Evaluation of water supply from a drainage canal in Kafr El-Skiekh area, Egypt

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1 Introduction

Water is life and also a limited resource that mankind should cherish. Water management aims to develop and protect the available water and land resources in the developing countries. In water scarce countries depending on external water supplies, like Egypt, water distribution to the different water users is of paramount importance. Egypt is an arid country with hardly any rainfall. For its water resources, Egypt is depending mainly on the supply of fresh water transported from Nile basin countries through the Nile River.

Main problem facing the Nile delta is water supply shortage at the end of irrigation network especially at the tail of main canals branched from Nile River; nowadays the government depends on feeding some canals which have water supply shortage from the drains, In this study, a pipe was constructed at the end of the branch canal to feed it whenever there is water shortage. But backflow conveyed from the drain to the canal depends on water level differences between drain and canal tail. That is because the water structure (pipe) connecting the end of the canal with the drain does not have control gates or valves. It is only to convey water from the drain into the canal whenever the drain water is higher or opposite.

Main objectives of this study are to evaluate the balance of water demand and supply in branch canals which partially depend on water supply from the drain at canal tail in irrigation network at the Nile delta by quantifying the amount of water feeding the canal from the drain during shortage time then comparing it with shortage in fresh water supply.

The study area shown in **Fig.1** is located in Kafr El-Sheikh government which is considered as one of the governments of Egypt. It lies in the north of the country along the western branch of the Nile Delta. Study area located at the tail of main canal (Meet Yazeed) which considered as the main canal feeding the study area, and this drainage canal connecting to the main drain (Bhr Nashart). This main drain is feeding some branch canals that are facing water shortage. The branch canal (Sefsaf) was selected to be evaluated, which is feeding from main canal in head and feeding from main drain in tail.

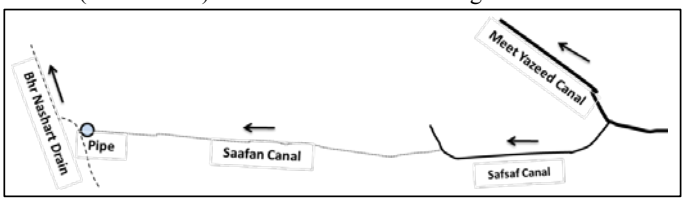

Fig. 1 Study area in Egypt

2 Material and Methods

The indicator of water supply is used in this study to compare between water supply and water demand with and without backflow to check the effect of water backflow from the drain on the canal. Based on this evaluation, some data was required from the field to calculate the indicator. These data are water levels, gate openings, discharges, pipe data connecting channels with (Bhr Nashart) drain and crop pattern. These measurements were measured from the period May 2008 until May 2009. By The Water Management Research Institute (WMRI) of the National Water Research Center (WMRI, 2008).

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Calculations of daily water supply in the head of branch canal depend on calibration of head regulator, which the following data are required for calculation, water levels at upstream, downstream and gate opening of head regulator. Calculation of daily backflow from the drain depends on calibration of pipe connecting canal with drain (DCM, 2001, HEC-RAS, 2008) which requires the following data, tail water levels, drain levels and pipe dimensions. Calculation of water demand is based on CROPWAT model (FAO, No. 56.)**.**

3 Results and Discussion

It was observed that flow type was submerged flow case most of the days under the gate as shown in **Fig.2**, The ratio between distributed discharge and required discharge without considering backflow was higher than the value one at winter season which means that there is sufficient water supply and it was less than one in summer season which mean that there is shortage in water. After adding the backflow to the fresh water supply it was observed that the ratio between distributed discharge and required discharge was increased at winter season while there is no need for extra water and was constant at summer season. It was obtained from the analysis that

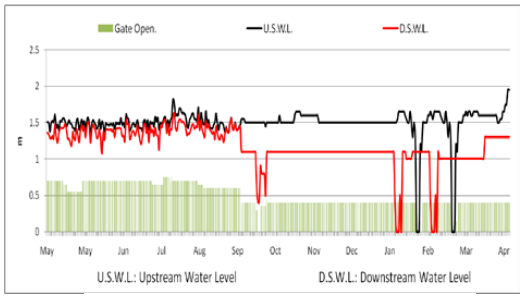

Fig.2 Water level at Sefsaf head regulator

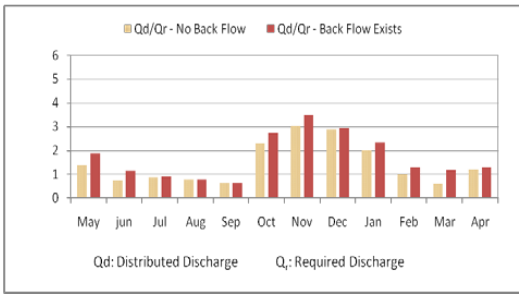

Fig.3 Q_d/Q_r values with and without backflow

most of the year drain tail water level is higher that canal water level except for summer season, which mean that we have backflow from the drain to the canal at winter season as shown in **Fig 3**.

4 Conclusion

Study area is facing water shortage at the head of (Sefsaf) canal. It means that it is important to consider increasing water feeding to the canal to be sufficient for crop requirements. Back flow depends on not water availability but difference of water levels between the end of the canal and the drain. It means sometimes there is backflow while there is sufficient water in winter season. So backflow should be controlled by gate or pump lifting point. At July, August and September water demand is greater than water supply while there is no back flow at this period. It means the ineffectiveness of the pipe connecting the drain with the canal. At the rest of the year there is sufficient water in the canals while there is back flow from the drain into the canal which also indicates the poor design of the pipe system, which might affect crop productivity.

References

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