

THESIS

ANALYSIS OF CANAL REGIME UNDER DIFFERENT HYDRAULIC AND  
GEOMETRIC CONDITIONS: A CASE STUDY OF LBDC CANAL SYSTEM



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## ABSTRACT

The study deals with the checking of stability and analyzing of hydraulic behavior of canal system. It also aims to provide management and monitoring tools to the persons who are responsible for operation and maintenance of canal system. Area selected for study comprises of a large canal network known as Lower Bari Doab Canal System. The Lower Bari Doab Canal off-takes from Balloki Barrage which is located southwest of Lahore at a distance of 65 Km.

The LBDC off-takes from left bank of river Ravi at Balloki and flows for 201.37 Km along the length of command area of about 0.676 million hectares. The Lower Bari Doab Canal provides irrigation facilities to the areas located in District Kasur, Okara, Sahiwal and Khanewal. After completion of Mangla Dam in 1967 under Indus Basin Treaty (1960), most of the water to the canal is supplied from the Chenab and Jhelum rivers by transferring through Rasul-Qaderabad and Qaderabad-Balloki link canals which puts the area in direct command of Mangla reservoir. Average annual water allocation is 5.9 Billion Cubic Meter with 3.2 BCM for the Kharif and 2.7 BCM for the Rabi.

Two stage Remodeling Projects of LBDC have been implemented in past during 1966-72 and 1982. The back grounds for such Remodeling of parent canal were (i) increase in CCA from 1.442 MA to 1.730 MA and (ii) Construction of Indus Basin Project caused for a new Sidhnai Barrage against the old Sidhnai Barrage (operative since 1988 and now became obsolete) after operation of new Barrage in 1966-67. A new Sidhnai Canal was constructed u/s of new Barrage and linked with old Sidhnai Canal. The upper part of new Sidhnai Canal Command turned out of



Command of new Sidhnai Canal and therefore this area was shifted to Lower Bari Doab Canal. For this purpose a feeder Channel called Koranga-Fazal Shah Feeder (97000 ft. length) head discharge of 618 Cusec was constructed from 570+600/R of LBDC and connected with upper part of old Sidhnai Canal System. (iii) Transfers of 1000 Cusec through Montgomery-Pakpattan Link Canal and feeding the Canals on River Satluj at Sulemanki headworks.

Sediment load at the head of the canal was analyzed using the last twenty three years data from 1990-2012 which indicates a strong seasonal pattern. The maximum sediment concentration was observed from June to the August. At different sections canal behaves differently. In high flow, sediment flow is more than sediment carrying capacity as calculated by sediment transport functions. At 100 % flow, canal bed is eroded. X-sections at RD 0+500 and 60+750 show erosion trend. At 80 % flow, canal bed behaves partially in erosion and deposition. X-sections at RD 3+000 and 22+250 show erosion and deposition trend. At 60 % flow, canal bed is in deposition. X-sections at RD 0+750 and 22+000 showed deposition trend.