productive sector

The ways in which drought physically impacts, or has a direct effect, on the productive sector is the same regardless of the type of economy, although the relative and absolute magnitude of each shock depends on country characteristics (Figure 2[18]). A decline in rainfall has an initial physical impact on agriculture, livestock and dairy production, hydro-electric power generation and other water-intensive activities. Domestic availability of water is also restricted, with

[18] The flow-chart abstracts from the 'social' consequences of drought. Such costs are not directly considered in this paper because of the methodological difficulties entailed in trying to incorporate them.

Figure 2: Physical Impact of a Drought Shock



(a) There is competition between sectors for water, with policy implications

implications for health and household activities including the time required to collect water. There is increased competition between sectors for water and such competition may have important policy implications (for example, hydro-electric power generation versus domestic irrigation). In addition, within certain sectors, direct production may compete with workforce consumption requirements, as, for example, in the case of mines located in relatively remote areas. However, the decline in value terms of drought-affected crops will be relatively lower than the decline in volume to the extent that lower supply results in higher prices, partly maintaining agricultural sector incomes.

Drought shocks then have a range of second-round shocks, the nature and magnitude of which depend on particular country circumstances. For example, declines in relatively water-intensive output may constrain output in sectors and sub-sectors linked to water-intensive industries. In addition, there may be a loss of earnings as labour is laid off, overtime bans are imposed and, perhaps, shorter shifts are worked, in turn potentially reducing demand in the economy, although such loss of employment opportunities may be difficult to measure. Drought also has potential external sector impacts, including on merchandise trade and external debt stocks.

The different ways in which drought theoretically impacts on the productive sectors in each of the four country typologies is explored in greater detail below. Quantitative and qualitative evidence on actual impact is then reported in Section 4.

Simple economies In a simple economy, the economic impact of drought is largely felt via its direct impact on the agricultural sector, in turn reflected in substantial percentage declines in GDP, agricultural exports and employment opportunities, as well as widespread sale of assets. Due to the relative importance of the agricultural sector, the impact of drought may be particularly great. Severe drought also results in widespread nutritional stress, increased morbidity and, occasionally, loss of human life. However, because of weak inter-sectoral linkages, a high degree of self-provisioning and relatively small non-agricultural sectors, the multiplier effect through the rest of the economy is fairly limited, largely occurring through a decline in consumer expenditure. The effects of drought are likely to be concentrated in the rural economy.

Productive recovery from drought in simple economies may be faster than in more diversified economies. Assuming the timely availability of sufficient seed, other agricultural inputs and tools, and predominantly annual cultivation cycles, good rains in the following year can restore levels of GDP approximately back up to pre-drought levels.[19] However, drought may leave a legacy of increased economic

[19] Economic recovery may be slower in the case of sugar cane, coffee and other crops with a multi-year production cycle.

difficulties such as higher levels of internal and external official and private debt, larger balance-of-payments deficits and reduced and less equitably distributed capital assets (such as livestock, household items etc.).

Intermediate economies Due to both direct effects on water-intensive sectors and to relatively strong inter-sectoral linkages, drought impacts on the manufacturing as well as agricultural and livestock sectors. Reduced domestic supply and imports of inputs have an adverse impact on non-agricultural production. Balance-of-payments difficulties as a result of lower exports impinge not only on final consumption and capital goods imports but also on intermediate goods imports. Although increased manufacturing production costs may be passed on to consumers, consumer purchasing power will already be constrained owing to the probable occurrence of one or more of the following factors: increases in food prices, losses in earnings as employment opportunities decline,[20] nominal wage freezes and reduced availability and higher cost of credit because of government measures to finance the increased budget deficit (see below). Indeed, demand constraints may more than offset supply constraints. Therefore, manufacturers also face falling markets for their products, possibly limiting the extent to which increased costs can be passed on. Reduced profitability and thus dampened private sector enthusiasm, coupled with increased costs of imports and, possibly, higher interest rates or reduced access to credits, may also result in delayed investment in new capital and technology, with longer-term economic implications.

In the aftermath of drought, shortages may emerge owing to a combination of firms' rundown of raw material and product stocks during the drought to alleviate cash-flow problems and constraints on the import of inputs because of continuing foreign-exchange shortages. The recovery of the non-agricultural sectors may also be delayed by a slow pick-up in demand. As a result, the agricultural sector may recover more quickly than the industrial sector. Large inter-yearly fluctuations in the economy, such as are caused by drought, also create management difficulties, for example in controlling public expenditure, although it is not possible to measure the associated economic cost of this.

Effects of drought are diffused more widely through the economy than in a simple economy because of the greater overall integration of the economy. The more fully developed and operational economy-wide financial systems for the flow of funds, including small-scale private savings and transfers (for example, the Post Office

[20] Reductions in demand for labour are unlikely to be fully reflected in official statistics as these effects are partly met through restrictions on overtime, shorter working shifts and laying off of casual labour. Contract labour may also be laid off but permanent labour forces may be protected by stringent employment regulations, perhaps requiring significant redundancy payments and so inhibiting large declines in formal sector employment.

Box 1: Impact of Drought on the Manufacturing Sector in Zimbabwe

Largely as a result of the 1991/2 drought, Zimbabwean manufacturing output declined by 9.3% in 1992. The drought alone led to a minimum 25% reduction in volume of manufacturing output and a 6% reduction in foreign currency receipts from manufactured exports or a 2% reduction in total export receipts. All sub-sectors declined with the exception of beverages and tobacco. The most severely affected sub-sectors were textiles (including cotton ginning), clothing and footwear, non-metallic mineral products, metal and metal products and transport equipment. The drought impacted on the manufacturing sector via the following:

Water shortages - most municipalities imposed rationing, with severe water shortages occurring in the cities of Mutare, Chegutu and Bulawayo.

Electricity shortages - load-shedding, rationing from September 1992 and increased electricity tariffs affected the whole country. Load-shedding imposed particular costs on sub-sectors with batch or continuous processing. The system of rationing discriminated against smaller manufacturers.

Input supply difficulties - shortages of agricultural inputs to the manufacturing sector were experienced. However, larger food processing companies, such as grain millers, actually increased production as imports were channelled through urban plants rather than processed in smaller rural plants. Similarly, the meat processing industry faced increased supply of inputs as the drought forced up slaughtering rates. However, with the exception of meat, the drought increased the cost of agricultural inputs.

Reductions in demand - there was reduced demand both for agricultural inputs and also for other basic consumer goods such as clothing and footwear, partly due to reduced incomes but also due to contractionary effects of the Economic Structural Adjustment Programme (ESAP) and trade liberalisation, resulting in increased penetration by competitive imports.

Macroeconomic conditions - higher government domestic borrowing, in part to finance drought-related expenditure, and higher rates of inflation and nominal interest, hit particularly severely in sub-sectors where working capital requirements had increased sharply because of parastatal price rises (e.g. for steel).

Partly as a consequence of the drought, the International Finance Corporation identified the Zimbabwe Stock Market as the worst performer of 54 world stock markets in 1992, with a decline in value of 62%. Although increased costs of production were partly passed on to consumers, manufacturers faced a deterioration in their financial viability.

Source: Summarised from Robinson (1993).

Savings Banks in Zimbabwe and South Africa) also diffuse the impact more widely.

A schema for analysing the impact of drought on the productive sector of intermediate economies is shown in Figure 3. This schema is also useful for analysing economy-wide effects in the case of simple and complex economies. However, in simple economies relatively weak inter-sectoral linkages and the greater importance of imports of final rather than intermediate goods (with the important exception of oil) imply relatively small linkage effects outside of agriculture. In complex economies linkage effects are reduced by the relative unimportance of the agricultural sector.

Complex economies Agricultural drought constitutes a relatively smaller exogenous shock in complex than in simple and intermediate economies, and its impacts are relatively easily absorbed. In part, this is because of the typically smaller contribution of agriculture to GDP, exports and, in particular, employment. Water resources are also likely to be better managed. The relative unimportance of agro-processing industries and greater diversification within the productive economy also imply relatively weak linkages between agriculture and the rest of the economy.[21] In addition, complex economies are typically both more open and have greater availability of foreign exchange, facilitating the import of normally domestically sourced items without constraining levels of other imports. Declines in production may also be offset by a draw-down of existing stocks of certain drought-afflicted crops, such as cereals (in part the consequence of agricultural policies). Food expenditure also represents a smaller percentage of household expenditure, implying that even if prices of drought-affected food products rise, the purchasing power of most groups is not significantly affected.

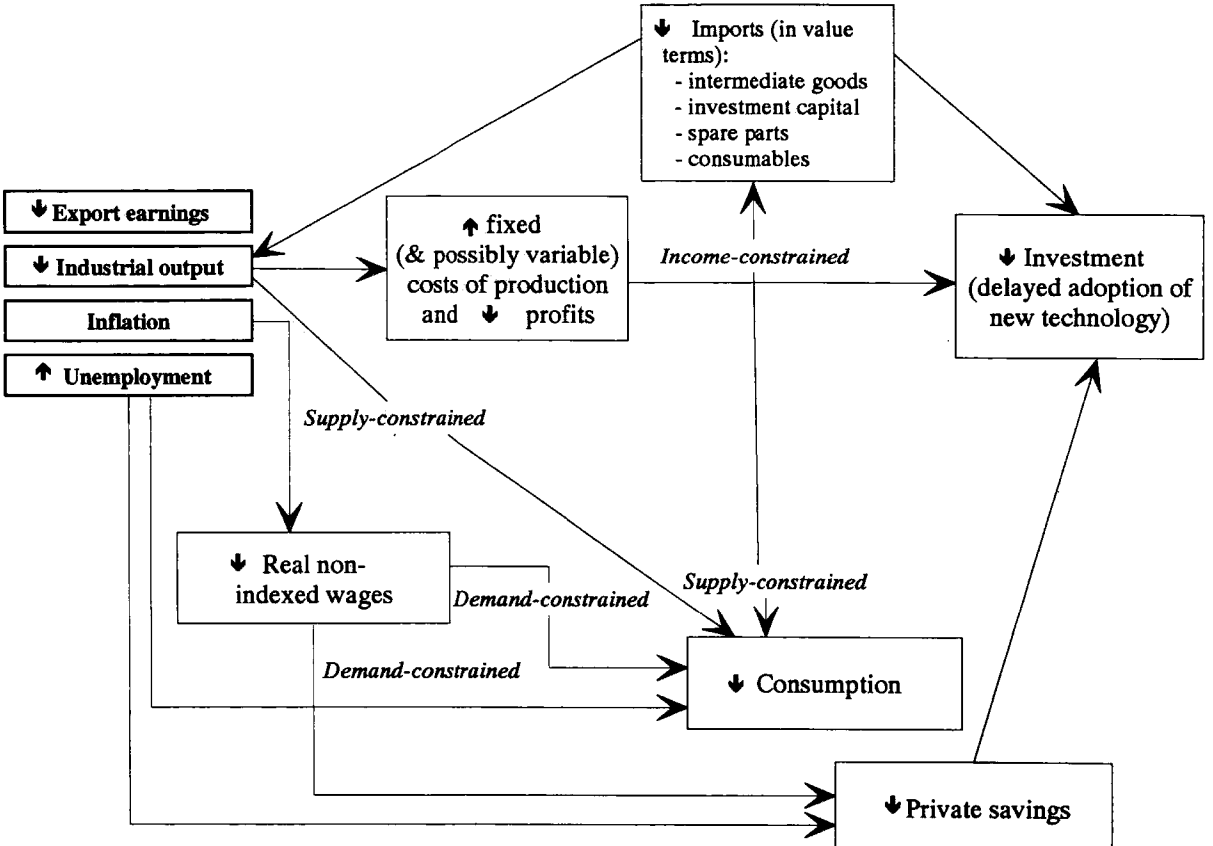
A relatively small proportion of the population, largely comprising that part of the rural economy which is directly impacted, is significantly affected by a drought event in more complex economies.[22] Thus, the scale of relief programmes is relatively small and their costs can be fairly easily absorbed by the government, so avoiding substantial increases in government domestic and external borrowing.

---

[21] The likely scale of impact is illustrated by the 1982 drought in Australia, where agricultural output, which had represented 5.2% of GDP in 1981, fell by 29%, but GDP declined by only 2.8%.

[22] For example, California experienced 6 consecutive years of drought between 1987 and 1992, and in 1990 alone the estimated cost to Californian agriculture was US$450 million. But only one sub-sector of the urban economy was seriously affected, the urban landscape gardening industry. Californian electricity utilities were also obliged to turn increasingly to more expensive fossil fuels because of losses in hydropower generation. According to one estimate, this switch to fossil fuels cost users US$2.93b. over the period 1987-91 (California, Department of Water Resources, 1991).

Figure 3: Domestic Economic Impact of a Drought Shock



However, the affected segment of the population may be severely hurt in terms of loss of income, assets and savings.[23]

Dualistic economies Some drought-prone economies in SSA exhibit a high degree of dualism with a large capital-intensive extractive sector which features significantly in the trade account, but which is weakly linked with other sectors of the economy. Unless the extractive sector is water-intensive and fails through lack of investment or poor management to insulate itself from variable water supply, the economic impact of drought is likely to be limited to variability in the agricultural sector with limited multiplier effects. The macroeconomic impact of drought appears small and similar to that in a complex economy. But this impression is deceptive, overlooking the profound impacts within the normal economy which affect the majority of the population. The potential impacts in terms of intensified food insecurity and water-related health risks and loss of livelihoods are considerable. However, the broad revenue base and the scope for financial stability provided by taxing the extractive sector provide considerable opportunity for countervailing measures.[24]

[23] For example, Purtill *et al.* (1983) estimated that farm incomes for Australia's broadacre properties fell by an average of 45% during the 1982-3 drought, with declines as high as 96% in Victoria. Debt held by drought-afflicted farms increased four-fold over the period between June and November 1982. The drought also resulted in a 2% fall in employment nationwide.

[24] For example, in Botswana (Drèze and Sen, 1989) and also Namibia in 1992/93 (Thomson, 1994b) the macro aggregates and trade account effects were modest and governments had the resources to finance substantial relief programmes.

Box 2: Modelling the Economic Impact of the 1992 Drought in South Africa

The agricultural sector accounts for a relatively small part of GDP in South Africa - in 1991 some 6.6% of GDP, a level similar to that in the USA and Australia. However, compared with other complex drought-afflicted economies, the agricultural sector is a relatively important source of employment. During 1985-8, 13.6% of the South African workforce was employed in agriculture compared with 5.5% in Australia and 3.0% in the USA. Thus drought might be expected to have a relatively greater impact on, for example, domestic private savings and demand.

The Reserve Bank of South Africa has developed a macroeconomic model to examine the impact of the 1992 drought which would otherwise be difficult to isolate from the effects of the continued recession. The model is based on the Keynesian income-expenditure approach, incorporating the supply side of the economy through a number of equations modelling the value added by different output sectors and with supply side constraints determined by full employment of the labour force and fixed capital stock in a neo-classical production function. The agricultural multiplier was calculated as 1.6 for the country overall, although it could be higher in predominantly agriculturally orientated rural areas (Pretorius and Smal, 1992).

The simulation results indicated that a 14% decline in agricultural sector value added would result in a 1.8% decline in GDP (results similar to those estimated above for Australia), of which 1% is direct and 0.8% indirect impacts. The direct impact of reduced rainfall on the manufacturing sector was comparatively limited owing to past investment in urban water supplies effectively assuring the availability of water. The other computed effects included falls of 1.8% in real disposable income, 0.5% in consumption expenditure (due to lower disposable income and higher food prices), and 5% in gross domestic saving and an incremental rise in the rate of inflation of 0.8%. The model also estimated a 0.5% decline in gross domestic investment, although the actual reduction may have been considerably higher. The country was expected to import some 4.6 millions tons of maize between April 1992 and March 1993, costing some R1,725m. in April-December 1992 alone. Maize export earnings fell by an estimated R365m., with further declines in other agricultural exports as well as an estimated R335m. drop in exports from other sectors linked to agriculture. However, lower demand as a result of the drought was expected to reduce non-agricultural imports by R1,225m. Overall, the drought was expected to have a net negative effect of at least R1,200m. on the current account of the balance of payments. In terms of employment, it was estimated to have resulted in the loss of 49,000 agricultural jobs and 20,000 formal sector jobs in non-agricultural sectors. Farmers' indebtedness was also expected to have risen, cutting some farmers off from access to further credit.

4. Some Preliminary Findings

4.1 Overview

The empirical findings presented below draw on the analysis of the impact of drought on overall economic and sectoral performance in six SSA economies: Burkina Faso, Ethiopia, Kenya, Senegal, Zambia and Zimbabwe. Additional qualitative evidence is drawn from a case study for Namibia. However, Namibia is excluded from the statistical analysis because of data constraints for the pre-independence period. The discussion focuses on factors determining economic sensitivity to drought shocks, the long-term effects of drought shocks, the impact of drought shocks on trade and external debt, drought mitigation measures and the implications of drought for economic and development planning (Section 4.2). The relationship between drought shocks and government economic policy is then explored in some length (Section 4.3).

4.2 Evidence from a comparative analysis of six sub-Saharan African economies[25]

The six countries selected for statistical analysis illustrate how a range of structural conditions interact with large differences in resource endowments to determine the economy-wide impact of drought. In terms of the typology proposed above, these reflect a wide range of situations. Two of the economies considered, Burkina Faso and Ethiopia, can be stylised as simple economies, with the agricultural sector forming a particularly substantial part of GDP and with overwhelmingly rural populations. Kenya has an agricultural sector that is relatively diverse agro-ecologically and in terms of commodities, as well as a relatively larger non-agricultural sector. Senegal, the one lower middle-income country considered, also has some characteristics of an intermediate economy, with relatively strong inter-sectoral linkages reflecting past French colonial policy. Zimbabwe, which has one of the more developed manufacturing sectors in SSA, is the only economy which can be unambiguously classified as an intermediate economy. Zambia is more dualistic, heavily dependent on the minerals sector.

Economic sensitivity to drought Regression analysis of the economic impact of drought on both GDP and agricultural GDP suggests that Ethiopia, Senegal and Zimbabwe are relatively more vulnerable to drought. In terms of non-agricultural

[25] These findings are reported in more detail in Benson (1994).

GDP, drought has had relatively the least impact in the two lowest-income countries, Burkina Faso and Ethiopia. These results are broadly consistent with an 'inverted-U' rather than a simple linear inverse relationship between drought vulnerability and economic development. The Zambian results also support the hypothesis that a dualistic economy is partly cushioned from the impact of drought by the size of the non-water-intensive extractive sector.[26]

The case studies also illustrate how the development process may actually aggravate the impact of drought. In Ethiopia, the relative drought insensitivity of the small non-agricultural economy reflects the low level of development and a war economy that discouraged market integration. The predominance of subsistence households, producing almost entirely for on-farm consumption, combined with poor market development and vertical sectoral integration, in turn due to weak infrastructure and a very small domestic market, implies that impacts of drought are largely contained within the rural economy. The overall Ethiopian economy will become more vulnerable to drought as the infrastructure expands, integrating the economy nationally; as inter-sectoral linkages are developed; and as household self-provisioning declines and households become increasingly drawn into monetised activities.

Drought may also exacerbate income inequality, undermining efforts to achieve equitable and sustainable development. For example, qualitative evidence from Zimbabwe suggests increasing inequality during periods of drought, although short-term changes in patterns of income distribution are difficult to demonstrate quantitatively (Box 3).

The case-study countries also suggest several factors listed below which interact with rainfall variability, in turn partly determining the extent and intensity of a drought shock irrespective of the type of economy.

- **Prevailing economic conditions** - a weakened economy increases the impact of drought, as demonstrated by the 1991/2 drought in Southern Africa and the more recent Kenyan crisis.

[26] One of the most intriguing cases of dualism is South Africa, which is classified as upper-middle income in terms of per capita GDP and is the largest, most industrialised economy in Africa. The macroeconomic implications of the severe drought in 1991/92 were relatively modest despite maize import costs of some $700m. (see Box 2). However, with only 1 of white commercial farms accounting for 40% of agricultural output, there was a large 'tail' of non-viable enterprises employing much migrant labour in drought-prone areas. Some 55% of the black population living in the former homelands is dependent on a continuation of self-provisioning and remittances, and is therefore food and health insecure in a drought.

Box 3: Impact of Drought on the Distribution of Income

Drought impacts differently on various socio-economic and geographically-located groups, with implications for the pattern of income distribution, as in the following examples:

- Differential impact of drought on employment opportunities between sectors and sub-sectors, with certain sub-sectors such as mining and some service industries relatively immune to drought (assuming they are not adversely affected by possible electricity shortages or by significant reductions in demand).

- Differential impact of drought on the supply of and returns to labour in the formal and informal sectors. For example, Berg (1975) argues in the case of the Sahel that migration to urban areas during the 1972-4 drought resulted, in the first instance, in increased movement of labour into the urban informal sector. This reduced returns to labour in this sector, whilst wages in the formal sector, which were protected by statutory minimum wages regulations, increased substantially.

- Varying degrees of vulnerability occur within sectors. For example, within the agriculture sector, peasant farmers are likely to be more vulnerable to drought because of the greater predominance of rainfed agriculture and their greater concentration in less favourable climatic regions. This is demonstrated in the case of Zimbabwe where output of individual crops is more sensitive to rainfall under communal production (Benson and Clay, 1994). As a consequence, smaller farmers are likely to face much greater loss of assets in relative terms, widening the gap between them and large-scale commercial producers. For similar reasons, pastoralists with limited numbers of livestock may be worse affected than large-scale commercial cattle farmers.

- Differential impact of drought between urban and rural areas. Drought may entail a two-way redistribution of income between rural and urban households, although flows from rural to urban households probably dominate. These occur most fundamentally via the greater deterioration in terms of trade suffered by rural households and the potentially severe impact of drought on their main source of earnings. However, in some economies such as Zimbabwe, these may be partly offset by increased flows of urban-rural remittances during periods of drought (Hicks, 1993).

- Differential impact of drought between regions, depending on rainfall levels, the catchment areas of major supplies of water and the relative importance of water-intensive activities in each region. Ease of access to relief supplies relative to need may also vary between regions. This has implications for the relative resources available to provincial government.

Continued

Box 3 cont.: **Impact of Drought on the Distribution of Income**

- Differences in the incremental rate of price rises of different commodity types have differential impacts on various groups of consumers, depending on their consumption patterns. Lower-income groups face disproportionately high falls in purchasing power as increasingly large proportions of income are spent on most inflation-prone basic foodstuffs, as demonstrated, for example, in Zimbabwe (Benson and Clay, 1994).

Drought shocks may also have long-term implications for income distribution if there is widescale sale of assets by lower-income households, at prices significantly below the non-drought norm. Widescale sale of assets may, in turn, have implications on, for example, demand for education in some countries. For example, in Zimbabwe goats are often kept as, in effect, an education fund to pay for secondary education (Hicks, 1993). However, a number of households were forced to sell their goats to sustain short-term levels of consumption in the aftermath of the 1991/92 drought shock.

- **Management of water resources** - the impact of drought on particular activities may be intensified if water resources have been poorly managed in the past and so 'stocks' of water drawn upon for those activities are therefore already low. Zimbabwe's experience in 1992 shows how the decision rules for use of water may leave continued supply at risk to extreme events (Box 4).

- **International commodity price movements** - the six economies are all dependent on two or three export commodities for a major part of their export earnings and are price-takers for these commodities, as is most of SSA.[27] Commodity price movements consequently play a significant role in either offsetting or amplifying the impact of drought in some economies. In the case of Senegal, improved groundnut prices together with strong growth in fish and fertiliser earnings counteracted the impact of the 1983/4 drought on the balance of payments. In contrast, the Zimbabwean economy was adversely affected by the weak market for non-ferrous metals as well as by drought in 1992/3.

- **The structure of the agricultural sector** - agrarian economies are sensitive to variability in rainfall, but the precise consequences depend on a number of factors including the combination of crops grown; the technology used, including the proportion of cultivated land under rainfed and irrigated production; the

[27] Kox (1990) estimated that as recently as 1988, two commodities provided at least 60% of export earnings to 30 out of the 43 sub-Saharan African countries. Zimbabwe was the only country where the top two commodities provided less than 40% of total export earnings.

Box 4: Lake Kariba and the 1991/2 Drought

Long-term mismanagement of the water supply was an important factor contributing to the electricity supply crisis and the risk to urban drinking water in Zambia and Zimbabwe in 1992. Since 1981/2, there had been a predicted sequence of, on average, years of lower rainfall in the Kariba and Kafue catchments. Climatologists had identified in the 1960s a statistically robust 18-year cycle in the summer rainfall region of South Eastern Africa, and successfully predicted the wetter and drier periods of the 1970s and 1980s (Tyson, 1978). This regional rainfall pattern appears to be distinctive from the rest of sub-Saharan Africa (Hulme, 1993).

Water offtake for power generation at Kariba by the Zambian and Zimbabwean electricity generating authorities was based on the average intake for the relatively more favourable 1970s. Offtake was not adjusted to take account of the sequence of relatively lower inflow levels in the 1980s and so exceeded on average the rate of inflow into the lake by 16%, making the system increasingly vulnerable to further rainfall anomalies. At least in the case of Zimbabwe, such reckless management may partly reflect pressures to minimise short-run costs of power generation in face of the large operating deficits of the Zimbabwe Electricity Supply Authority. The effects of electricity curtailment in Zimbabwe in 1992 were estimated as a reduction of Z$560m. in GDP, Z$200m. in exports and a loss of 3,000 jobs.

degree of use of marginal lands for agricultural purposes; the structure of management and ownership of land; and inter-sectoral linkages. For example, Kenya has a relatively large agriculture sector and drought has potentially serious short-term food-security implications. However, the two major export crops, tea and coffee, have been largely unaffected by droughts since 1970, in turn cushioning the impact of drought on the agricultural sector and the economy overall. In Zimbabwe, the shift since 1980 in maize and cotton production from the large-scale commercial sector to the communal sector which is more heavily concentrated in marginal areas has probably increased the sensitivity of agriculture to rainfall variability. These examples underscore the importance of adopting a disaggregated approach in assessing the vulnerability of an economy and its agricultural sector to drought.

- **The existing policy framework** - where large areas of the formal economy are highly regulated, a drought may have relatively little impact because of existing constraints on, for example, private investment and imports. Similarly, the easing of certain policy constraints, whether or not for reasons related to drought, can mitigate the impact of drought. For example, in 1984 the relaxing of import constraints in Zimbabwe eased the impact of three years of regional and national drought on levels of imports (Davies, R. *et al.*, 1993).

- **Internal or external conflict** - this is likely to sustain high levels of government expenditure and levels of activity in domestic war-related industries and services, as demonstrated by Ethiopia. However, conflict may also reinforce the impact of drought to the extent that it disrupts agricultural and other productive activities and renders affected populations more vulnerable to the impact of even comparatively minor drought.

The structure of financial sectors and government financial policy may also be important factors shaping the impact of a drought shock. For example, Zimbabwe's well developed formal financial system was drawn upon to meet the increased central government budgetary deficit arising as a result of the 1991/2 drought, crowding out private sector borrowing as well as contributing to the sustainment of very high interest rates. The transferral of remittances from urban to rural households was also facilitated by the well articulated system for small savings. This mitigated the impact of the drought on the rural areas but at the same time effectively spread its impact.

Relatively uncommon and more extreme events appear to account for a disproportionate share of economic impacts outside the agricultural and livestock sector. Not surprisingly, the impact of drought is greater, *ceteris paribus*, where there have been several successive years of below-average rainfall, implying lower grain reserves, reduced household savings, reduced inter-temporal water storage, a weaker livestock sector and so on.

An important issue is whether there are certain underlying factors contributing to increasing vulnerability to drought. The examination of experience in the case-study countries suggests that important factors are population growth, environmental degradation and reliance on agriculture as the engine of growth.

Population growth The high rate of population growth in SSA, forecast at 3.4% per annum for the period 1992 to 2000 (UNDP, 1994) is exerting great pressure on land, water and food supplies and the need to generate increased employment opportunities. In Senegal, cash crop production is declining as subsistence households strive to meet their own food requirements on gradually diminishing plots. The high rate of urbanisation in SSA, forecast at 5.6% per annum over the same period, implies that urban water supply for domestic use will have to double in the next 12-13 years if this rate of urban growth is to be sustained.

Environmental degradation Growing population pressure on land is forcing increased cultivation of marginal lands in, for example, Ethiopia and Senegal. Sahelian countries have also experienced increased aridity. There is, however, no consensus on the mechanisms underlying increasing degradation and so no scientific basis for stating whether or not this trend will reverse (Hulme, 1992; 1993). However, it does imply that practices developed to suit previous rainfall patterns may not be sustainable, implying potentially increased vulnerability to

drought in the short-term as households and economies adapt to changing weather conditions.

Agriculture is becoming increasingly important as a source of growth in, for example, Kenya and Zambia as the scope for further economic growth in other sectors, particularly the expansion of public services, diminishes and pressure to secure long-term sustainable growth becomes increasingly important. The agricultural sector is also identified in policy and plan statements in many SSA countries as their major source of increased export earnings in these countries.

Another factor which may have implications for the impact of drought concerns the current process of liberalisation and structural adjustment in SSA (see Section 4.4).

However, it is also important to acknowledge the inherent danger in placing too much emphasis on drought or, indeed, any exogenous shocks as key factors determining economic trends. Such explanations of economic performance can conceal more fundamental problems. For example, the 1982-4 drought in Zimbabwe occurred during a period of severe balance-of-payments difficulties. Davies (1992) argues that the government initially viewed these difficulties as temporary, arising as a result of the drought. Rather than adopting a longer-term solution, it therefore employed short-term quick-fix solutions in the form of import controls.

Longer-term impact of drought on economic performance Drought shocks may be a long-term impediment to growth in certain economies. However, the impact of drought is mitigated to the extent that lower growth during periods of drought is offset by increased growth during the recovery period. For the purposes of this study, this issue was assessed in two ways: by analysing the rate of recovery and the implications of lost GDP in terms of lower growth rates. Relatively speedy recovery was indicated by a generally insignificant relationship between economic performance and lagged drought variables in the case-study countries. However, as we noted earlier, there was some qualitative evidence that overall rates of recovery from a drought shock may be slower in intermediate than in simple economies, due to the greater impact of drought on the industrial sector in the former, combined with less speedy recovery of the industrial than the agricultural sector. For example, following the 1991/92 drought, agricultural sector production in Zimbabwe bounced back relatively rapidly, encouraged by incentive prices and a massive free input programme for small farmers. Meanwhile, the performance of the non-agricultural sector remained sluggish, depressed by lack of demand, high nominal interest rates and tight credit conditions, in part as a consequence of the drought (World Bank, 1993a).

Alternative scenarios run to consider losses to GDP occurring as a result of drought shocks suggest that drought may be a long-term impediment to growth (Box 5). The long-term impact may be even greater than indicated by these results to the

Box 5: Modelling the Longer-term Impact of Drought

To try to capture the potential impact of drought on the longer-term growth of an economy, a simple auto-regressive model was developed to provide numerical examples for Burkina Faso and Zambia (Benson, 1994). Levels of agricultural and non-agricultural GDP in year t were regressed on their levels in year t-1 as well as a drought variable and other significant exogenous factors. Logarithmic ordinary least squares (OLS) regressions were run in the form:

$$y_t = \alpha + \beta y_{t-1} + \gamma Dr_t + \delta Ex_{1t} + ... + \zeta Ex_{nt} + \varepsilon_t$$

where y is real or constant price agricultural or non-agricultural GDP, Dr is the drought variable and $Ex_1 ... Ex_n$ are any other significant exogenous variables. Fitted regressions were then used to examine the impact on GDP of reducing deviations of the drought variable below its mean value levels by 20% and 50%.

On the less extreme assumption of a 20% reduction in the deviations below the level of the drought variable, Zambian agricultural GDP would have been an average of 0.7% higher per annum during 1970-81 and 1.9% higher over the period 1981-91. Non-agricultural GDP would have been 0.6% per annum higher in the earlier period but virtually unchanged in the latter period. In the case of Burkina Faso, agricultural GDP would have been virtually unchanged during 1971-80, but 0.5% higher per annum over the period 1981-90. Non-agricultural GDP would have been an average of 16.1% per annum higher in the earlier period and 1.7% higher in the latter period.

extent that droughts distort investment portfolios and restrict rates of capital accumulation. Any such effects may be exacerbated if economic development objectives are set aside for the duration of the drought, weakening the links between relief and development as well as reducing the longer-term costs of drought. Indeed, in the most simple economies such as Burkina Faso and Ethiopia, drought is an underlying long-term impediment to growth rather than a short-term setback in growth rates and may even be emerging as an increasing impediment to development. Perceptions of drought perhaps need to be adjusted towards viewing drought less as an exogenous shock, as is currently the case, and more as a structural problem in such economies.

Drought and trade The impact of drought shocks on merchandise trade is an important issue. The experience of the six case-study countries indicates substantial increases in cereal imports during and in the aftermath of severe drought years. There also appears to be some evidence of increased cereal imports effectively constraining other imports, at least in the case of Burkina Faso. Demand for imports of capital and intermediate goods may also be dampened, as for example

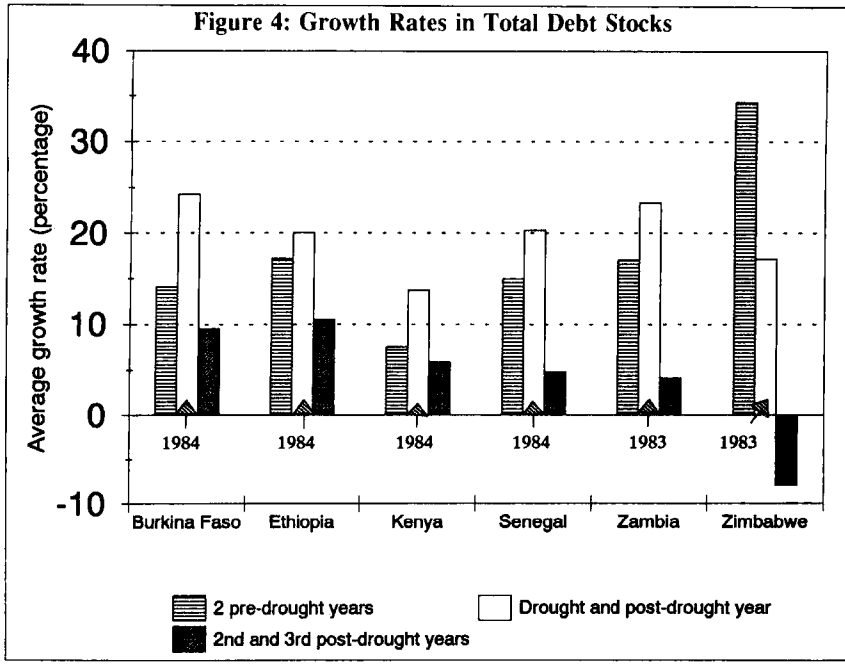
in Zimbabwe in 1992. There are less clearly defined trends for exports. This is partly because of some lags between production and export. Nevertheless, examination of agricultural export data does reveal some evidence of losses in export earnings. Such losses may be particularly crucial in the future in the case of Sahelian countries which previously relied on workers' remittances from neighbouring countries as a major component of export earnings. Since the late 1980s, there has been a noticeable decline in the flow of remittances to these countries due to worsening economic conditions in host countries. However, economic export earnings may also be boosted during periods of drought to the extent that countries are able to export goods in surplus as a consequence of the drought-related decline in domestic consumption. For example, in Zimbabwe in 1992 producers of textiles, footwear and furniture sought increased export outlets.

The policy environment is also important in determining the impact of drought on the external sector. For example, again in the case of Zimbabwe, the gradual build-up in stocks of imported inputs in 1990 and 1991 because of uncertainty about the sustainment of a more liberal import regime and speculation created by the unstable exchange rate meant that producers entered the drought period with considerable inputs already in stock.

External debt Evidence for the six case-study countries also indicates that, since the mid-1970s, severe drought events have resulted in increased debt stocks, except in the case of Zimbabwe where debt fell as a result of a deliberate longer-term government policy of debt reduction (Figure 4). Such increases have largely been intended to meet increased external financing gaps and have largely been in the form of long-term public and publicly guaranteed debt. Increased debt has longer-term implications for levels of debt servicing, and thus for the availability of foreign exchange to finance capital imports, which may be vital. For example, in Ethiopia, between the end of 1983 and the drought year 1984, increases forecast in interest payments alone resulted in a 9.2% increase in debt service projected for 1985. Drought can also strain a country's ability to service its debt, as, for example, in the case of Zambia in 1992.

Drought mitigation strategies Traditionally, in all of the case-study countries drought mitigation strategies have been defined in terms of improving food security at the national and household level, as, for example, in the case of Ethiopia. Typically in the immediate aftermath of a drought, there is increased government and donor attention on the possibility of a further drought, and certain additional mitigation measures are discussed and sometimes implemented. These often relate to larger-scale investment in water resources. However, there has been little sustained interest in either the public or private sectors in mitigating economic impacts, for example through the taking out of drought insurance policies.

Drought and economic and development planning In the case-study countries considered, weather is invariably cited *ex post* as an important variable determining



overall patterns of growth. However, in very few of the policy and planning documents examined during this study were drought risk or climatic variability taken into account in forecasting growth rates either for the agricultural sector or for GDP more broadly. The issue of whether or not more consideration should be given to weather patterns in drawing up long-term overall economic and development plans is by no means straightforward. In least developed countries such as Ethiopia, the costs of relief programmes are largely met though external grant assistance, implying little additional pressure on government budget and external sector balances and thus on the direction of government policy. However, in slightly more developed economies, the costs of drought are partly met from domestic sources. It is clearly uneconomic for governments or donors to draw up detailed alternative economic plans which come into effect in the event of drought. Nevertheless, formal identification of key government and donor priorities, as they relate to specific aspects of expenditure and investment plans *ex ante*, would help ensure continued implementation of overall economic policies even during periods of drought.

4.3 Drought and government economic policy

Drought shocks have implications for government policy, first and foremost via their impact on the budget deficit. As demonstrated in the case of Zimbabwe, drought can result in a reduction in tax revenue, leading to both lower absolute levels of tax revenue, because of lower rates of economic activity, and delayed payment in taxes due. Drought also results in increased expenditures which, in the case of Zimbabwe, accounted for some 2.7% of GDP in 1991/2 and 4.5% of GDP in 1992/3. Subsidies to certain agricultural parastatals may also increase. For example, the Zimbabwean Government had to meet increased losses of the Agricultural Financial Corporation, the Grain Marketing Board (GMB) and the National Railways of Zimbabwe as a direct consequence of the 1991/2 drought. However, prior to the deliberate run-down of maize stocks in 1990-1, the GMB had typically imposed heavier burdens on government finances during years of surplus than of deficit maize production owing to particularly high storage and disposal costs.

Increased budgetary burdens, resulting from reduced revenues and additional items of expenditure, can be met by raising additional government finance, implying an increase in absolute levels of expenditure, by reallocating planned government expenditure, or by a mixture of the two. There are two basic potential sources of additional finance. First, a government can increase levels of borrowing from domestic and external official and private sources, although its ability to do so is in part determined by its existing level of indebtedness, its relationship with official lenders and the confidence of private lenders in the economy. There is evidence of increases in both external (see above) and internal borrowing during periods of drought. The latter is illustrated, for example, in the case of Zimbabwe in 1992. As noted earlier, the Zimbabwean Government counteracted the implicit monetary expansion entailed in this increased borrowing by maintaining the prevailing high levels of interest. This contributed to a 5.2% fall in private sector investment year on year, implying a slow-down in the refurbishment of domestic industry which was required as barriers to external competition were removed.

A second potential source of government financing is via an increase in taxes, raising rates of existing taxes or perhaps introducing a special drought tax surcharge, and/or a reduction in subsidies. In the case of Zimbabwe, drought levies were imposed in both 1984-5 and 1987. However, quite the reverse policy was adopted in 1992, with a reduction in the rate of company taxation to help alleviate financial difficulties which had arisen partly as a consequence of the drought.

Reallocation of government expenditure may be conducted within or between sectors, with varying opportunity costs. In the case of both Zimbabwe and Namibia, drought-related expenditures apparently led to a shift in the balance of the investment programme, delaying some non-drought related projects. In Namibia it was announced that the initial funding of the drought relief programme would be

met by postponing the upgrading of the trans-Caprivi highway, although, in the event, it was unclear precisely where the funds for the drought relief programme were found (Thomson, 1994b). Further research would be required to analyse the long-term economic costs of such reallocations of government expenditure, including possible impacts on the climate for private domestic and foreign investment. However, there is some evidence that these reallocations may reduce long-term growth rates. For example, an estimated 58% of the Namibian Drought Relief Programme expenditure involved the provision of goods, services and financial transfers which would not have been provided in the absence of drought. These expenditures had no long-term benefit in reducing the impact of drought, although some of the programme, for example in the area of water supply, fitted in with existing work and priorities (Thomson, 1994b). There is also some evidence that levels of staffing may not be increased sufficiently to deal with the extra workload, displacing normal staff activities and effectively entailing an additional, although intangible, switch of government expenditure as, for example, occurred in Zimbabwe in 1992, from preventative health care such as immunisation to emergency activities (Tobaiwa, 1993).

The Namibian case study also highlights how drought can force other issues - in this case, chronic poverty - on to the government policy agenda, both increasing the costs of relief and having longer term implications for levels of government expenditure (Thomson, 1994b).

4.4 Drought and Economic Reform

In the longer term, successful adjustment probably increases economic resilience to drought, particularly to the extent that it strengthens overall economic performance. It may also stimulate increased private sector drought mitigation measures as economies become less regulated and private sectors expand.

However, the relationship between the process of structural adjustment and economic resilience to drought is more complex in the short-term. A number of issues can be organised under five broad lines of enquiry:

- Is drought a contributing factor to the adoption of a structural adjustment programme?
- Does drought impede implementation?
- Does drought exacerbate potential adverse short-term impacts of reform?
- Is drought a factor contributing to the abandonment of reform programmes?
- Does the existence of a structural adjustment programme influence the nature and volume of drought relief measures?

Adoption of reform programmes There is some evidence that natural disasters may be an important factor contributing to the adoption of a structural reform

programme. For example, Killick and Malik (1991) found in a survey of seventeen randomly selected developing countries which were IMF programmes that in six cases natural disasters, and in four drought specifically, had been an 'important, perhaps dominant factor in the adoption of the programme'. Among the six case-study countries here Senegal provides a further example of the role of drought in leading to the adoption of structural reform programmes.

Whatever the precise causation, the attempt to launch or sustain without modifications a major reform programme may in fact be inappropriate in such circumstances. Experience has demonstrated that structural adjustment needs to occur against a backdrop of macroeconomic stabilisation. Indeed a World Bank report concluded that some countries, including those recovering from natural disaster or war 'are plainly inappropriate for adjustment'.[28] In these countries, emergency or bridging operations are considered more appropriate.

Implementation of reform The impact of drought on the implementation of a reform programme is partly determined by the resolve and the political strength of the reforming government. The latter is important to the extent that drought exacerbates the short-term adverse impacts of reform and thus exerts pressure on governments to ease reform programmes. The stage reached in the adjustment programme is also important, with a lesser impact expected during the later stages as most of the more vulnerable components, such as price liberalisation, the removal of consumer subsidies and market liberalisation, are likely to have already been implemented. This was demonstrated in the case of Senegal, for example, in the 1980 drought. The 1991/92 Southern African drought, which occurred during the relatively early stages of structural adjustment programmes in both Zambia and, in particular, Zimbabwe, offers some evidence of the impact during the earlier phases. For example, in the case of Zambia, it delayed the liberalisation of agricultural markets and inhibited the development of autonomous agricultural financial institutions. In Zimbabwe, it hampered efforts to reduce the budget deficit and restructure the civil service and the parastatals.

Short-term adverse impacts of reform Drought probably exacerbates the short-term adverse impacts of reform first and foremost via its effect on vulnerable groups. Drought typically reinforces the inflationary impact of the removal of subsidies on basic food and other commodities, to the extent that governments continue to remove subsidies, and also contributes to job losses. It can also intensify the short-term adverse economic impacts of reform more generally, for example by prolonging tight monetary policy with implications for the rates of investment, as occurred in Zimbabwe.

---

[28] World Bank (1992) 'World Bank Structural Adjustment Operations'. World Bank: Washington, DC, June, cited in Thompson (1993).

Abandonment of reform programmes Senegal's experience in 1980 provides the only example from the case-study countries of a country where drought contributed to the abandonment of a reform programme. This instance is particularly ironic since drought was also a factor contributing to the decision to adopt the reform programme in the first place. More recently, the international financial institutions (IFIs) appear to be more willing to modify structural reform programmes in the aftermath of drought, as indicated by experience in both Zambia and Zimbabwe (World Bank, 1993a). This flexibility possibly reflects greater experience in the implementation of reform programmes. There is perhaps too an increasing determination for reform to succeed and to avoid the major losses of resources committed and the political damage that results from the abandonment of a whole structural adjustment programme.

Drought relief The existence of reform programmes and, more generally, relationships with donors, particularly the IFIs, seems to play an important role in determining the nature and level of international response to drought. This partly reflects an increasing trend towards reluctance to provide aid to non-reforming countries, particularly to countries where the IFIs have actually withdrawn assistance. It also reflects determination to achieve some successful stories of adjustment. For example, in the case of Zambia some senior officials firmly believed that, had a drought of similar magnitude to that of 1991/2 occurred in 1987 when Zambia had just broken off relationships with the IMF, the country would have received very little external assistance (Seshamani, 1993).[29] The sizeable level of actual assistance to both Zambia and Zimbabwe in the response of the 1991/2 drought also reflected concerns to keep the adjustment process on track. Structural adjustment programmes also provide a framework within which to monitor the economic impacts of drought, and effectively facilitate the provision of non-humanitarian assistance.

In the case of Zambia, there is evidence that the structural adjustment programme itself hindered the relief programme. Tight fiscal policy pursued as part of the structural adjustment process had a direct impact on the government's ability to raise external financing for the drought because of lack of counterpart Kwacha resources. Fiscal constraints also apparently impeded the transport of relief supplies owing to shortages of local revenues to meet internal transport, storage and handling (ITSH) costs. Similarly, the gradual depreciation of the Kwacha due to exchange-rate liberalisation created problems in fixing transport rates, which also resulted in some delays in the delivery of relief supplies (Seshamani, 1993).

---

[29] Three adjustment credits were approved for Zambia in 1985-6. Relations between the IMF and the Zambian government were broken off in 1987 after Zambia abandoned its reform programme and ceased debt-servicing payments. Adjustment lending was resumed in 1991 after the country had cleared its debt arrears.

5. Implications for Supporting Drought Crisis Management and Mitigation Measures

5.1 Economic structures, resource endowments and governance

This study has provided provisional evidence of the way economic structures and resource endowments interact in determining the impacts of drought shocks. The typology developed above is considered to have relevance to the policies of the IFIs and bilateral donor agencies in supporting drought crisis management and mitigation measures in Africa. However, in considering donor policies, the additional dimension of 'governance' is a factor to be taken into account. The interaction of these three factors, economic structures, resource endowment and governance, provides a framework for distinguishing between broad, but distinctive, drought-response and mitigation strategies.

First, the typology can be used to indicate the different circumstances to which donors will be responding:

Simple economies - the effects of the drought shock will be concentrated in the rural economy. The impacts are likely to be particularly severe on those involved in self-provisioning and in marginal environments. The direct impacts outside the rural economy will be relatively limited. Impacts on the balance of payments from reduced agricultural production will depend on resource endowment and also import requirements for drought crisis management. In terms of governance, there is a real danger that those in the capital city are insulated from the impacts of the drought, at least in the first instance. However, the effects on the balance of payments and the financing of additional drought response measures will put pressures on government.

Unless there is *good governance*, sensitive to the impacts of the shock on the rural economy, there is a real danger of a drought/famine syndrome. Examples are some Sahelian countries in 1969-74, and again in 1982-84.

Intermediate, more complex economies - the shock is likely to be more widely diffused through the economy. The urban industrial economy is impacted directly and through intersectoral linkages and expenditure multiplier effects. With a more complex financial system, remittances to rural areas may help affected groups to cope with impacts. But, as noted earlier, this also diffuses the effects of the drought more generally throughout lower-income groups in the economy. In terms of *governance*, there will be considerable social pressures to intervene to help affected populations, to limit the effects on urban consumers and to prevent the drought, associated with recession, having severe economy-wide impacts. There will be

strong pressure on domestic finances from both the revenue and expenditure sides. There are likely to be foreign-exchange pressures because of a direct reduction in export revenues and increased food imports.

Dualism implies that the effects of the drought shock are largely contained within the rural sector, even in economies with relatively high GDP per capita. Such countries are also likely to have greater financial capacities to handle the external and probably also the internal effects of the drought shock better than least developed economies. In terms of governance, the *costs* of a socially sensitive drought management policy are relatively lower, for example in Botswana and Namibia, than in either simple or intermediate economies.

The current economic environment is a further consideration. In many African economies a structural adjustment programme (SAP) is being implemented. This is, to borrow Hans Singer's phrase for describing food aid policy, both a challenge and an opportunity. Structural adjustment involves a highly constrained policy framework of objectives and targets within which government is expected to respond to a crisis. However, a SAP implies that donors, together with government, are monitoring closely the economic and financial situation on a short-term basis. The presence of a SAP may also imply that external resources are potentially more readily available to counteract the negative economic consequences of a drought shock.

5.2 Instruments for drought crisis management

The selection of instruments that are available to a donor has to be sensitive to the structure and resource endowments of the recipient economy. The current economic policy environment and broader questions of *governance* also impinge. This latter point may be made by contrasting, for example, the situation in Zambia and Zimbabwe in 1992, in which there were relatively effective governments with a relatively broad mandate, with that of Malawi and Mozambique, where there were problems of ineffective government and conflict-related displaced populations. Alternatively, the situation in Kenya in 1979/80, or again in 1984, is, from the perspective of governance and the confidence that the donors have in government, very different from that in 1992/93. Similarly, in considering dualistic economies, the situation in Botswana and Namibia is potentially very different from that in, for example, Niger. Therefore the selection of instruments will unavoidably take into account an assessment of the capacity and commitment of government to drought crisis management.

The instruments available to the donor include:

- *financial aid* for balance-of-payments and budgetary support. However, for purposes of supporting drought crisis management, a programme of such assistance must be quick-disbursing.

- *programme food aid.* The amounts of commitments to the Food Aid Convention make this a not very substantial instrument for bilateral donors such as the UK or other smaller food aid donors. However, in a European Union or US context, this is a major instrument for balance-of-payments and budgetary support.

- *bilateral project aid.* This includes technical co-operation and funding of local costs and import components.

- *emergency financial aid.* Funding is provided for the direct relief of affected populations through NGOs, the UN, and possibly government agencies.

- *emergency food aid.* This is provided for direct relief, again usually indirectly through NGOs or the UN.

- *advocacy* is a policy instrument for bilateral donors at the level of the EU for European states or more generally the boards of international financial institutions (IFI).

Taking into account the typology and the instruments available, a broad hierarchy of instruments in terms of their effectiveness is indicated.

Intermediate, more complex economies The typology suggests that the provision of *additional financial aid* to provide balance-of-payments and budgetary support should have the highest priority. This aid should also be rapidly disbursing to minimise the negative impacts of the drought shock on government foreign-exchange reserves. Rapid disbursement is also important in minimising additional internal funding requirements. In the context of a structural adjustment programme, flexibility over the use of funds already programmed is important in order to avoid a drop in disbursement. Flexibility in terms of SAP targets may also be required.

Programme food aid, if and only if it can be rapidly programmed and delivered, is nearly as effective as financial assistance. Issues are whether it will be timely, cost-effective or appropriate in terms of providing the type of food that can be readily absorbed in the recipient country market. Where internal budgetary support is intended, then special attention may be required to counterpart funds arrangements.

Bilateral project aid Again, it is essential to sustain the flow of funds, thereby maintaining activities throughout the drought shock. There is scope for 'quick action' projects or accelerated implementation.

Advocacy Bilateral donors can play an important role in the context of international financial institutions and their decisions. An aspect of that influence concerns the country policy framework that may be in place. In turn, strong support by the IFIs may make it easier for the governments of affected countries to access private short-term sources of balance-of-payments finance.

Where there is good governance, there is a lower priority for either emergency food aid or emergency financial aid, both of which are relatively inflexible instruments as they are tied to direct relief. Doubtless there will be scope for NGO activity and special UN programmes. However, emergency aid is costly to deliver and raises all sorts of targeting issues. Nor does such direct aid address the economy-wide aspects of the shock.

Simple, least developed economies The problems here are not entirely dissimilar to those of more complex economies. However, the impacts are likely to be more concentrated in the rural sector and less of a general recessionary nature. Consequently, more targeted interventions are needed. The appropriate response of a donor must also depend strongly on governance. If there is an effective government, in which the donor has confidence, then general support with financial aid or programme food aid may still be an appropriate response.

Targeted emergency aid will be more effective in this context. Where government is less effective or even non-therapeutic, the use of indirect channels may also be more appropriate. Examples appear to have been Malawi and Mozambique in 1992/93. This has been the situation of some of the Sahelian economies and the Horn of Africa since the mid-1980s.

Dualistic economies An important issue is the extent to which those economies with relatively high GDP per capita need assistance on any substantial scale. The governance issue also arises. Botswana, Namibia and also South Africa would appear no longer to need substantial external assistance in response to a drought crisis. However, the appropriate response is far from clear in, for example, the case of Niger.[30]

[30] Apart from a drought shock, similar problems arise in relation to complex emergencies in highly dualised economies such as Liberia and Zaire.

5.3 Support for drought mitigation measures

In supporting mitigation measures in drought-vulnerable countries, the instruments that are most important include:

- project and TC funds;
- SAP and other economic frameworks; and
- more general research-oriented funding.

The study has focused particularly on the impacts of drought shocks and therefore looked more closely at donor responses in that context. Nevertheless, there are many issues concerning appropriate drought mitigation measures that might be considered and these include the following areas.

Understanding of drought processes There is need to encourage links between technical, scientific and social science research. This is the theme of the editorial and contributions to the recent *Development Research Insights* 12 (Clay, 1994).[31]

Early warning systems These have developed on both narrowly technical and also socio-economic aspects of the vulnerability of African economies and societies. Looking at the drought in Southern Africa in 1991/92, where technical systems were relatively good, a number of issues emerged. The full scale of the drought impact only became clear over approximately 4-5 months, between November 1991 and April 1992. The social dimension is especially important in ensuring policy sensitivity to smaller shocks and also for targeting. How EWS are organised will depend very much on issues of governance, as well as differences of economic structure and resource endowments. The situation in the Sahelian countries is, for example, very different from that in the SADC region.

Drought-proofing investments Recent experience would suggest that water systems are an important area of potentially increasing vulnerability. However, appropriate areas for drought-proofing investment depend heavily on natural resource endowments. There is scope for re-examining the existing portfolios of projects.

---

[31] That publication resulted in part from this study and partly from a meeting of the UK Working Group on Drought under the IDNDR. That working group involves researchers from a number of institutions and it would seem desirable that its activities were sustained. The usefulness of further economic modelling might also be considered in the light of the study findings on the importance of differences in economic structure in determining the impact of drought shocks.

For the future, procedures should be put in place for ensuring that risks of drought shock are taken fully into account in project design and appraisal.

System management This issue cannot be disassociated from that of drought-proofing. Again, water resources appear to be a very important area. In this context Winpenny's (1994) work on managing water as an economic resource indicates an important direction for further exploration.

Agricultural impacts of drought This study has focused deliberately on the non-agricultural aspects of drought. In part this was because of a perceived imbalance in previous work. There are, however, serious context-specific issues of importance regarding agriculture including:

- minimum essential foodstocks at a national and decentralised level;
- diversification of crops;
- varietal work; and
- irrigation and water management issues.

Drought-preparedness planning Recent experience (e.g. SADC, 1993) suggests that the following areas are worth noting:

- post-disaster recovery, including seed supply and livestock rehabilitation, is generally poorly handled;
- emergency water-supply interventions are widely ineffective and not properly integrated with health measures;
- credit mechanisms are often not in place to assist affected producers;
- food-for-work (FFW) type activities have an important potential role in highly drought-vulnerable areas and also as part of anti-recessionary measures; and
- drought mitigation should be incorporated into longer-term poverty programmes, including FFW and income and food transfer activities.

Overall, there are many things that can be considered in terms of drought mitigation at different levels:

- national, highly context-specific activities;
- regional issues, including EWS and logistics systems; and

- some Africa-wide issues including, in particular, further work on the understanding of drought processes and their policy implications.

This study has set out only preliminary conclusions, and a more refined agenda will emerge from the discussion and further analysis of these issues.

6. Some Provisional Conclusions

I. Drought shocks have large, but highly differentiated, economy-wide impacts. The likely frequency, scale and character of these impacts depend on the interaction of economic structure and resource endowments, as well as more immediate short-term economic effects.

II. Counter-intuitively, some of the relatively more developed or 'complex' economies, such as Senegal, Zambia and Zimbabwe, may be more vulnerable economically to drought shocks than least developed and more arid countries such as Burkina Faso and Mali, or those receiving media attention basically because of conflict-related emergencies, such as Mozambique and Somalia.

III. For this reason, both strategies to mitigate the impacts of drought in the longer term and effective responses to specific shocks will have to be sensitive to these differences in circumstances. Such policies are likely to be poorly calibrated if they are based on Africa-wide or even more general prescriptions for drought mitigation.

IV. The articulation of strategies for distinct sub-regions finds support in the current state of scientific understanding of climatic variability. The long-run problem of aridification in the Sahel, the quasi-cyclical weather patterns of South-East Africa and the classically random patterns of East Africa are broadly co-terminous with the CILSS, IGADD and SADC regions (although Sudan and Tanzania are arguably from a climatic viewpoint in the wrong region for drought mitigation policy).

V. Economic investment and water-resource management strategies should be formulated on the basis of the best available *longer-term* scientific data. This conclusion is underlined by the example of increasing vulnerability of the Kariba/Zambezi system to extreme climatic conditions from the mid-1980s.

VI. The complexities of economic structure and resource endowment justify closer exploration of the dynamics of highly drought-vulnerable economies through economic models. The objective of modelling would be to inform broader policy with a better understanding of the consequences of economic changes. It is not envisaged that such modelling would be used to fine-tune short-term economic policy.

VII. A more specific weakness in current, or at least recent, policy practice is the failure to take drought shocks into account in formulating medium-term economic strategies, for example in the formulation of structural adjustment programmes.

VIII. *Structural adjustment and drought* The study gives further support to the argument that the formulation of structural adjustment programmes should be sensitive to drought. It is not clear that this implies re-defining medium-term policy goals, so long as these are based on a realistic assessment of the economic environment, and not just on the most favourable assumptions. Rather, it implies that there ought to be some element of preparedness. In designing SAPs thought should be given to what would be required if there were to be a severe drought, or indeed some other major economic shock. This exercise might be based in part on exploring, as we have done, one or more recent shocks.

IX. *Responding to drought in the context of SAP* The cases examined suggest that when a shock occurs some combination of the following responses may be appropriate:

- rephasing of some policy objectives;
- redirection of already committed resources that may be underutilised because of the shock;
- rapid commitment and *disbursement* of additional external resources.

Sustaining SAPs should not oblige a government to finance its drought response in ways that intensify the recessionary effects of the shock on the domestic economy, as in Zimbabwe in 1992/93.

X. *Food security* Whatever the differing economy-wide consequences, in SSA droughts invariably have severe food-security implications. These impacts, including in South Africa, occur at a disaggregated and regional level. With a few exceptions, such as South Africa and Botswana, there are also external resourcing implications of additional food import programmes.

XI. *Modalities of assistance* Economic and relief instruments should not be regarded as separate, more or less autonomous areas of policy action. The appropriate and also the likely balance of actions (which are not necessarily the same) will depend on the country policy environment.

XII. *Monitoring drought shocks at a country level* There are likely to be two overlapping monitoring systems concerned with food security and economic issues. The former would be more useful if information on rainfall and the agricultural and food situation were more regularly integrated into economic monitoring. Similarly those monitoring economic performance should take a closer interest in the interpretation and use of technical and scientific information.

XIII. *Issues not directly addressed in this study* There are a number of important issues which have not been directly addressed in the drought study.

The micro-social aspects of drought are of considerable importance There is a substantial body of continuing research and policy analysis on vulnerable people at the household, community and provincial levels. Policy relevant findings can be expected from work on coping strategies of a context-specific nature also relevant to emergency action and drought mitigation more generally.

The details of public expenditure were not explored in the detail that the authors would have wished. Frankly, the data are not in most cases in the public domain. Even within financial institutions and governments these data are often available on a very restricted basis. The World Bank undertakes country public expenditure reviews only periodically, and for several of the case-study countries there had not been a review in the recent past.

The impacts of drought mediated through intersectoral linkages are complex. These effects could only be addressed superficially without more sophisticated modelling. However, the study has suggested a broader framework within which some of these issues could be explored in more detail at a specific country level.

The study emphasises the importance of resource endowments. However, it has not attempted to look at environmental issues in any detail. It should be noted that there is no evidence of long-run climatic change driven either by global warming or human pressure on resources. Lack of satisfactory explanation for secular aridification in the Sahel is a case in point. However, the actual rainfall patterns in the Sahel and also South-East Africa in the last 15 years do not provide a basis for complacency on this issue.

XIV. *Where do we go from here?* Some of these many issues are to be considered further in the concluding phase of this study which will explore policy issues for national governments and ways in which IFIs and donor agencies could more effectively support both drought crisis management and mitigation measures in SSA. It is hoped that this provisional analysis will provoke others to explore some of these issues at a country level or in a wider context.

References

Benson, C. (1994) 'Drought and Macro-economic Performance: A Comparative Analysis of six sub-Saharan African Economies'. London: Overseas Development Institute (mimeo).

Benson, C. and Clay, E. (1994) 'The Economic Impact of Drought in Zimbabwe, 1980-93: A Quantitative and Qualitative Assessment'. London: Overseas Development Institute (mimeo).

Berg, E. (1975) 'The economic impact of drought and inflation in the Sahel', based on a report, *The Recent Economic Evolution of the Sahel*, prepared by the University of Michigan for AID. University of Michigan: June.

Borsotti, M. (1993) *Drought Relief Programme in Zimbabwe. Critical Considerations on its Implementation: Lessons Learnt and Future Steps*. Harare: UNDP, May.

Borton J. *et al.* (1988) *ODA Emergency Aid to Africa 1983-86*, Evaluation Report EV425. London: Overseas Development Administration.

California Department of Water Resources (1991) *California's Continuing Drought, 1987-91*. Sacramento, CA: California Department of Water Resources.

Chen, M. (1991) *Coping with Seasonality and Drought*. New Delhi: Sage Publications.

Clay, E. (1994) 'Drought in Southern Africa: Shocks and Research', *Development Research Insights* 12. London and Brighton: Overseas Development Institute and Institute of Development Studies, University of Sussex, March.

Collins, C. (1993) 'Famine Defeated. Southern Africa, UN Win Battle Against Drought', *Africa Recovery Briefing Paper* 9. New York: United Nations Department of Public Information, August.

Davies, R. (1992) 'Macroeconomic Aspects of Zimbabwe's "Transition from Socialism" '. Paper presented in the MacArthur Workshop on Development, Security and International Co-operation Seminar on Institutional Perspectives on Third World Development, Center for International Studies, Department of Urban Studies and Planning, Massachusetts Institute of Technology, March 17. Harare: University of Zimbabwe.

Davies, R., Rattsø, J. and Ragnar, T. (1993) 'The Macroeconomics of Zimbabwe in the Eighties - A CGE-Model Approach'. Draft paper presented to the ESRC Development Economics Study Group. Harare: University of Zimbabwe, June.

Davies, S. (1993) 'Versatile Livelihoods: Strategic Adaptation to Food Insecurity in the Malian Sahel'. Brighton: Institute of Development Studies, University of Sussex, February.

Department of Humanitarian Affairs/SADC. (1992) 'Drought Emergency in Southern Africa (DESA). Consolidated UN-SADC Appeal Mid Term Review'. Geneva, December.

Downing, T.E., Gitu, K.W. and Kamau, C.M. (eds) (1987) *Coping with Drought in Kenya : National and Local Strategies.* Boulder, CO: Lynn Rienner Publishers.

Drèze, J. and Sen., A. (1989) *The Political Economy of Hunger.* Oxford: Clarendon Press.

Elbadawi, I., Ghura, D. and Uwujaren, G. (1992) 'Why Structural Adjustment has not Succeeded in Sub-Saharan Africa', *Working Paper Series 1000.* Washington, DC: World Bank, October.

FAO (1978) 'Report on Agro-ecological zones Project'. Vol. 1 of *Methodology and Results for Africa. World Soil Resources Report* 48. Rome.

Glantz, M.H. (ed.) (1987) *Drought and Hunger in Africa: Denying Famine a Future.* Cambridge: Cambridge University Press.

Haggblade, S., Hammer, J. and Hazell, P. (1991) 'Modelling Agricultural Growth Multipliers'. *American Journal of Agricultural Economics*, Vol. 73(2): 361-374, May.

Hicks, D. (1993) *An Evaluation of the Zimbabwe Drought Relief Programme 1992/1993: The Roles of Household Level Response and Decentralised Decision Making.* Harare: World Food Programme, March.

Hulme, M. (1992) 'Rainfall Changes in Africa: 1931-60 to 1961-90', *International Journal of Climatology* 12: 685-699.

Hulme, M. (1993) 'A Note on the Incidence of Drought in sub-Saharan Africa'. Draft paper prepared for the Overseas Development Institute. Norwich: Climatic Research Unit, University of East Anglia, October.

Hulme, M. (1994) 'Rainfall Variability and Drought Risk Analysis in Sub-Saharan Africa'. Draft paper prepared for the Overseas Development Institute. Norwich: Climatic Research Unit, University of East Anglia, May.

Killick, T. and Malik, M. (1991) 'Country Experiences with IMF Programmes in the 1980s'. *ODI Working Paper* 48. London: Overseas Development Institute.

Killick, T. (1993) *The Adaptive Economy: Adjustment Policies in Small, Low Income Countries.* Washington, DC: The World Bank.

Le Houérou, H.N. et al. (1993) 'Agro-bioclimatic classification of Africa'. *Agrometeorology Series Working Paper*, No 6. Rome: FAO.

Pretorius, C.J. and Smal, C.J. (1992) 'Notes on the macro-economic effects of the drought'. *South African Reserve Bank Quarterly Bulletin* No 184, June.

Nowlan, J. and Jackson, B. (1992) 'Drought in Southern Africa'. Version 5. Harare: US Agency for International Development, September.

Purtill, A. Blackhouse, M., Abey, A. and Davenport, S. (1983) 'A Study of the Drought'. Supplement to *Quarterly Review of the Rural Economy 5(1).* Canberra: Bureau of Agricultural Economics.

Robinson, P. (1993) *Economic Effects of the 1992 Drought on the Manufacturing Sector in Zimbabwe.* London: Overseas Development Institute.

SADC (1993) *Drought Management Workshops in Southern Africa.* Report of the Regional Drought Management Workshop, 13-16 September, 1993, Harare.

Seshamani, V. (1993) 'The Role of the International Community in Drought Management in Zambia. From Recent Experience to Future Preparedness',

Annex to Zambia Country Study prepared for SADC Regional Drought Management Workshop, Harare: 13-16 September.

Sheets, H. and Morris, R. (1974) *Disaster in the Desert: Failure of International Relief in West African Drought.* Washington, DC: Carnegie Endowment for International Peace.

Thompson, C. (1993a) 'Drought Emergency in Southern Africa: The Role of International Agencies'. Paper prepared for SADC Regional Drought Management Workshop, 13-16 September, Harare.

Thomson, A. (1994a) *Drought and Market Liberalization in Kenya.* London: Overseas Development Institute.

Thomson, A. (1994b) *The Impact of Drought on Government Expenditure in Namibia in 1992/93.* London: Overseas Development Institute.

Tiffen, M. and Mulele, M.R. (1993) 'The Environmental Impact of the 1991-2 Drought on Zambia'. Report for the IUCN, the World Conservation Union. London: Overseas Development Institute

Tobaiwa, C. (1993) 'Zimbabwe: The Response to the 1992 Drought in the Context of Long-Term Development Objectives'. Paper prepared for SADC Regional Drought Management Workshop, 13-16 September, Harare.

Tyson, P.D. and Dyer, T.G. (1978) 'The predicted above-normal rainfall of the Seventies and the likelihood of droughts in the Eighties in South Africa', *South African Journal of Science* 74: 372-377.

United Nations Development Programme (1994) *Human Development Report.* New York and Oxford: Oxford University Press.

Wilhite, D.A. (ed.) (1993) *Drought Assessment, Management and Planning: Theory and Case Studies.* Boston, MA: Kluwer Academic Publishers.

Winpenny, J. (1994) *Managing Water as an Economic Resource.* London and New York: Routledge.

World Bank (1991a) *Food Security and Slow Onset Disasters in Eastern Africa: Departmental Action Plan.* Washington, DC: Agriculture Operations Department, Eastern Africa, January.

World Bank (1991b) *Food Security and Disasters in Africa: A Framework for Action.* Washington, DC: Africa Technical Department.

World Bank (1991c) 'Report and Recommendation of the President of the International Bank for Reconstruction and Development and the International Development Association to the Executive Directors on a Proposed Loan in an Amount Equivalent to US$125 million and a Proposed Credit in an Amount Equivalent to SDR 35.9 Million to the Republic of Zimbabwe for a Structural Adjustment Program'. Report No. P-5684-ZIM. Washington, DC: December.

World Bank (1993a) 'Report and Recommendation of the President of the International Development Association to the Executive Directors on a Proposed Credit of SDR 88.3 Million to the Republic of Zimbabwe for a Second Structural Adjustment Credit'. Report No. P-6085-ZIM. Washington, DC: December.

World Bank (1993b) *World Development Report 1993.* New York: Oxford University Press.

World Food Programme (1993) 'A Disaster Averted', *World Food Programme Journal* 25: 22-24.
World Food Programme Evaluation (1994) CFA/37/C SCP: 12/6-B 1 February.

Printed by The Chameleon Press Limited, 5-25 Burr Road, London SW18 4SG

60: Explaining Africa's Post-Independence Development Experiences, *Tony Killick*, 1992, £4.00, ISBN 0 85003 177 X*
61: The Informal Financial Sector: How Does It Operate and Who Are the Customers?, *J J Thomas*, 1992, £4.00, ISBN 0 85003 178 8
62: Environmental Change and Dryland Management in Machakos District, Kenya: Institutional Profile, *edited by Mary Tiffen*, 1992, £4.00, ISBN 0 85003 179 6*
63: Environmental Change and Dryland Management in Machakos District, Kenya: Tree Management, *Michael Mortimore*, 1992, £4.00, ISBN 0 85003 180 X*
64: IMF Lending: The Analytical Issues, *Graham Bird*, 1992, £4.00, ISBN 0 85003 182 6
65: The Seed Sector in Developing Countries: A Framework for Performance Analysis, *Elizabeth Cromwell, Esbern Friis-Hansen and Michael Turner*, 1992, £6.00, ISBN 0 85003 183 4
66: The Performance of the Seed Sector in Zimbabwe: An Analysis of the Influence of Organisational Structure, *Esbern Friis-Hansen*, 1992, £4.00, ISBN 0 85003 184 2
67: Political Regimes and Economic Policy Patterns in Developing Countries, 1978–88, *John Healey, Richard Ketley, Mark Robinson*, 1992, £4.00, ISBN 0 85003 185 0
68: The Impact of NGO Poverty Alleviation Projects: Results of the Case Study Evaluations, *Roger Riddell and Mark Robinson*, 1992, £4.00, ISBN 0 85003 1923
69: Continuity and Change in IMF Programme Design, 1982–92, *Tony Killick*, 1992, £4.00, ISBN 0 85003 194 X
70: IMF Lending: The Empirical Evidence, *Graham Bird*, 1993, £4.00, ISBN 0 85003 197 4
71: Issues in the Design of IMF Programmes, *Tony Killick*, 1993, £4.00, ISBN 0 85003 199 0
72: Food Aid Programmes of the European Community and its Member States: A Comparative Statistical Analysis, *Edward Clay and Charlotte Benson*, 1993, £4.00, ISBN 0 85003 200 8
73: Economic Inflexibility in Africa: Evidence and Causes, *Tony Killick*, 1993, £4.00, ISBN 0 85003 205 9
74: The Changing Role of NGOs in the Provision of Relief and Rehabilitation Assistance: Case Study 1 - Afghanistan/Pakistan, *Nigel Nicholds with John Borton*, 1994, £6.00, ISBN 0 85003 206 7
75: The Changing Role of NGOs in the Provision of Relief and Rehabilitation Assistance: Case Study 2 - Cambodia/Thailand, *Charlotte Benson*, 1993, £6.00, ISBN 0 85003 207 5
76: The Changing Role of NGOs in the Provision of Relief and Rehabilitation Assistance: Case Study 3 - Northern Ethiopia/Eritrea, *John Borton*, 1994, £6.00, ISBN 0 85003 210 5
77: The Impact of Drought on Sub-Saharan African Economies: A Preliminary Examination, *Charlotte Benson and Edward Clay*, 1994, £6.00, ISBN 0 85003 212 1

* *currently out of print*

Overseas Development Institute
Regent's College
Inner Circle
Regent's Park
London NW1 4NS
UK

Telephone: +44 (0)171 487 7413
Fax: +44 (0)171 487 7590
Telex: 94082191 ODIUK G
odi @ gn.apc.org (Internet)

£6.00