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Lecture No. 5

Drought and its classification



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4.1 Introduction

- Low rainfall or failure of monsoon rain is a recurring feature in India. This has been responsible for droughts and famines.
- The word drought = Scarcity of water in a region.
- Though, **aridity** and drought are due to insufficient water, aridity is a **permanent** climatic feature and is the culmination of a number of long term processes.
- However, **drought** is a **temporary condition** that occurs for a short period due to deficient precipitation for vegetation, river flow, water supply and human consumption.



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Aridity Vs. Drought

Particulars	Aridity	Drought
Duration	Permanent feature	Temporary condition of scarcity of varying duration
Factors	Culmination of many long term processes , considers all climatic features	Caused by deficient rainfall
Aspect described	Description of Climate	Description of Water availability



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4.2 Definition of drought

- There is no universally accepted definition for drought.
 - a) Early workers defined drought as prolonged period without rainfall.
 - b) According to **Ramdas** (1960) drought is a situation when the actual seasonal rainfall is deficient by more than twice the mean deviation.
 - c) **American Meteorological Society** defined drought as a period of abnormally dry weather sufficiently prolonged for lack of water to cause a severe hydrological imbalance in the area affected.



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- d) Prolonged deficiencies of soil moisture adversely affect crop growth indicating incidence of **agricultural drought**. It is the result of imbalance between soil moisture and evapo-transpiration needs of an area over a fairly long period so as to cause damage to standing crops and to reduce the yields.
- e) The **irrigation commission** of India defines drought as a situation occurring in any area where the annual rainfall is less than 75% of normal rainfall.



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4.3 Classification of drought

Drought can be classified based on duration, nature of users, time of occurrence and using some specific terms.

4.3.1 Based on duration

- **Permanent drought:** This is characteristic of the desert climate where sparse vegetation growing is adapted to drought and agriculture is possible only by irrigation during entire crop season.
- **Seasonal drought:** This is found in climates with well defined rainy and dry seasons. Most of the arid and semiarid zones fall in this category. Duration of the crop varieties and planting dates should be such that the growing season should fall within rainy season.



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Contingent drought:

This involves an **abnormal failure** of rainfall. It may occur almost anywhere especially in most parts of humid or sub humid climates. It is usually brief, irregular and generally affects only a small area.

Invisible drought:

This can occur even when there is frequent rain in an area. When rainfall is **inadequate** to meet the **evapo-transpiration losses**, the result is borderline water deficiency in soil resulting in less than optimum yield. This occurs usually in humid regions.



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4.3.2 Based on relevance to the users (National Commission on Agriculture, 1976)

Meteorological drought: It is defined as a condition, where the annual precipitation is less than the normal over an area for prolonged period (month, season or year).

Atmospheric drought: It is due to low air humidity, frequently accompanied by hot dry winds. It may occur even under conditions of adequate available soil moisture. It refers to a condition when plants show wilting symptoms during the hot part of the day when transpiration exceeds absorption temporarily for a short period. When absorption keeps pace with transpiration the plants revive. (Mid day wilt).



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- **Hydrological drought** Prolonged Meteorological drought results in hydrological drought with depletion of surface water and consequent drying of reservoirs, tanks etc. It results in deficiency of water for all sectors using water. This is based on water balance and how it affects irrigation as a whole for bringing crops to maturity.
- **Agricultural drought (soil drought):** It is the result of soil moisture stress due to imbalance between available soil moisture and evapo transpiration of a crop. It is usually gradual and progressive. Plants can therefore, adjust at least partly, to the increased soil moisture stress. This situation arises as a consequence of scanty precipitation or its uneven distribution both in space and time.



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Relevant definition of agricultural drought appears to be a period of dryness during the crop season, sufficiently prolonged to adversely affect the yield. The extent of yield loss depends on the crop growth stage and the degree of stress. It does not begin when the rain ceases, but actually commences only when the plant roots are not able to obtain the soil moisture rapidly enough to replace evapo- transpiration losses.



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4.3.3 Based on time of occurrence

Early season drought: It occurs due to delay in onset of monsoon or due to long dry spells after early sowing.

Mid season drought: Occurs due to long gaps between two successive rains and stored moisture becoming insufficient during the long dry spell.

Late season drought: Occurs due to early cessation of rainfall and crop water stress at maturity stage.



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4.3.4. Other terms to describe drought

- **Relative drought:** The drought for one crop may not be a drought situation for another crop. This is due to mismatch between soil moisture condition and crop selection. For Eg. A condition may be a drought situation for growing rice, but the same situation may not be a drought for growing groundnut.
- **Physiological drought:** Refers to a condition where crops are unable to absorb water from soil even when water is available, due to the high osmotic pressure of soil solution due to increased soil concentration, as in saline and alkaline soils. It is not due to deficit of water supply.



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Important causes for agricultural drought are:

- Inadequate precipitation
- Erratic distribution
- Long dry spells in the monsoon
- Late onset of monsoon
- Early withdrawal of monsoon
- Lack of proper soil and crop management



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THANK YOU