

conventional methods of hydrological analysis. Cross-references are made at appropriate points and over-all results have been collated in summary statements.

General Features of the Hydrological Regime⁽¹⁾

The Indus Valley is a vast depression filled with alluvium. It is bounded on the north by the Himalayas, on the northwest by the Kirthar and Sulaiman Ranges and on the east and south by the Thar Desert and the Rann of Cutch.

The climate of the Indus Plain is subtropical-arid in most regions, but in its extreme northern portion the climate may be classified as subtropical-semi-humid. Temperatures vary typically from 80 to 115 degrees Fahrenheit in the summer, to less than 50 degrees Fahrenheit in the winter, with frosts not uncommon although prolonged sub-zero periods are rare.

Practically all the Plain receives less than 15 inches of rain per year. About a fifth of the area receives less than 5 inches. In over half of the Plain, the rainfall is so low and sporadic that it is of almost negligible value as an adjunct to water supply for irrigation. In the extreme northern sector, rainfall supplies a substantial part of the total water, ranging from 18 to 24 inches per year. The average annual amount of effective rain for crops is about five inches in the Former Punjab and Bahawalpur.

Most of the rainfall occurs during the summer months; during the spring and fall, precipitation may be virtually zero. West Pakistan lies at the western edge of the Indian Ocean monsoon belt, and the intensity of monsoon rainfall varies greatly from year to year depending on the prevailing meteorological pattern.

The Indus River and its five famed tributaries of the Punjab arise from sources in the Himalaya Mountains and meander in wide shallow channels through a vast flat plain, which has an area of nearly 80,000 square miles. The river waters are derived from the monsoon rains and from snowmelt in the northern mountains. Each year a surge in river flow starts in April, crests in mid-summer, and declines in October to a rather steady low discharge consisting largely of the

(1)An excellent description of the geological, hydrological and climatological features of the Indus Plain that relate to water resources of West Pakistan is presented by A. V. Karpov and Ross Nebolsine: "Indus Valley : Key to Pakistan's Future" Indus (magazine): December 1960, January 1961 and March 1961.