

IRRIGATION CANALS MODERNIZATION TO IMPROVE WATER AND LABOR SAVINGS

M Rijo @, ICAAM-Instituto de Ciências Agrárias e Mediterrânicas, Universidade de Évora, Colégio da Mitra, Apartado 94, 7002-554 Évora, Portugal, E-mail: rijo@uevora.pt

General article (GA)

Topic code 3.5

Keywords: irrigation canals, canal control, SCADA technologies, buffer reservoirs

SUMMARY

Irrigation is the largest water user in the World, using up to 85% of the available resource. For these reasons, irrigation is being pressed in an increasing way to improve water use efficiency, release more water to industrial and urban users and to pay the same price for this scarce natural resource. Agriculture must be prepared for this increasing competition, developing intelligent management and operation of the irrigation systems.

For technical and financial reasons, large brut water conveyance and delivery systems are usually in canal.

Above 90 % of the irrigation canals in the world are local upstream controlled. With this control strategy, canals can be sized to convey the maximum uniform steady. This simplifies both the design (constant cross section along the canal) as control system requirements.

Local upstream canal control is particularly effective when associated with programmed water delivery methods. However, this method has disadvantages when combined with water flexible delivery methods, because pool water storage must change opposite to its natural tendency.

Upstream controlled canals performance can be improved, saving water and labor in the canal operation and improving the water delivery service quality, using three ways, that can be used or not simultaneously – automatic canal control, SCADA systems and buffer reservoirs.

With the digital canal control, the controllers can be programmed, for example, with the local upstream control, activated in situations of scarcity of water, when it is important to implement rigid water delivery rules, and, at the same time, programmed with the distant downstream control, that maintains the same canal hydrodynamics, but guarantees the total automation of the canals, producing important water savings in connection with flexible water delivery rules. The communication will present these automatic canal control approaches and their advantages.

Upstream control always needs manual flow control at all canal intakes and offtakes, what requires a lot of manpower. A Supervisory Control And Data Acquisition (SCADA) system can be installed to enable remote manual control of flows. SCADA systems can complement the automatic control of the canals. Anyway, considering the hydraulic system visualization possibility in real time, SCADA are, always, important water management tools, permitting to improve the quality of the water delivery, saving labor, time and energy in the canal operation. The communication will present the usual monitoring and control actions of the SCADA systems and the correspondent controllers.

Buffer reservoirs can reduce water losses, storing the excess water that arrives from upstream canal when the offtakes begin to close, and improve the system's ability to satisfy the expected and unexpected water demands at downstream. The communication will present the definition, purposes, types and sizing of these reservoirs.