IMPACT OF DROUGHT ON LAND DEGRADATION / SOIL EROSION

Drought: the Concept

Drought is a normal recurring feature of climate; it occurs in virtually all-climatic regimes (Wilhite 1992a). It occurs in high as well as low rainfall areas. It is a temporary aberration, in contrast to aridity, which is a permanent feature of climate and is restricted to low rainfall areas. Drought is the consequence of a natural reduction in the amount of precipitation received over an extended period of time, usually a season or more in length, although other climatic factors (such as high temperatures, high winds, and low relative humidity) are often associated with it in many regions of the world and can significantly aggravate the severity of the event. Drought is also related to the timing (i.e., principal season of occurrence, delays in the start of the rainy season, occurrence of rains in relation to principal crop growth stages) and the effectiveness of the rains (i.e., rainfall intensity, number of rainfall events). Thus, each drought year is unique in its climatic characteristics and impacts.

Drought differs from other natural hazards in several ways. First, since the effects of drought often accumulate slowly over a considerable period of time and may linger for years after the termination of the event, the onset and end of drought is difficult to determine. Because of this, drought is often referred to as a creeping phenomenon (Tannehill 1947). Although Tannehill first used this terminology more than fifty years ago, climatologists continue to struggle with recognizing the onset of drought and scientists and policy makers continue to debate the basis (i.e., criteria) for declaring an end to a drought.

Second, the absence of a precise and universally accepted definition of drought adds to the confusion about whether or not a drought really exists and, if it does, its degree of severity. Realistically, definitions of drought must be region and application (or impact) specific. This is one explanation for the scores of definitions that have been developed. Wilhite and Glantz (1985) analyzed more than 150 definitions in their classification study, and many more exist. Although the definitions are numerous, many do not adequately define drought in meaningful terms for scientists and policy makers. The thresholds for declaring drought are arbitrary in most cases (i.e., they are not linked to specific impacts in key economic sectors). These types of problems are the result of a misunderstanding of the concept by those formulating definitions and the lack of consideration given to how scientists or disciplines will eventually need to apply the definition in actual drought

situations (e.g., assessments of impacts in multiple economic sectors, drought declarations or revocation for eligibility to relief programs).

Third, drought impacts are nonstructural, in contrast to the impacts of floods, hurricanes, and most other natural hazards. Its impacts are spread over a larger geographical area than are damages that result from other natural hazards. For these reasons, the quantification of impacts and the provision of disaster relief are far more difficult tasks for drought than they are for other natural hazards. Emergency managers, for example, are more accustomed to dealing with impacts that are structural and localized, responding to these events by restoring communication and transportation channels, providing emergency medical supplies, ensuring safe drinking water, and so forth. These characteristics of drought have hindered the development of accurate, reliable, and timely estimates of severity and impacts and, ultimately, the formulation of drought contingency plans by most governments.

Drought severity is dependent not only on the duration, intensity, and spatial extent of a specific drought episode, but also on the demands made by human activities and vegetation on a region's water supplies. The characteristics of drought, along with its far-reaching impacts, make its effects on society, economy, and the environment difficult to identify and quantify. This continues to represent a formidable challenge to those scientists involved in operational climate assessments.

Many persons consider drought to be a natural event. In reality, the risk associated with drought for any region is a product of both the region's exposure to the event (i.e., probability of occurrence at various severity levels) and the vulnerability of society to the event. The natural event (i.e., meteorological drought) is a result of the occurrence of persistent large-scale disruptions or anomalies in the global circulation pattern of the atmosphere. Exposure to drought varies spatially and there is little, if anything, that we can do to alter drought occurrences. Vulnerability on the other hand is, is determine by social factors such as population, demographic characteristics, technology, policy, social behaviour, land use patterns, water use, economic development, diversity of economic base, and cultural composition. These factors change over time, so vulnerability will change in response to these changes. Subsequent droughts in the same region will have different effects, even if they are identical in intensity, duration, and spatial characteristics, because societal characteristics will have changed. However, much can be done to lessen societal vulnerability to drought. Improved understanding of a region's drought climatology will provide critical information on the frequency and the intensity of historical events. Identifying the factors that explain who and what is at risk and why (i.e., the underlying factors behind the vulnerability) can

lead to the development and implementation of a wide variety of mitigation actions and programs to reduce impacts from future drought events.

Land Degradation / Soil Erosion

Degradation of land means the loss of some or all of its productive capacity as result of human activity.

Soil erosion has been occurring for millions of years. However, accelerated erosion is a much more recent phenomenon. It is always as a result of mankind's unwise actions, such as overgrazing or unsuitable cultivation practices, which leave the land vulnerable during times of erosive rainfall or windstorms.

Soil erosion occurs both incrementally as a result of many small rainfall events, and more dramatically, as a result of large but relatively rare storms. Dramatic erosion events can produce large gullies and create flooding and property damage, which may hit the news headlines. By contrast, erosion due to small, common events may appear insignificant on the field but its cumulative impact can be equally severe. Erosions most serious impact may well be its threat to the sustainability of agricultural productivity, which result from on-site damage, which it causes. Crops are particularly reliant on the upper horizons of the soil, which are the most vulnerable to erosion by water and wind.

Soil erosion/land degradation is enhanced during periods of drought consequent upon the drying out of topsoil and effective loss of soil structure and aggregation. In this condition, topsoil is easily blown away as a result of the erodibility of the soil and the erosive nature of wind and rainfall.

References: ***Early Warning Systems for Drought Preparedness and Drought Management. AGM-2 WMO/TD No 1037***