

Water Efficiency Practices in the Metropolitan Area of Monterrey

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ABSTRACT

In the semi-arid region such as the Metropolitan Area of Monterrey, the factor that enhances or delays industrial and population growth is water. Even though the majority tries to solution this problem by searching new aquifers or constructing lakes. In our case we are fighting this battle with three major practices that have given us best results. These three practices are the following:

- 1.- Leak detection and their correction.- this is done by locating macrometers in order to compare the total flow in a certain section and closing all the micrometer in that section and checking if the macrometer registers flow, if it does, it means that there are leaks or clandestine connections. By this measurement we have been able to reduce leaks, increasing the efficiency of water management.
- 2.- Reclamation water reuse.- in the past after the wastewater was treated the effluent would be discharged into the river. At this moment some of this treated water is used in the industry instead of using drinking water. This way we have more drinking water available for population growth and specific industry that have to use potable drinking water.
- 3.- Water culture.- Using different media to culture people specially children to use water wisely has been an important impact to increase water efficiency. Besides, dew to the fact that during the 80's and 90's water shortage in the Metropolitan area was frequent, people have given water the value that it deserves.

In conclusion the Metropolitan area of Monterrey, through three basic practices we have been able to sustain population and industry growth with the same amount of water.

Keywords: Metropolitan area of Monterrey, reclaimed water, sectorization, water culture.

INTRODUCTION

In the semi arid regions such as the Metropolitan Area of Monterrey (MAM) water has been the major limitation for population and industry growth. During the 80's the MAM suffered severe drought added to a rapidly increased population that caused the water utility company to serve water to the inhabitants and the industry with very few hours per day. A new lake was constructed thinking that it would be the solution, but due to the fact that very drought years followed the lake at the most had up to 30% of the total capacity and has a very high evaporation rate due basically to high wind velocity. Other sources such as water wells were put in consideration and most of the wells that had severe damage with a hurricane were put back to work and helped, but after surveys were done we found out that around 36.4% of the water was unaccounted basically caused by three factors: Leaks, water not measured and measurement errors. There was no sense in integrating new sources if the efficiency was to low. Therefore it was determined that additional steps should be included in order satisfy water requirements in the MAM which included three basic practices:

1.- Reduction of unaccounted water: With a loop of 52 km of main distribution lines and 6,200 km of small distribution water lines it is very hard to avoid water leaks. Therefore it was very important to analyze and determine the best practice to reduce leaks in the distribution line. A program called “Sectorization of the Distribution Line” was implemented, this program has the objective of reducing unaccounted water to a level of 15% by dividing the distribution system in 1,400 sectors of 500 micrometers each and installing macrometers on each sector in order to compare it with the 500 micrometers contained in that sector. First the main valve was closed and we encountered that quit a bit of the valves were not working properly, because when the whole sector was shut off the macrometer would indicate that water was still flowing, therefore all these valves were replaced. After this process the main valve was reopened and all the small (500) meters were closed, if the macrometer registered flow it meant that there were leaks in the pipe lines or clandestine connections. Therefore leak detectors were used and leaks found were corrected. After the leaks were corrected then clandestine connections were investigated.

With a total cost of the project will be 20.1 million dollars, the amount of hours-man used for each sector was approximately 2,122 but with practice these hours have been reduced. Up to this date 1,590 sectors have been checked which represents 80.9% of the total.. Another factor that influences leaks in pipe is the flow pressure, which was reduced from 3.0 kg/cm² to 1.5 kg/cm² with pressure reduction valves. In order to disturb the least our client’s communication has been the keystone, every sector is notified one day before about the water service shut down so they will be prepared and is shut of only four hours a day, we understand that it is something that will bother the client but we explain to them that it is necessary in order to detect leaks. The results of this practices has been fabulous because from 1998 to sept-2002 we have been able to reduce 10.1% water loss through leak correction equal to 1,010 lps (liters per second) capable of giving service to an additional 374,000 inhabitants equal to about the growth in five years in the MAM. With this practice even though in the last four years there has been an increase in population the water consumed has been the same.

Another practice that has reduced water leaks consist of using leak detector, with program implemented we are able to check the whole distribution system of the MAM every 1-½ year. This program is working all year around with four sets of two persons with very important results.

2.-Reclamation water reuse.- Even though wastewater treatment plants were installed with the main objective of obtaining water that would be safe in an environmental manner for its discharge into rivers and lakes used for recreation and agriculture, once treated with the quality obtained, it was determined that it could be reused as reclaimed water. Reclaimed water is defined as wastewater treated at least with the following process; bar screen, grit chamber, primary clarifier, aeration tank and secondary clarifier, considered as a secondary treatment which is the normal process in our wastewater treatment plants. Tertiary treatment would be better which would include additional treatments such as either of the following or several process together; sand filter, micro filtration, reverse osmosis, elimination of chloride, ultraviolet, etc. In many parts of the world reclaimed water is used for industry, golf coarse and landscaping irrigation, and agricultural irrigation.

In 1995 secondary wastewater treatment plants were installed in the MAM with capacity to treat up to 8,500 lps, at the moment we are treating 6,500 lps and at the moment are using 350 lps invoiced and planning by next year to increase to 600 lps) as reclaimed

water in industry and the rest in agriculture in our state and in Tamaulipas. With the amount of reclaimed water use, the same amount of potable water is saved, therefore can withstand an increase of 111,000 of inhabitants or 1.6 years. Besides the advantage to the industry is that reclaimed water is much cheaper and as the reclaimed water increases the price per cubic meters will be reduced, the opposite happens with potable water that as the consumption increases the cost per cubic meters also increases. There is a vast opportunity with reclaimed water reuse but we have given the first step and will continue to increase reclaimed water for industry, golf courses, parks and agriculture. Therefore reclaimed water reuse is a very good option to reduce potable water use in process that do not have to comply with drinking water standards, where as the potable water can be used for households and industry related to consumption products.

3.- Water Culture.- Culture of wise water use is essential in order to reduce mean water consumption per inhabitant. Communication is a key practice by changing the person's attitude towards this natural resource of our clients by letting them know that water is essential for life. Many campaigns have been useful for this practice and at the moment it has been 16 years since water culture has been implemented. There is a special week every year, which is the "State Water Week" which in conjunction with United Nations with its program "Global Water day" and the participating of other institutions made the distribution of water saving kits, booklets and other diffusion pamphlets. Over 200 people have been prepared for this purpose and the participation of elementary, high school, and college have been very important in order to aware inhabitants of the importance of using water wisely, teaching over 45,000 students that are key factors at present time and even more in the future. Also television, radio, comic book distribution, panoramic advertising have helped with the practice of water saving. A very relevant issue is that at the moment there are 2,796 water guardian students that help with the campaign directly in schools in order to remind children that water is scarce and that care should be taken with its use. The results have been amazing and reflect basically that in the year 2000 the average water consumed per client was 18.43 m³ and by 2001 it was reduced to 17.99 m³, with 700,000 registered clients this would give us a saving of 118 lps or equal to a growth of 44, 000 inhabitants.

It is clear that when something hurts in the past it is very hard to forget, and this has been a very important factor. In the 80's and 90's water shortage in distribution line was frequent and it is a good way that people learn the hard way that water is a very important resource and therefore it should be used wisely. At the moment water in the MAM is available 24 hours a day all year around fortunately, but people are aware that if we do not take care of the resource drastic measures will be taken and that means water reduction.

Another important factor that helps people prevent water waste, is installing water meters. When people do not have meters they tend to waste more water, because they have the same fee regarding the water they use, which at the same time causes pressure reduction in the households and problems to homes that are in high elevations. But when meters were replaced and installed, people are aware that if water consumption is high the cost of the water will also be high and will hit them in their pockets, therefore they will be more careful with water use.

CONCLUSIONS

In semi arid regions like the Metropolitan Area of Monterrey water has been scarce and will continue to be. Even though these regions have high limitations on there growth because of water deficit, good practices can help make a wise use of this resource. Three practices that have been implemented by the water and wastewater utility company of Monterrey have been keystones in order to alleviate population growth. These practices are leak detection and their correction, reclaimed water reuse and water culture. The amount of potable water saved by these practices equals to 1,468 lps which represents 14.68% of total water consumed by the Metropolitan Area of Monterrey and can withstand an increase of approximately 530,000 inhabitants or 8 years with the same amount of water.