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ASSESSING WATER AVAILABILITY IN THE OROUA RIVER CATCHMENT

A thesis presented in partial fulfillment of the requirements for a
Master Degree in Applied Science (Agricultural Engineering)

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ABSTRACT

The study estimated the 1993-1998 natural flows as well as their corresponding reliabilities along Kiwitea Stream and Oroua River upstream of the old Kawa Wool station. These estimates could present a baseline condition for assessing the hydrologic capability of the catchment for the existing rights and the amount of streamflow still available for additional rights.

The study demonstrated that water availability modeling could be a useful tool in water resource management and planning for the Oroua catchment. The “usual” or high river flow allocation management for the Oroua River wherein a right may abstract water up to its permitted rates could be modeled in WRAP. The results of the simulation based on full abstraction of permitted rates suggested that on a monthly basis, there was enough flow physically available to meet all consented abstraction rights including the minimum flow requirement at Almadale and Spur Road stations throughout the 1993-1998 simulation period.

The study had identified an apparent shortcoming of the WRAP model in simulating the MWRC’s water allocation schemes at times of low river flow wherein water rights are either restricted or curtailed whenever the flow reached the set monthly flow threshold and the minimum flow level. The WRAP program was lacking of a mechanism or algorithm that will allow a water diversion target to vary depending on a gauged flow at other locations.

The study demonstrated that the criteria stipulated in the Oroua Catchment Water Allocation Regional Plan for rostering abstraction at times of low river flow could be accounted in WRAP water availability modeling using a weighted ranked priority scheme. The results of simulation apportioning the combined maximum abstraction rates for irrigation purposes, based on prior use and natural upstream-to-downstream location among irrigation rights, indicated a minimal increase in the utilization of available water of the Oroua River. Thus, with increased water use as a management objective, such options would not be an attractive alternative.

To facilitate relevant hydrologic and institutional water availability and reliability assessment of the Oroua River, it is recommended that a modification be made in the WRAP program to include mechanism or algorithms that will allow automatic change of diversion target as a function of gauged flow. Also, a shorter computational interval, such as weekly or daily, would yield more relevant results for real-time water management for the Oroua River.

For future simulation or modeling studies for the Oroua River, there is a need to have an actual streamflow measurement or gauging station downstream of the river for validation purposes. There is also a need to have data on actual abstractions and discharges to the Oroua River and its tributaries.

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