

A perspective to wastewater legislation in European Countries and Turkey

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Abstract: Factors such as intense industrialization, population growth, pollution due to the resulting over-consumption, ill-judged approaches to water policy and water management, inefficient irrigation techniques and global climate change increase the competition for water resources even more day by day. This entails the use of alternative water resources. In many countries, as well as in Turkey, the emphasis placed on the use of treated wastewater is growing. In its worldwide projections until the year 2030, United Nations' water-related goals for sustainable development are to achieve the reuse of water in greater quantities and to increase the use of safe treated wastewater. According to the model developed for the potentials of reusing wastewater of European countries, Turkey ranks as the 4th among 31 countries in the projection for the year 2025. In the relevant legislation in our country, there are parts that encourage the use of treated wastewater in areas as irrigation water. Although there are some serious obstacles against the reuse of water in Europe, European countries have started updating the legislation and seeking ways to increase the safe reuse of wastewater through intense efforts, especially during the years 2014-2016, for it are known that safe and healthy reuse of water can be provided in other areas. In this study, the legal legislation and operation concerning the reuse of wastewater both in our country and in European countries is evaluated. It is aimed to present the approaches toward the reuse of wastewater in both their positive and negative aspects.

Key words: Legislation, water recycling, water pollution regulations, projections

1. INTRODUCTION

Water is the fundamental element for the survival of humankind and is very valuable. Since the early 2000's, worldwide incidents and the resulting changes are posing serious problems to humanity's access to resources. Water resources are among the most important factors that are affected by these problems. These changes can be described as the rapid and unbounded population growth, mass migrations, intense demands for people's food supply, the anomalies seen in the timing and duration of yearly precipitation, the rise in the rate of increase of atmosphere temperature, etc. All these elements which, pose a threat to sustainable use of resources, are causing a decrease in the world's available water supply. This is of critical importance as quality and quantity constantly vary in terms of agricultural irrigation that uses up almost 70% of the available water supply. Ultimately, this can lead to consequences that have economic, social and even political impact. By transferring the share of agricultural irrigation to meeting the water demands of cities and the industry, which they believe, will provide high yield and benefits, public authorities are forcing users to look for new water sources (Winpenny et al., 2010).

The matters of maintaining the sustainable use of water resources and the use of different water sources for meeting the rising demands are being evaluated and researched. Water has a character that is prone to rapid negative influence that results in the deterioration of its quality parameters. Therefore, when fresh water supplies are taken into account, it can be said that they can rapidly become undrinkable and unavailable. However, it is believed that by way of treating with proper techniques the polluted water sources that are unfit neither for people's drinking water needs, nor for industrial use or by using them directly in agricultural irrigation, the demands can be satisfied. Scientists and institutions are performing many studies concerning such practices and their possible

outcomes. There are certain points to be taken into account and noted concerning the use of untreated wastewater or of treated wastewater (Sanz and Gawlik, 2014). Different water sources such as these can be used for agricultural irrigation purposes or for the irrigation of green areas.

These points lead to the conclusion that the use of such water resources must be thoroughly examined, researched and subjected to severe inspection and its use should be defined with laws.

2. METHODOLOGY

Since this study is an areal assessment on a macro level, the information and resources used as scientific material are based on the legal regulations of European countries and of Turkey on the matter. In this study, the European Framework Directive on Water which deals with water sources and wastewater reuse in European countries has been examined; as well as the agricultural and recreational use of treated wastewaters and the related legal regulations and the perspectives on the matter in general. In this context, Turkey's attitudes towards the issue and the studies carried out on the European Water Framework Directive and the use of treated wastewater have been investigated. Possibilities for the utilization of relevant regulations and resources have been investigated and the findings have been reported in the Results section.

3. RESULTS AND DISCUSSION

3.1 The reuse of treated wastewater and the concerning legislations in European Countries

European countries, which can be said to have been in a good condition in terms of water sources until the end of the previous century, used not to face severe drought, floods or serious scarcity in drinking or utility water too often. Today, however, almost 11% of the European continent and the 17% of the inhabitant populations are faced with the problem of water shortage (scarcity) (EC, 2015). In addition to this, the developments which allow us to use domestic and industrial water sources in the best ways and highest levels possible have inversely proportional negative effects on the environment and water sources (Akkaya et al., 2006). On top of these matters, especially in the countries on the Mediterranean belt including Turkey, the irregularity in the distribution and intensity of precipitation has caused the option of diversifying the water sources already being used to be taken into consideration.

One of the sources that could possibly be used is utilizing the organic domestic wastewater in particular, in order to be reused for the purpose of agricultural or recreational, and even domestic use (Angelakis et al., 1999; Mesropyan et al., 2016). In the United Nations Sustainable Development Goals (SDG6) it has been prescribed to increase the reusability of treated wastewater until 2030. It is possible that this could even be beneficial. However, among the issues that require attention, its possible effects on the environment and human health come first. For poorly treated waters or waters that fail to meet certain standards could pose serious hazards for human health, particularly by way of entering into the food chain.

The aforementioned reasons have forced the countries to take measures and many legal arrangements have been made as a result of the legislations that have been adopted. Among the various directives concerning the protection and management of water sources in the European countries, the most important one is the European Water Framework Directive (WFD), which was issued in the year 2000, by the number 2000/60/EC. WFD has taken effect for the purpose of forming a framework for integrated water management throughout Europe (Moens, 2003; Blöch, 2005). Including all water sources, European Water Framework Directive offers a holistic approach to the protection of water sources and the opportunity for source rehabilitation and sustainable use. It is expected to have long-term effects. On the level of river basins where water management is not

limited by political borders, new approaches concerning management style, water pricing and the “polluter pays” principle (Gelgeç, 2012).

Having started in early 90’s, the studies have continued with the establishment of a new Environment-Water mission unit within the European Union Commission in 1996. It has been deemed favorable to discuss and make plans for the future of water sources in Europe not only in the context of wastewater or reusability, but also in an integrated fashion. And the result of the efforts that were made toward this purpose was the European Water Framework Directive.

With the intention of making legal arrangements concerning the use of treated wastewater and bringing certain standards to its use throughout Europe, The European Wastewater Directive was introduced by the European Union Council in 1991, issued by the number 91/271/EEC. This directive has been replaced by the directive that goes by the number 98/15/EC in 1998, with the goal of making some arrangements. Having a binding effect on the European countries, it includes observations on the methods to be used in the treatment of wastewater, on the necessary standards and on the desired properties of the water to be discharged. Yet another directive is the Nitrates Directive which goes by the number 91/676/EEC, introduced in order to prevent agricultural nitrates from getting mixed with waters, causing pollution and any possible future pollutions.

However, the legislations and directives concerned have not been influential in increasing the Reuse of Treated Wastewater to the desired levels. Therefore, a need for new arrangements has arisen. For this purpose, in a new circular economy package introduced in December 2015 by the European Union Commission, what needs to be done in order to encourage and support the reuse of treated wastewater all over Europe has been laid out in the form of an Action Plan. According to this Plan; 1) an integrated water use and management program will be implemented within the framework of the legislations adopted by the European Commission. For example; as a measure to address water scarcity and in order to achieve good status under the Water Framework Directive, and in the investment to be made in the treatment of effluents as required by the Urban Wastewater Treatment Directive. For this purpose, within the framework of the criteria specified in WFD for the reuse of wastewater in an integrated manner, certain regulations were adopted within the Joint Implementation Strategy for the Water Framework Directive, under the heading of the planning and management of water use, to be put into effect cooperatively by the European Commission, Member Countries and other partners. These regulations were issued in July 2016. In the light of studies carried out in the European Union and some other countries, ways for a better wastewater use which takes into account the environmental and socio-economical factors as well. 2) As it was decided that no consistent and comprehensive legislation exists within the European Union, Member Countries and other users had to come up with their own legislations. The use on the European region has not reached the desired levels as this situation caused too many conflicting legal arrangements to be made. The Commission has decided to make efforts for specifying water quality parameters for reuse on the lowest level possible, from the beginning of 2017 on. It was agreed that the Joint Research Center and an independent scientific committee for the Health, Environment and Emergency Risks (SCHEER) establish cooperatively the parameters concerning public health, which cause much concern. 3) In the context of reuse in industrial activities, efforts are already being made within the framework of Industrial Emissions Directive, issued by the number 2010/75/EU. 4) Several working groups have been formed in the recent years for supporting the reuse of treated wastewater in Europe and in order to make efforts towards this goal (Industrial Water Reuse and Recycling (InDuRe), Water and Irrigated Agriculture Resilient Europe (WIRE), Real Time Water Quality Monitoring (RTWQM), Verdygo – modular and sustainable wastewater treatment) (EC, 2015).

When legal arrangements which have already been made and those that are planned to be implemented are considered, it can be said that there is a strong will within the European Union to increase the Reuse of Treated Wastewater, that especially in the south of Europe, the countries within the Mediterranean Basin are faced now with a serious problem of drought and water scarcity and that intense efforts are directed to solving these problems.

3.2 Reuse of treated wastewater in Turkey and the relevant legislations

In Turkey, within the scope of liabilities specified under the “Environment” section of the “National Program for the Undertaking of European Union Requirements,” issued in 2001 and updated in 2003, joint efforts by the participation of relevant organizations and institutions are being made for fitting the environmental legislation of Turkey to the European Union legislation. Among the things to be done within the scope of conforming to the Water Framework Directive (WFD), is to revise the existing legislation concerning water management, to overcome the conflicting points and to make the necessary legal arrangements for this purpose.

Within this framework, certain legal arrangements have been made in terms of conformity and forming a country-specific legislation. The Water Pollution Regulation, which goes by the number 25687, was issued in 2004. The purpose of the Regulation was to determine the legal and technical basis necessary for preventing water pollution in conformity with the sustainable development goals, in order to protect the country’s potential of ground water and surface water sources and to help it be utilized in the best ways possible. Later, in 2006, the number 26047 issued the Urban Wastewater Regulation. Correspondingly, in 2010, the number 27527 issued the Technical Procedure Statement for Wastewater Treatment Facilities. With this statement, certain parameters such as the criteria concerning the design of urban wastewater treatment facilities, the technologies to be preferred and the criteria for the discharge of treated wastewater, etc. have been standardized (Özbay and Kavaklı, 2008).

Despite the legislation that was adopted, even the number of wastewater treatment facilities is way under the desired rate. Wastewater treatment facilities are sufficient to meet the needs of only approximately 45% of the country’s population. And the existing treatment facilities are mostly located on the western and southern regions of the country (Arslan-Alaton et al., 2005). Approximately the halves of these facilities are adequate only for pre-treatment and the treatment of wastewater itself is a serious problem. For these reasons and due to the fact that water sources are only relatively adequate for now, the reuse of treated wastewater consists only of a few pilot projects and scientific studies. In conclusion, when Turkey is concerned, it can be said that there is still much to be done both for the treatment of wastewater and the reuse of treated wastewater.

4. CONCLUSIONS

Since the beginning of the century, the need for water in Continental Europe, especially in the countries that are located on the Mediterranean belt, including Turkey, has increased due to factors such as the irregularities in the timing and intensity of precipitation, the heavy increase in the populations resulting from mass migration, the increase in the industrial water use due to the increased use of technology, etc. For these reasons, alternative sources to be offered for utilization are being considered continually. According to some of United Nations reports, the issues of wastewater management and water quality have cross-linkages with a range of other water- and non-water issues, not least in respect of the water, energy and food nexus. It has also been acknowledged that wastewater management clearly plays a role in achieving future water security in a world where water stress will increase (UN-Water, 2015).

As specified in the legislation, one of these alternative sources is treated wastewater. The very limited number of alternative sources that can be utilized so quickly and easily turns the attention to the reuse of wastewater after treatment. When the legislation adopted in the European Union and Turkey is examined and evaluated, it is seen that serious efforts are directed to dealing with issues concerning both water and the reuse of treated wastewater and that it is considered in detail in terms of health, environment and socio-economical factors. These considerations generally result from the concerns related to possible problems to be faced in the treatment, the criteria to be adopted for the process and the possibility of the discharged water to pose a threat to the public through the product chain. The different uses of reclaimed water lead to different pathways by which reclaimed water enters the environment. It is important to look at both the initial receiving environment for

reclaimed water and the final location (USEPA, 2012). Health, environment and other sensitive factors must be considered while making legal regulations about wastewater treatment or usage.

In conclusion; it is possible to claim that reuse of treated wastewater and the legislations concerning it in the European Union and in Turkey are improving. Within the framework of the plans and projections that are made, efforts are directed towards both designating the legislations and establishing environment and human health-safe utilization criteria.

REFERENCES

- Angelakis, A.N., Morocos de Monte, M.H.F., Bontoux, L., Asano, T., 1999. The status of wastewater reuse practice in Mediterranean Basin: Need for guidelines. *Wat. Resources* 33(10): 2201-2217.
- Akkaya, C., Efeoğlu, A., Yeşil, N., 2006. Avrupa Birliği su çerçeve direktifi ve Türkiye' de uygulanabilirliği. TMMOB Su Politikaları Kongresi, Ankara.
- Arslan-Alaton, İ., Gürel, M., Eremektar, G., Övez, S., Tanık, A., Orhon, D., 2005. Türkiye' de sürdürülebilir atıksu yönetimi: Mevcut durum, karşılaşılan sorunlar ve çözüm önerileri. *Aritılmış Evsel Atıksuların Tarımsal Sulamada Kullanılması Çalıştayı*, Ankara.
- Blösch H., 2005. European Union legislation on wastewater treatment and nutrients removal. In *Proceedings of IWA Specialized Conference on Nutrient Management*, 18-21/09/2005, Krakow, Poland.
- EC, 2015. *Water reuse - An action plan within the circular economy*. European Commission, Water Department, Brussels.
- Gelgeç, T., 2012. *Türkiye Su Mevzuatı ve Değişen Su Paradigması*. Namık Kemal Üniversitesi Fen Bil. Enst. Yüksek Lisans Tezi, 46 sayfa, Tekirdağ.
- Mesropyan, E., Mkrtychyan, V., Hovsepyan, A., 2016. A new solution to municipal wastewater treatment in Armenia. *European Water* 53: 71-75.
- Moens, R.P., 2003. *Su Çerçeve Direktifi' nin Türkiye' de Uygulanması, Uygulama El Kitabı*. Project No: 105774, Doc. No: 13/99047338/MJH, Vol. F1.
- Özbay, İ., Kavaklı, M., 2008. Türkiye' de ve diğer ülkelerde arıtılmış atıksuların geri kazanım uygulamalarının incelenmesi. *Çevre Sorunları Konferansı*, Kocaeli.
- Sanz, L.A., Gawlik, B.M. 2014. *Water REuse in Europe: Relevant Guidelines Needs for and Barriers to Innovation*. E.U. J.R.C. Institute Environment and Sustainability, 51p.
- UN-Water, 2015. *Wastewater management. A UN Water Analytical Brief*. UN Water Publications.
- USEPA, 2102. *Guidelines for water reuse*. (EPA/600/R-12/618) United States Environmental Protection Agency, USA.
- Winpenny, J., Heinz, I., Koo-Oshima, S., 2010. *The Wealth of Waste: The Economics of Wastewater use in Agriculture*. Food and Agriculture Organization of the United Nations. *Water Reports* No: 35.