Indian Farming 64(5): 2–5, 19; August 2014

Strategies for Drought Management

in rain deficit conditions

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INDIA is principally an agricultural country. Agriculture is the backbone of our socio-economic system. It not only provides food and raw material but also employment opportunities to a very large proportion of the population. About 70 per cent of our population is directly engaged in agriculture. In 2012-13, the contribution of agriculture and allied sectors in India's GDP is 13.7 per cent. In the past two decades, Indian agriculture has undergone rapid transformation. The policy of globalization and liberalization has opened up new avenues for agricultural modernization. This has not only lead to commercialization and diversification, but also triggered various technological and institutional innovations owing to investments from corporate entities. There was time when India was a net importing country for foodgrains. In 2011-12, India achieved a target of food grain production of 250 million tonnes. The consistent growth in food production has helped India to become self reliant in foodgrain.

Sometimes, it has also been observed that the delay in monsoon influence the sowing of the crops badly which results in decline in productivity particularly for rice and *kharif* crops. Uncertain monsoon not only becomes a cause of worry for the farmers but also keeps the managers, planners and agriculturists in a precarious situation. The Indian Meteorological Department (IMD) is the agency which is responsible to supply and disseminate the short range, medium range and long range forecasts in our country. But, over the years a wide gap between the real and predicted values has been noticed.

Drought: a precarious situation for farmers. Source: http://www.thehindubusinessline.com

Good monsoon is the key for Indian agriculture. South-west monsoon rainfall is one of the important meteorological events for India. A normal rainfall stabilizes the growth and development of the county. In India, about 60% of the total cultivated area is rainfed, supporting 40% of the India's food demand of 1.2 billion people. Rainfed area also supports 60% of livestock population, likewise 87.5% coarse cereals, 87% pulses, 77% oilseeds and 65% cotton are predominantly grown in rainfed areas. Deficit in monsoon impacts the supply of many economic goods, such as foodgrains, water, forage, fish, and hydro-electric power. Drought is one of the major threats among natural hazards to people's livelihoods and socio-economic development. Since few decades, it has been observed that the uncertainty in monsoon has become a regular feature. For some years, there has been a timely reached monsoon but it lost its strength during mid season which affects the productivity of the crops..

Classification of Drought

A broad definition of drought is a deficiency of precipitation over an extended period of time, usually a season or more, which results in a water shortage for some activity, group, or environmental sectors. However, in terms of typologies, droughts are classified as meteorological, agricultural, hydrological, and socio-economic.

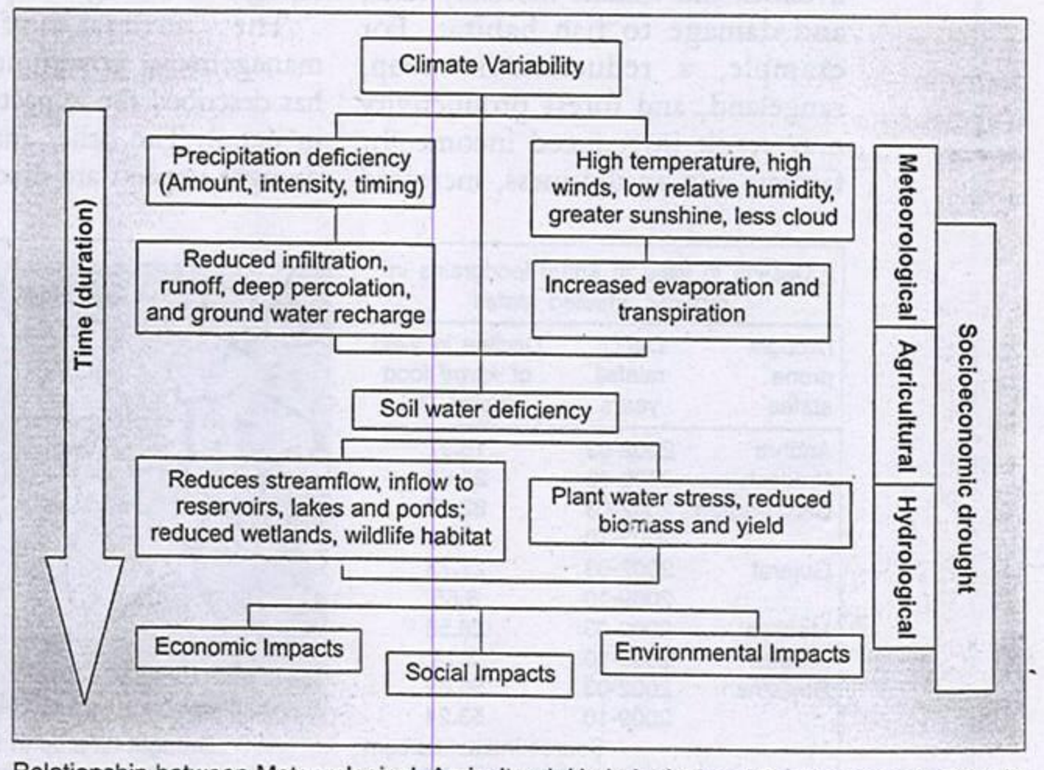
Meteorological drought is usually defined by a precipitation deficiency over a pre-determined period of time. The thresholds chosen, such as 50 percent of normal precipitation over a six-month time period will vary by location according to user needs or applications.

Agricultural drought is defined more commonly by the lack of availability of soil water to support crop and forage growth than by the departure of normal precipitation over some specified period of time. The relationship between precipitation and infiltration of precipitation into the soil is often not direct. Infiltration rates vary depending on antecedent moisture conditions, slope, soil type, and the intensity of the precipitation event. Soil characteristics also differ, for example, some soils have a higher water-holding capacity, which makes them less vulnerable to drought.

Hydrological drought is normally defined by deficiencies in surface and subsurface water supplies relative to average conditions at various points in time through the seasons. Like agricultural drought, there is no direct relationship between precipitation amounts and the status of surface and subsurface water supplies in lakes, reservoirs, aquifers, and streams because these hydrological system components are used for multiple and competing purposes, such as irrigation, recreation, tourism, flood control, transportation, hydroelectric power production, domestic water supply, protection of endangered species, and environmental and ecosystem management. There is also a considerable time lag between departures of precipitation and the point at which these deficiencies become evident in surface and subsurface components of the hydrologic system.

Socio-economic drought differs markedly from the other types of drought because it reflects the relationship between the supply and demand for some commodity or economic good (such as water, livestock forage, or hydroelectric power) that is dependent on precipitation/water availability. Supply varies annually as a function of precipitation. Demand also fluctuates and is often associated with a positive trend as a result of increasing population, development and other factors, the relationship between these types of drought is as given in the illustration.

The direct linkage between the main types of drought and precipitation deficiencies is reduced over time because water availability in surface and subsurface systems is affected by how these systems are managed. Changes in the management of these water supplies can either reduce or aggravate the effects of drought. Drought does not automatically lead to a disaster. Disaster only occurs when there is a serious disruption of the functioning of a community or a society, which involves widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.



Relationship between Meteorological, Agricultural, Hydrological and Socio-economic drought

Drought in India

Meteorologically, India is divided into 36 Sub-Divisions. For the purpose of agricultural planning and development, the country is divided into 127 agro climatic zones depending on the temperature, quantum of rainfall, soil and cropping pattern. Drought is a normal recurrent feature of Indian climate and is usually characterized in terms of its spatial extension, intensity and duration. Unlike other natural disasters, it has a slow onset but grows in intensity with devastating effect. The key drought indicators are rainfall, water storage levels in reservoirs, surface and groundwater levels, sowing and crop conditions. The South-west monsoon Season (June – September) is the main rainy season in India, when about 73% of the country's annual rainfall is realized. Hence, the failure of SW monsoon manifests as drought. Around 68% of the land area in India is prone to drought of varying degrees.

The impact of drought on Agriculture

Drought produces a large number of impacts that affects economical, environmental and social standard of