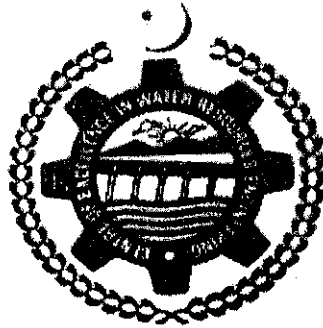


THESIS

**DEVELOPMENT OF FUTURE RESERVOIR OPERATION
STRATEGY FOR RAISED MANGLA DAM**



By

**UMAIR MANNAN
(2002-PG-WRE-30)**

For the Degree of

MASTER OF SCIENCE

IN

WATER RESOURCES ENGINEERING

**CENTRE OF EXCELLENCE IN WATER RESOURCES ENGINEERING
University of Engineering & Technology, Lahore, Pakistan**

2004

ABSTRACT

Water is a pre-requisite for life and development. There is an ever-increasing demand for water due to rapid population growth in the World today. It is therefore necessary to have a better administration, protection and exploitation of water resources. There is a necessity to use limited storage capacities as effectively as possible thereby requiring re-evaluations of operating policies.

Mangla reservoir is the 12th largest earth filled dam in the World, which was built on River Jhelum in 1967. Mangla dam is now being raised by 30 ft with maximum conservation level being raised by 40 ft, to regain the storage capacity lost due to sedimentation. Provision to raise the dam was kept in its original design. A new operation strategy is required for the raised dam. Reservoir operation strategy for raised Mangla reservoir has been developed in this report.

Methodology adopted for this study was to first of all simulate historic operation of Mangla reservoir with the help of HEC-5 (Simulation of Flood Control and Conservation System) computer model. Model was calibrated first by comparing the results of simulated historic operation with actual operation. Then a basic criterion was adopted to modify the indents in such a manner that optimum yield is obtained for maximum conservation levels of El.1202 ft and El.1242 ft. The difference in irrigation yields for both levels gave the average additional irrigation water available.

Modification/optimization of historic Kharif and Rabi indents was carried out as these were to be used as input for future simulation of the reservoir. Historic Kharif indents were reduced on the basis that releases in excess of actual irrigation demand had been made from Mangla reservoir in the past. Rabi indents were made realistic by incorporating the effect of sediment that would be deposited in the reservoir, when raising will be completed in 2007.

Future operation of Mangla reservoir for un-raised condition was then simulated by using optimized indents for maximum conservation level of El.1202 ft. For simulation of raised condition Kharif indents were kept the same because enough spillages were available to fill the increased storage after the reservoir is raised, but Rabi indents were increased in a way that pattern of the indents remained the same as for un-raised scenario. Different factors were used so that incremental Rabi indents for maximum conservation level of 1242 ft increased by 2.8, 2.9, 3.0, 3.1, and 3.2 MAF. Each option was then simulated for a period of 60 years in the future i.e. from 2007-08 to 2066-67.

Option, which gave the maximum benefit, was selected as best possible option to obtain optimum benefit from raised Mangla dam. Large gains in terms of irrigation benefits are expected if the selected option is used as a basis for developing seasonal rule curves for the optimum operation of Mangla reservoir.