Seasonal Forecasting Techniques

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Seasonal Forecasting

An Attempt to Provide useful Information about the "Climate" that can be expected in the coming season.
Pakistan is situated in a region which is more prone to climate changes.

Where both summer and winter rainfalls occur.

Useful if predicted well in time.

Issuing of timely accurate forecast of seasonal rainfall might be more useful.

Harmful / useless if not predicted timely.
Importance of Seasonal Forecasts

- Agriculture in Pakistan is highly dependant on seasonal weather. Any abnormalities in the weather during the season, such as: delay in the outbreak of rains, untimely or excessive rains, droughts, or spells of too-high or too-low temperatures, would very seriously affect the growth and final yield of the crops.

- Seasonal forecasting is also useful for various purposes i.e. shipping, fisheries, flood forecasting, Disaster Management & Risk Reduction etc.
Modern Seasonal Forecasting Techniques

- Traditional synoptic weather forecasting
- Numerical weather prediction
- Statistical methods
- Various Short range & Long range forecasting techniques.
Technical Advances in Seasonal Forecasting

Many technical advances have been made to improve seasonal forecast accuracy.

- Models for Sea Surface Temperatures are available from different Climate Centers.
- Models of upper Air Winds are available from different climate centers.
- Models of Surface & Atmospheric Pressure, Temperatures, Winds, Relative humidity and other Meteorological Elements are available on Regional & Global Level.
- These can be used for assessing Medium Range / Seasonal conditions of Atmosphere.
Summer Season

The duration of summer season in Pakistan is about six months with two major seasons:

**Pre-Monsoon (April-June)**

Pre monsoon season is a transition period from the winter circulation to the monsoon circulation in the region. During the season, westerly waves shift northwards and relatively the frequency of western disturbances become less. It remains active over the northern parts of the region with the decreasing frequency of occurrence as compared to the peak winter months.

**Monsoon (July – September)**

Pakistan is situated in Asian monsoon zone and usually receives monsoon rainfall during the months of July, August and September. These rains are ignited by the winds originating from Bay of Bengal.

In case of heavy monsoon season, floods are the outcome. If monsoon fails to deliver sufficient precipitation, then drought conditions prevail over most parts of the country in the subsequent months/season.
Tracks of Summer (Monsoon) Weather Systems

Monsoonal Zone

Monsoon
South Pacific ENSO conditions.

Intensity and location, of seasonal low pressure.

Position and Intensity of 200 mb Jet Stream.

Mascarene High Pressure System / Low level Jet.

Rainfall / Thunderstorm of China, Indonesia and Malaysia etc.

( Release of latent heat over Monsoon area)

Himalayan snow cover.

North Atlantic Oscillation (Northern parts of Pakistan)
**Winter Season**

The duration of winter season in Pakistan is about five months:

**Winter season (November - March)**

During winter months, the western and northern parts of the country experience cloudiness and rainfall / snowfall in association with weather systems commonly known as “Western Disturbance”. It is one of the most important weather systems that can cause adverse weather conditions over the region. It usually originates over the Mediterranean Sea / Black Sea as an extra-tropical frontal system, but its frontal characteristics are lost while moving eastward to Pakistan across Iran / Afghanistan. However, even then an intense Western Disturbance is capable of producing wide spread heavy rainfall / snowfall over northern half of the country due to supply of moisture from the Arabian Sea.
Tracks of Winter Weather Systems

Westerly Wave
(Mid Latitude Weather Systems)
Prepared on the Basis of Various Global Climate Factors

- Arabian Ocean Sea Surface Temperatures.
- North Atlantic Oscillation (NAO)
- Upper Air Jet Stream (200 mb)
- Middle Eastern Surface Wind Analysis.
Seasonal Agro - Meteorological Forecast
AGRO-METEOROLOGY

- The study and application of relationships between Meteorology and Agriculture, involving problems such as timing the planting of crops.

- Agro-Meteorology is a branch of applied Meteorology that deals with weather and climate in their relation to Agriculture.
AGO-MET RESEARCH FOCUS

- To study the relationship between weather, climate and Crops, Vegetation Dynamics
- To study and develop the operational technology and software systems for Agro-meteorological Information Services
- To Study Climatic Change Impacts on current & future Agriculture System of Pakistan.
Agro - Meteorology for Crops

- For Wheat Crop
- For Cotton Crop
- For Sugar Cane
- For Tobacco

These advisories are communicated to Formers through Radio / Weekly Bulletin
AGRO-MET OBSERVATION DATA

- Meteorological Elements
- Crop Growth and Development status
- Soil Water Content (Soil Moisture)
- Agro Meteorological Disaster (Drought / Floods / Water Logging)
Three Tier AGRO-Met Advisory System

- **District Agro-Met Advisories Bulletins:**
  Issued by AMFUs & contains crop specific advisories for a given district

- **State Level Composite AAS Bulletins:**
  Issued by State Meteorological Centre & contains district wise advisories

- **National Agro-Met. Advisory Bulletins:**
  Issued by National Agro-Met Advisory Service Centre, PMD & contains state wise advisories
Agro Meteorological Advisory Service

PMD
PREPARATION OF LOCATION SPECIFIC FORECAST

AAS UNITS
(PARC Institutes)
PREPARATION OF AGROMET ADVISORY BULLETIN

Internet Fax Phone

AIR T.V PRINT

PERSONAL CONTACT

FARMER

Feedback From AAS Unit
Farmer’s Feedback

From AAS Unit
Normalized Differential Vegetation Index of Pakistan

Legend
- Non vegetated area
- Bare Soil
- Fodder Crop
- Rice
- Forest

Developed By:
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RS & GIS Section
Research and Development Division
Pakistan Meteorological Department
End Users

- National Highway Authorities (NHA)
- Disaster Management Authorities (PDMA & NDMA)
- Water & Power Development Authority (WAPDA)
- Irrigation Departments
- Pakistan Agriculture Research Council, Institutes (PARC)
- Health Departments
- NGOs & INGO working for communities
- Provincial Agro-Meteorological Units
- Public through Media (Newspaper, Radio & TV Special Programs)
For more Information Please Visit our Web Site
http://www.pmd.gov.pk
Thank You!