

**EFFECTIVENESS OF TERTIARY CANAL LINING AND ITS
IMPACTS ON SOCIO-ECONOMIC CONDITIONS OF PAKISTAN**



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ABSTRACT

This study was designed to determine the effectiveness of partial lining of tertiary canals with the specific objective to evaluate the performance of lining with respect to the age of lining. Twenty partially lined tertiary canals (1 – 25 years of lining age) were randomly selected in four districts in Punjab, Pakistan. The sampled tertiary canals were classified into five age groups with a class interval of five years. i.e. Group-I (1 – 5 years), Group-II (6 – 10 years), Group-III (11 – 15 years), Group-IV (16 – 20 years) and Group-V (21 – 25 Years). The flow rate of selected tertiary canals was measured at three locations along the channels, i.e. at head of the lined sections close to the outlet or mogha, at the end of the lined sections, and in the unlined sections at a distance equal to the length of lined sections.

The mean steady state conveyance losses in lined sections of twenty sampled tertiary canals varied from 0.63 to 0.87 l/sec per 100 m length. The lowest losses were observed in newly lined tertiary canals one to 5 years old whilst the highest losses were observed in case of lined sections of G-V where the age of lining was between 21 to 25 years. The lined tertiary canals of Group-I reduced the conveyance losses by 46%, whereas the conveyance losses in Group-V were reduced by 29%. The average conveyance efficiency in lined and unlined sections was calculated as 90 and 84%, respectively.

The reported number of tertiary canals in IBIS is 122,268 whereas 99,715 have been lined upto 2008-09. It was found in the present study that the conveyance efficiency of the lined tertiary canals was reduced with increasing age of lining, which means that beside other factors the average annual water saving is a function of age of lining. On the basis of present study, in the year 2008-09, the average annual water saving by partial lining (30% length) of tertiary canals in IBIS was estimated as 6.6 bcm per year.

Based on the above analysis, a predictive water saving scenario has been developed to estimate the saving of irrigation water after partial lining of the tertiary canals in 2010-11, and the sustainability of benefits with increase in age of lining has also been worked out. The water saving was predicted by using statistical linear regression technique. According to the predictive analysis the immediate water saving during the first five year after lining is predicted about 8.3 bcm per year, which under current management, would decrease by an average rate of 3.2 percent annually. But after 20 years the average annual water saving would be 1.71 bcm, assuming no interventions are carried out after completion of lining of all the tertiary canals.

Apart from increasing the conveyance efficiency and reducing seepage losses, the lining of tertiary canals has significantly increased the crop yield and income of the farmers. The average crop yield on lands served by the lined tertiary canals have increased by 23.8, 9.8, and 20.3 percent for wheat, rice, and sugarcane crops, respectively. Similarly gross income from these crops were higher by 18, 35, and 17 percent respectively.