WATER PROBLEMS BETWEEN AGRICULTURE AND URBAN AREAS

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ABSTRACT

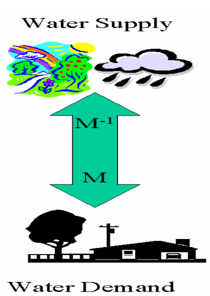
A simple analysis in the water cycle for any place in the world, the rainfall is somehow constant. Agriculture area does not increase and irrigation techniques can be improved. As a result, some of this water is feasible to save. In counter side, urban water demand is growing up with two main suppliers: surface water coming from lakes, rivers, or channels and groundwater coming from aquifers. Here it is the conflict problem. Agriculture and urban water consumption depend on the same sources: surface water and groundwater. Strictly, there is dependency between the sources, however, for primarily approximations, they can be considered independent.

INTRODUCTION

Currently in Mexico, farmers in agriculture spend water (8000 m^3/ha/year) in the open field, approximately; and the urban population uses 0.3 m^3/day(109.5 m^3/year) per capita (World wide calculations are made with 400 m^3/year per capita.) In fact, there is a decreasing water use trend in both cases: farmers and citizens. Farmers are applying new alternatives like sprinker and drip irrigation, better irrigation schedule and volume control. These techniques are emerging not only for saving water but also for increasing yield and quality products. Even more, water is not ready in the crop field; it is required to conduct it from a river, a lake or a dam, with water losses by either evaporation or infiltration until 60%. Citizens in urban areas have been dealing with the control of local spills in the main water distribution system as well as reducing the water losses inside the houses.

RESULTS

On the basis of simple theory, we are going to identify the variables involved: total water (w_t), surface water (w_s), and groundwater (w_g), water for urban areas (w_u), and water for agriculture (w_a). By taking the total water as the point of reference and normalized variables, $w_t = w_u + w_a = w_s + w_g$, it is



obtained $\begin{pmatrix} w_u \\ w_a \end{pmatrix} = \begin{pmatrix} m_{11} & m_{12} \\ m_{21} & m_{22} \end{pmatrix} \begin{pmatrix} w_s \\ w_g \end{pmatrix}$ and numerically, $\begin{pmatrix} 0.8 \\ 0.2 \end{pmatrix} = \begin{pmatrix} 0.8 & 0.8 \\ 0.2 & 0.2 \end{pmatrix} \begin{pmatrix} 0.1 \\ 0.9 \end{pmatrix}$

which corresponds to the general case, when agriculture and urban population depend on surface water and groundwater, simultaneously.