

drought-exposed populations if we are to be able to meaningfully address the question of whether Africa can be free from the consequences of recurring climate shocks.

1.0 Introduction

This section introduces the complex interaction between drought and development and highlights the fact that in chronically drought impacted countries in Africa drought risk must be seen as a central development concern and therefore mainstreamed into the national planning processes. Furthermore it draws on an important new study to demonstrate that there is no direct relationship between drought exposure and drought impact. This is because climate risk is mediated through complex socio-economic pathways which can either dampen or even exaggerate the effect of natural hazard such as drought. The policy implication of this are explored over the rest of the paper.

1.1 Drought can reverse national development gains

The impact of drought and climatic variability in both economic and mortality terms is generally larger for relatively simple, predominantly agricultural economies (e.g. Malawi or Mozambique). In the case of 'intermediate' economies (e.g. Zimbabwe) the impacts are better absorbed by a more complex and diversified economy (as in South Africa). Drought impact is mitigated in dualistic mineral exporting economies (e.g. Botswana, Namibia, and Zambia before the rapid decline in its copper industry during the 1980s) (Clay *et al* 2003) because these sectors are de-linked from other sectors of the economy and afford the opportunity of subsidizing the rainfall-dependent component of the economy. In many countries the frequency, duration and severity of drought can impact GDP and even threaten to reverse many apparently unrelated investments in national development. Drought in a simple or intermediate economy will have a particularly significant impact on the economy both directly and through knock-on effects to industries which add value to and export weather-dependent production. For example in Zimbabwe the drought of 1990/1991 resulted in a 45% drop in agricultural production but also a 62% decline in the value of the stock market, a 9% drop in manufacturing output and an 11% drop in the GDP (USAID-OFDA 1998). Similarly, in Kenya, the drought of 1999-2001 cost the economy some 2.5 billion dollars. As a proportion of the national economy this is a very significant loss and can best be thought of as 2.5 billion dollars of foregone development, for example, hospitals and schools not built.

1.2 UNDP finds drought to be the most important natural hazard in-terms of human mortality

Disasters affect a wide range socio-economic development and the range of stakeholders is broad. Every year disasters affect millions of people, cause economic losses of tens of billions of dollar, and kill tens of thousands of people (UN-ISDR 2003). The impacts are much greater for the poor, in terms of death rates, shattered livelihoods, starvation, and sometimes diseases. The economic impacts of disasters are a serious handicap to the economic development of many less developed countries, with losses sometimes equal to several years of national growth gains (UN-ISDR 2003).

The recent and influential inter-agency publication *Poverty and Climate Change* (ADB *et al.* 2004) highlights the fact that, in spite of all the science of climate modeling at our disposal, the only way we can really get an idea of how human societies might adapt to climate change is to analyze the experience of populations who have had to cope with climate uncertainty. This is principally in drylands areas and specifically the way they have adapted to the constant threat of drought. But

as much as we can learn from these adapt-or-perish socio-ecological systems, as much as these systems are a resource for policy options for adaptation, drought is not just a weather or climate issue. In many countries the frequency, duration and severity of drought can impact GDP and even threaten to reverse many apparently unrelated investments in national development.

UNDP-BCPR has recently launched the report *Reducing Disaster Risk Report: A Challenge for Development* (BCPR 2004), which is the first attempt to compare exposure to and effects from natural hazards worldwide. This analysis found that the single most significant natural hazard worldwide in terms of human mortality is drought. Furthermore, the impact index (human mortality) greatly underestimates the effects of drought, which are insidious due to their 'creeping' nature. Human mortality is simply the end state of this process. Seven out of the ten most vulnerable countries according to this index are in Sub-Saharan Africa (Somalia, Sudan, Ethiopia, Uganda, Chad, Mauritania and Mozambique) (Figure 1). These same countries have also suffered from either armed conflicts or political instability during the study period (1980-2000), which typically translates drought exposure into loss of human life by rendering households more vulnerable to the potential impacts of drought.

When discussing drought impacts it is important to note that policy choices in one country may have transboundary impacts. For example, the combination of drought and civil unrest in Sudan and Somalia has resulted in some 126,000 refugees in camps living on international support in Ethiopia, itself a drought-affected country; similarly some 110,000 Sudanese have recently fled to Chad, again a drought affected country.

While drought is often associated in peoples' minds with Africa because of the devastating Sahelian and Ethiopian droughts, it is in fact is a universal disaster. Asia has the greatest number of people affected by drought triggered disasters (Figure 2) Some 12,000,000 Afghans have been exposed to drought over the past several years, (UNDP-RBAP 2003) a situation clearly exacerbated by conflict. In China over the same period 22.6 million persons had inadequate drinking water due to drought (State Flood and Drought Relief Headquarters). In India approximately 130,000,000 people (15% of the population) have been exposed to drought over the past two years (UNDP-RBAP 2003). In Africa about 50 million people are affected by drought disasters in the early 1970's, 1980's, the beginning of the 1990's and in 2001.

1.3 **Drought and food security**

Drought and food insecurity go hand in hand, and much chronic and acute hunger in the world is associated with highly variable rainfall, with hunger peaking in times of drought. However, the common interpretation that drought causes food shortage is simplistic and ignores most of the important dynamics of rural economies that are associated with hunger. Extreme poverty accounts for half of the variability in malnutrition rates in across-country regression analyses. Smith and Haddad (2002) found that a rise of \$1,020 in per capita income across a number of countries was associated with a 7.4% reduction in child mortality. Thus, food security improves with income in the same way as the ability to cope with drought. Richer societies have more ways of securing livelihoods and those options translate into resilience. The availability of food on the market is obviously correlated with food security, but the relationship is not absolute, and many other factors act to determine whether an individual can buy the food and can prepare it, eat it and utilize it efficiently. Between 1970 and 1995 increased food availability accounted for only about one quarter of the global reduction in child malnutrition (Smith and Haddad, 2000). Food production is necessary to eliminate food insecurity, but it is seldom sufficient. For example, there are more hungry children in countries that have a surplus of cereals than in countries that have a deficit (Scherr, 2003). Almost one tenth of the world's hungry live in India, which maintains a large wheat surplus from year to year.

Drought can be a major determinant of food security. It can lead to crop loss, which has an immediate effect on smallholder agricultural households, but its effects are often indirectly felt, for example when the market price of food increases as it becomes more scarce. Food production is a major engine of the rural economy in poor countries, and drought will always have a widespread effect. People who depend upon income from farm work, food processing or food transport and marketing all lose income when food production is affected by drought. However, a drought-resilient society will also be a hunger-resilient society, as the same social and physical determinants are associated both with food security and drought resilience. The fact that hunger is a function of people's abilities to cope with external shocks, including drought, has been recognized by the major relief agencies. Both food security and drought resilience result from a complex set of interacting physical and societal traits and food security policy needs to be informed by knowledge of these interactions, not by linear models that imply an absolute certainty of drought leading to food insecurity. In one country drought may cause major human suffering and even death, whilst in another – as we shall see – a drought of a similar severity only has an economic impact. So how can we explain this and what are the implications for managing drought risk?

1.4

Economic development buys options for drought management

While most of the fatalities from drought and related disasters are experienced in the developing countries, developed countries record most of the economic losses; for example the drought of 1988 in the US caused an estimated damage of forty billion dollars due to direct and knock-on effects (Wilhite 1993). The size of the US economy is sufficient to absorb this shock, but what of many less developed countries? The UNDP study found that there was no direct correlation between drought exposure and human mortality (Figure 2) because the effects of a natural hazard are mediated through a socio-economic system which either attenuates or exacerbates the natural effects. For example in Indonesia, which has the same drought exposure as Australia, some 25,000 deaths per year are attributed to drought, whereas in the latter there were none. Clearly, ***the interrelated themes of governance, participation and growth collectively mediate impacts*** which point to the prospects for improved adaptation to climate uncertainty through appropriate development policies.

Furthermore, the study found that even countries in the same drought exposure class with similar GNP's had very different impacts. Nevertheless, there is a very strong correlation between *per capita* GNP and drought impact (as can be deduced from Figure 2). To be simplistic, the solution is development, but clearly there are many possible patterns of development, some of which may actually increase vulnerability. For example, rural populations drawn to a city may exchange drought vulnerability for even greater vulnerability in the form of exposure to crime, air pollution *etc.* Therefore policy makers must reflect carefully on the distribution of costs and benefits of various pathways to development, which is an inherently but often silent political issue.

Ideally national development policies should be informed by an understanding of policy options, the situations in which they are promising, and a determination of whether a particular policy increases or decreases vulnerability to climate risk and for whom. It is precisely this sort of integrated, sophisticated but practical policy support which UNDP hopes to provide together with various partners, in particular through a multi-facet programme of support to UNDP Country Offices and their national policy counterparts.

In short, in spite of the many methodological shortfalls, the UNDP study is an important step towards comparability of vulnerability and powerfully highlights how national economies can serve as a buffer to the potential impacts of natural hazards such as drought. Furthermore it demonstrates that even countries with similar *per capita* GNP's can experience very different

impacts when subjected to the same drought exposure, implying different levels of effectiveness in managing disaster risk.

Figure 1
Physical exposure to drought, 1980-2000

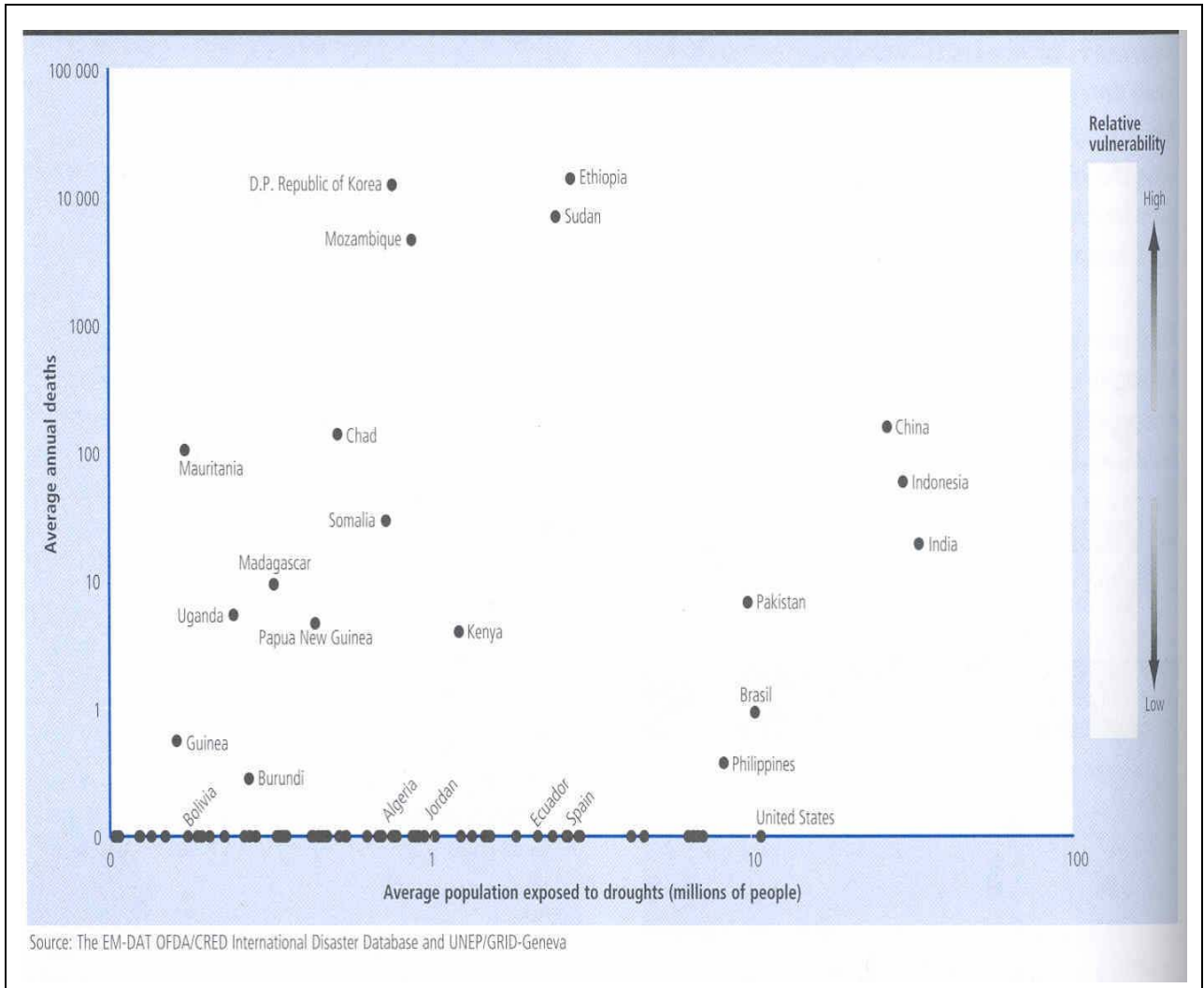
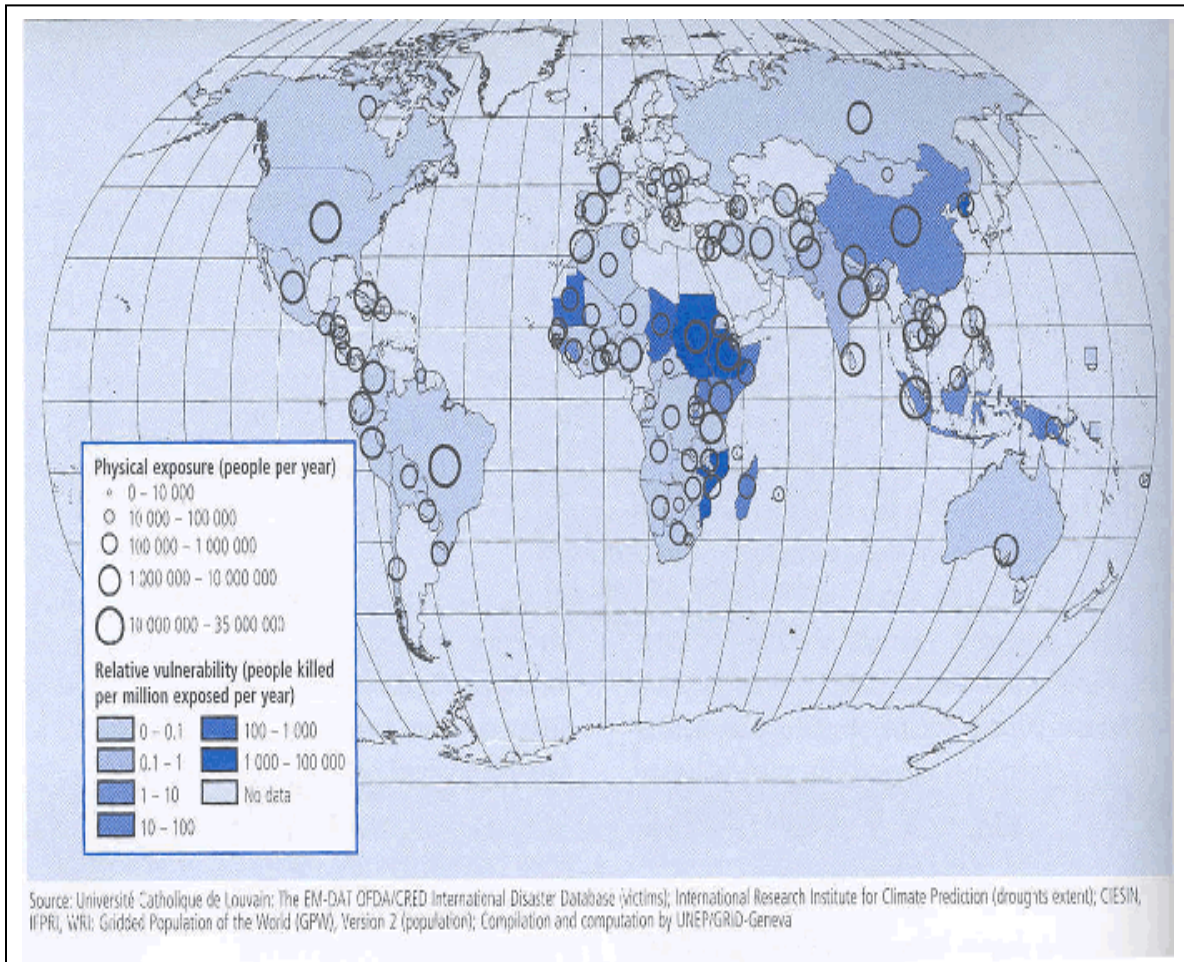


Figure 2
Physical exposure and relative vulnerability to drought, 1980-2000



2.0 The way we think about drought risk affects the way we manage it

Different groups have different perceptions, tolerances and capacities to manage various types of risk. Similarly, drought affects different groups in diverse ways, for example pastoralists as opposed to farmers living in drylands. This section explores how human societies adapt well or poorly to drought, which may be a function of an inadequate understanding of drought and/or inappropriate policy. This is illustrated by examples from North America and the Sahel region of Africa. Finally, drought is examined as a situation-specific management challenge and various types or conceptions of drought identified and the environment implications examined.