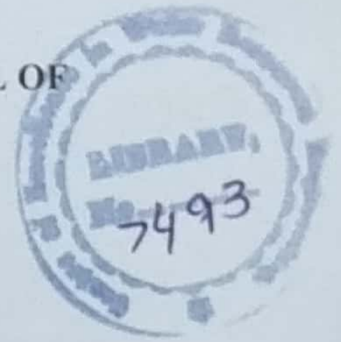


M.Sc. Thesis

**OPTIMIZATION OF HYDROPOWER POTENTIAL OF
MUNICIPAL WATER SUPPLY DAM**



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ABSTRACT

The dams are constructed for water storage for irrigation, domestic & industrial water supply and power production. Some of the small dams are built only for domestic water supply such as Simly dam, Rawal dam and Khanpur dam. Same like these dams there are many other municipal and irrigation water supply dams present in Pakistan. The water is being conveyed downstream without producing any power. The total potential of these dams for producing power is yet to be explored.

One of the ways to cut short the electricity load shedding problem in Pakistan can be by developing of hydropower stations on these dams. Hydropower can be generated at low cost from the municipal water supply dams as all civil works are already present there and a little cost is required for such power projects.

Pakistan is facing the shortage of energy and a major portion of electricity in the country is being produced from thermal sources (furnace oil, gas and coal etc). The expenses of power produced from thermal sources have also escalated due to increase in fuel prices.

The thermal sources are producing a lot of amount of carbon emissions which are creating adverse effects to the climate. Interests have there been brought up in renewable power sources and among these sources, power produced from water sources have been a particular interest of study. The small hydropower projects are under core interest as they offer very little effects on the environment and ecological systems.

The hydropower potential was estimated using HEC-ResSim model after the collection of historical Reservoir data from Water and Power Development Authority of Pakistan (WAPDA) and Climatological data from Pakistan Metrological Department (PMD). The same model was used to study the impact of change in guide curve, rule curve and dam height on the production of Hydropower.

The study was focused on the hydropower potential basically on particular dam site. The study area for this research was Khanpur Dam which is situated on the Haro River near new Khanpur town in Khyber Pakhtunkhaw province of Pakistan, on Taxila-Haripur road.

The result shows that there is a potential of 1 MW hydropower along with municipal water supply. By changing the guide curve to $5\text{m}^3/\text{sec}$ the availability of power by time increases from 90% up to 94.8% and by increasing the rule curve by 3ft (0.914m) the average power increases from 1 MW to 1.1 MW. By changing the dam height up to 15ft, increases the average power from 1 MW to 1.3 MW. The annual benefits from this hydropower scheme could be up to 7896 MWh/year.