

Huge water problem in egypt

[History](#), [Middle East](#)



Egypt is classified as an arid country, as it is predominantly covered by desert. In most areas, annual precipitation doesn't even reach 80 mm, whereas coastal provinces can receive up to 200 mm. (Tour Egypt, n. d.)

As Evans (2011) reported, Egypt has always been largely reliant on the Nile for its water supply, and as of today, the river still supplies 95% of the water used by the population for irrigating and personal use.

The problem with North African countries, similarly to Middle Eastern ones, is that they have to share a limited number of water sources, which means that they all rely on external water supply and have a precarious water situation, due to their lack of renewable, reliable water resources. (Nasr, M., 1999)

In view of Egypt's uncertain future on the water supply front, this report will analyse and compare three different water provision methods, namely water recycling, rainwater harvesting and desalination systems, determining the impact each one of them would have on the environment, how the public would perceive them and their costs.

Water provision methods

Water recycling

Egypt has been using water for drinking and cleaning from the river Nile for many years, but the problem is Egypt uses 95% of its water from the Nile and there are other countries that need to use the Nile for their water needs (Mayton, J., 2010). One of the ways this problem can be combated is by the use of Waste water recycling systems, which clean waste water in order for it

to be reused once again for the many purposes such as irrigation, ground water recharge, agriculture and industrial cleaning just to name but a few.

Rainwater harvesting

Another method that can be used for supplying Egypt with more water is by the use of a rain water harvesting system.

The actual amount of water that has been falling in the Northern part of Egypt is much higher than the amount of water that is stored in underground reservoirs per year. (EMWIS, 2008)

Rain water harvesting has been used for many years starting from using empty containers to collect the water to reuse. The main types of rain water harvesting systems that are used now are rooftop catchment systems and land surface catchment systems. Catchment placement systems on rooftops work by placing a tank situated at the end run of the normal gutter system which catches the rain water that runs off from the roof. The water that is collected is then taken from the tank on the roof to a filtration system where it can then be used for many purposes. This is a very simple installation and is the most common type used for simple rain water collection for homes.

Egypt has a large mass of land which it uses for farming. Therefore land surface catchment systems could also be implemented for their farming needs. Rain water catchment systems are used for large surface areas for catching rain.

An area is first designated on the ground for the rain water collection and then a reservoir system is designed and created for the storage of the

collected water. This is done by the use of pipes, and can also be piped off straight into a filter which can then be used for the different crops that farmers have. This method would be best suited for the farmers in Egypt as the likely hood for contamination is much higher than roof top catchment systems due to the nature of being stored in the ground.

Desalination

Another method that could be used in Egypt is Desalination systems which would reduce their need for the amount of water they rely on from the Nile. These systems provide potable water and there are several methods used for removing seawater or dirty ground water. Desalination can either use either membrane based or thermal based filtration which do remove all salt from the water, but do lower it to a level which makes it consumable by humans. This method would be great if Egypt can set up desalination systems whereby they utilise the water from the red sea.

3. Cost

3.1 Water recycling

As of 2010, there were over 200 wastewater recycling plants in Egypt; in order to tackle the country's water problem, The Ministry of Water Resources, has indentified wastewater recycling as the main solution. Thanks to the numerous wastewater recycling plants which have been built over the last few years, urban sanitation coverage reached 56% in 2004, although the situation in rural areas hasn't yet changed, with polluted water and low health standards still being critical. (Loutfy, N. M., 2010)

However, the main disadvantage of all wastewater recycling methods is the significant capital, operating and maintenance costs required to bring the plants into working conditions and keep them running, as shown in the table below, which compares costs and other features of four different water recycling methods. (Remco Engineering, n. d.)

Table 1. Water recycling costs

Source: Remco Engineering (n. d.)

Rainwater harvesting

In 2008, EMWIS reported that only a small percentage of the total amount of rain that falls on the Egyptian coast is actually collected by rainwater harvesting systems to be re-used. Rainwater harvesting systems were introduced in Egypt in 1993 and expanded in 1996.

According to GDCR, as inexpensive as all these methods may be, their costs depend on what materials are used and other factors which can vary from country to country. For instance, the cost of harvesting rainwater in Asia ranges between \$0.17 and \$0.37/m³, whereas in Northern Thailand, the initial cost, exclusive of maintenance, is \$1/l per storage tank. (GDRC, n. d.)

However, rainwater harvesting is generally less expensive than water recycling, as it doesn't require large amounts of energy, continuous maintenance or expensive structures.

Desalination

As of 2010, Egypt's desalination capacity stood at 652,024 m³/day and is expected to increase to 1,564,224 m³/day by the end of 2016, as a result

of the construction of new desalination plants. Therefore, the estimated cost of operating all the plants within the country is going to increase from \$90.4m in 2010 to \$172.0m in 2016. (Global Water Intelligence, 2010)

According to Mayton (2010), upon its acceptance of letting other NBI countries use the Nile as a water source, Egypt will have to reduce its dependence on the river and invest in desalination plants, which represent a cost-effective way to increase its internal water output.

Evaluation

It emerged that rainwater harvesting is the least expensive method, followed by rainwater recycling and desalination, which remains the most expensive option.

Public Acceptance

Water recycling

As Gloede (2011) observed, public response to wastewater recycling hasn't been positive as most people are not sure about the purity of recycled water; however, considering that this method could make countries subject to water shortages, such as Vietnam, China and Egypt, self-sufficient, it is highly likely that people will change their mind about it.

Rainwater harvesting

A recent study conducted by showed that people are familiar with this water provision system and prefer it to other methods. As far as risk perception is concerned, most respondents showed no hesitation when asked whether

they would use harvested water for impersonal use, however, they are not sure about the risks associated with drinking it. (Ward, S. et al., 2008)

Desalination

Recent surveys have revealed that people have different opinions on desalinated water. Al-Hajaji (2012) reported that a survey conducted in Jeddah showed that 41% of respondents would never drink desalinated water, as they are not sure about its purity.

On the contrary, Australians seem to be enthusiastic about this water provision method, to the extent that they believe it to be safer than recycled water; however, respondents have also identified several negative aspects associated with desalinated water, such as its negative environmental impact and energy requirements. (Dolnicar, S. & Schafer, A. I., 2006)

Considering that Egypt is more similar to Saudi Arabia than to Australia in terms of cultural background, Egyptians are more likely to share Saudis' opinion on desalinated water.

Environmental impact

Water recycling

According to Foley et al. (n. d.), there are still several issues associated with water recycling, some of which could have a negative impact on the environment. Among these are greenhouse gas emissions, organic residuals and high energy consumption. (Foley, J. et al., n. d.)

Rainwater harvesting

Rainwater harvesting doesn't require sophisticated structures or technology, which is why its impact on the environment is minimal. According to the Cabell Brand Center (2007), rainwater collecting structures are very beneficial to people and the whole environment, to the extent that one day, they should become part of standard building permits.

Desalination

Desalination can not be classified as an environmentally-friendly process, as its plants contribute to worsening the quality of coastal waters, with their pollutants and other agents that are used to desalinate seawater. Moreover, desalination plants use significant amounts of energy, which results in greenhouse gas emissions. (Sydney Coastal Council Group, n. d.)

Therefore, rainwater harvesting is the method that is less likely to have a negative impact on the environment.

Conclusion

The most accepted method is rain water harvesting, but unfortunately there is not enough rain fall in Egypt to satisfy their internal demand for water, although rain water harvesting systems are the easiest and cheapest to install. (Ward, S. et al., 2008)

On the other end of the scale for being accepted is the water recycling method. People don't like the idea of waste water being recycled for personal use as they don't trust the purity of the water. (Gloede, K., 2011) Water recycling plants also require huge capital for installation and running (Remco Engineering, n. d.). Desalination also requires large installation

capital and emits large amounts of green house gases. (Sydney Coastal Council Group, n. d.)

To combat this problem solar powered desalination systems are being tested and utilised in arid areas around the world.

Recommendation

This report has shown there is a huge water problem in Egypt which has to be urgently addressed. Each water provision method that has been mentioned has its advantages and disadvantages, but all three can be used in Egypt to help combat the drastic need for alternative water supply. Even though the expense will be high, in recommendation all three methods should be utilised so Egypt can be sure of a future where they won't have to worry about their water provisions.