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Review Article

The Legal Framework of Water Quality Management in Turkey

Türkiye'de Su Kalitesi Yönetiminin Yasal Çerçevesi

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Abstract

After the 1970's, an unprecedented urbanization and industrial activities have resulted in severe inland and coastal water degradation in Turkey. Infrastructure investment in wastewater management has fallen behind schedule due to the lack of required extensive financing to implement large projects. On the other hand, land-use planning has been overlooked due to increased demand for housing and legal gaps that weaken the enforcement in that respect. Turkey is updating its regulations within the framework of the current EU directives after becoming a candidate country to the European Union (EU). Comprehensive reforms related to institutional and legal issues have gradually taken place with the objective of meeting the defined strategies for water pollution abatement. A new "Water Law " has been drafted for ensuring a more efficient water management by updating the existing legal framework where needed and with emerging issues (e.g. climate change). In 2021, a "Consultative Assembly on Water" was established to analyze the content and items of the new "Water Law ", in particular, and the conclusion statement was displayed. In this study, Turkey's water quality management policies are presented by taking into consideration the present urgent actions and future needs, development at national, regional and municipal levels as well as the on-going EU accession process together with regional and international agreements. An assessment of inland and coastal water quality is done according to the regulations in force and set standards.

Keywords: *water quality assessment, coastal waters, inland waters, wastewater management, EU accession*

Öz

Türkiye'de özellikle 1970'lerden sonra, hızlı kentleşme ve endüstriyel faaliyetler, kıta iç ve kıyı sularında ciddi sorunlara neden olmuştur. Atık su yönetimine yönelik olan altyapı yatırımları büyük projeler için gerekli olan yüksek maliyetlerin karşılanamaması nedeniyle planlanan hedeflerin gerisinde kalmıştır. Ayrıca, artan konut talebi nedeniyle arazi kullanım planları göz ardı edilmiş olup yasalardaki boşluklar da bu yöndeki yaptırımı zayıflatmıştır. Türkiye, Avrupa Birliğine (AB) aday ülke olmasını takip eden süreçte yönetmeliklerini mevcut AB direktifleri çerçevesinde güncellemektedir. Atık su kirliliğini azaltmak için belirlenen stratejileri hayata geçirebilmek amacıyla kademeli olarak kurumsal ve yasal yapıya yönelik kapsamlı iyileştirmeler gerçekleştirilmiştir. Daha etkin bir su yönetimi sağlamak amacıyla, gerekli olması durumunda mevcut

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yasal yapıyı güncellemek ve iklim değişikliği gibi ortaya çıkan yeni sorunları da dahil edebilmek üzere yeni bir "Su Kanunu" taslağı hazırlanmıştır. 2021 yılında esasen "Su Kanunu" nun içerik ve maddelerinin incelendiği bir "Su Şurası" oluşturularak sonuç bildirgesi yayınlanmıştır. Bu çalışmada, mevcut acil eylemler ve gelecekteki ihtiyaçlar, devam eden AB katılım süreci ile birlikte ulusal ve uluslararası anlaşmalar da dikkate alınarak, Türkiye'nin su kalitesi yönetimi politikaları sunulmaktadır. Kıta içi ve kıyı sularının kalite değerlendirilmesi belirlenen yönetmeliklere ve standartlara göre yapılmıştır.

Anahtar sözcükler: *su kalitesinin değerlendirilmesi, kıyı suları, iç sular, atık su yönetimi, AB uyum süreci*

Introduction

Impacts on water quality may be generated by many various anthropogenic factors. These are (i) uncontrolled population growth that may create large volume of domestic pollution, difficult to assimilate by the receiving environment; (ii) industrial development without adequate infrastructure; (iii) dirty energy choices; (iv) intensive land-use and hydrologic changes; (v) climate variability and changes. Furthermore, severe climatic events result in more recurrent and also extreme and long-term droughts and floods with impacts on ecosystems, human livelihoods and infrastructure (Ülker et al., 2018; Wilk & Wittgren, 2009).

Inadequate water management has caused serious water quality problems in many parts of the world. In point source pollution control, developed countries have reacted to this problem with significant and commendable progress, in particular. However, commensurate progress has not occurred in developing countries. Subsequently, most water resources within and around the urban centers have become greatly polluted because of inadequate water management (Biswas & Tortajada, 2011). Turkey has been among these examples. As a consequence, after the 1980s this alarming situation has led the governmental and local authorities to launch comprehensive and enhanced actions for remedial measures and protection of the environment. The water management policy in Turkey has developed considering its growing population, rapid urbanization, and global and regional developments with the main target of providing the present and future population with required water needs (Burak et al., 2021a; Burak et al., 2021b; Savun-Hekimoğlu et al., 2021).

The national aim is to engage in a sustainable development policy based on the principles of international conventions to which the country is a signatory. For the last three decades, the government has been struggling to increase awareness on environmental issues and encourage implementation of conservation measures in the national policy documents (i.e. development plans). After 2000, as a negotiating candidate country to the European Union (EU), Turkey has started the preparation

of harmonizing its legislation with that of the EU (European Commission [EC], 2000). Subsequently, significant modification in water-related legal framework has been introduced with further improvement expected to be realized in the near future.

Insomuch that; "2020-2023 National Smart Cities Strategy and Action Plan" (Ministry of Environment and Urbanization [MoEU], 2019) has been prepared in order to guarantee that the investments are implemented with appropriate projects and activities in line with the smart city ecosystem. Regarding water management, one of the themes of the Smart Environment component, many targets and policies are included in international policy documents. Especially, high-level implementation steps are defined in the Smart Environment Component item number 15.2 (MoEU, 2019). The most important of these sub-items; improving water resources, reducing and treating wastewater, minimizing water losses, encouraging water reuse, storage, water conservation and sustainable use.

In this study, water quality of both inland and coastal waters in Turkey is evaluated; its management with regard to globally and nationally accepted criteria is assessed with a focus on evolving institutional and legal structure in Turkey. In addition, emerging concepts and policies within the framework of the EU Accession process are highlighted.

Institutional and Legal Framework of Water Quality Management

Turkey has met environmental concerns comparatively late, but from the 1970's onwards, soaring volume of pollution in inland and coastal waters with severe consequences on natural resources have caused environmental problems at dangerous levels. The worst offended water resources and coastal waters by anthropogenic pollution have been the ones located within or near by the western large metropolises and coastal cities (e.g. Istanbul, Izmir, Mersin, Antalya) due to in-migration from the eastern part of the country and natural growth. Furthermore, coastal cities on the Aegean and Mediterranean shoreline have been subjected to population increase in summer season due to touristic influx. The delay in the implementation of sewerage infrastructure has led to an increasing volume of domestic and industrial pollution, in particular. The lack of efficient and regular monitoring of receiving water bodies and enforcement of the ruling pollution control regulations have aggravated environmental concerns with regard to the public health as well as the health of aquatic ecosystems (Zeki et al., 2021). The regulatory framework for water quality management which defines policies (guidance documents), implementing measures (regulations) and enforcement (how to

implement the set regulations) may vary between and within countries; even in degrees of efficiency (Cross & Latorre, 2015).

Previously, the introduction of five-year plans was the first attempt at the adoption of a long-term and centralized policy-making approach related to public investments, whose planning and programming was entrusted to the former State Planning Organization (SPO), replaced by the Ministry of Development at present. Burak (2008) stated the following:

> Since the 1920s, measures to prevent water pollution have been incorporated in numerous laws, regulations and directives enacted by Parliament and other authorized bodies, and in the provisions of international conventions. Most of this legislation, including that in the Constitution, embody provisions for protection of the environment and public health (p. 167).

The Republic of Turkey has been undergoing significant changes in its legal and institutional structures since its establishment in 1923. The historical legal basis related with water can be summarized as follows:

The Law on Waters, No. 831 (The Official Gazette No: 368, 1926), which entered into force in 1926, is the pioneer of water resources legislation in Turkey. This is the first one targeting surface waters with the one entered in force later in 1953, the establishment Law No. 6200 (The Official Gazette No: 8592, 1953) of the State Hydraulic Works (DSI). This law empowers DSI to develop surface and groundwater resources, as such, indirectly, it is a legal tool regulating water resources. These are followed by the "Groundwater Law" No. 167, promulgated in 1960 (The Official Gazette No:10688, 1960) to be enforced by DSI. Additionally, the Environment Act of 1983 (The Official Gazette No:18132, 1983) with its Water Pollution Control Regulations (WPCR) has been a valuable legal basis for regulating inland waters as well as discharge standards and coastal waters (Burak, 2008).

The legal structure of the Environment Act consists of a system of technical regulations and standards that specify the principles of implementation. WPCR (The Official Gazette No: 25687, 2004) promulgated in 1988 is one of the most crucial and inclusive components of this system. Later, Surface Water Quality Regulation (SWQR) (The Official Gazette No: 28483, 2012) is issued in 2012 and the revisions of the regulation are issued in 2015, 2016 and 2021. These regulations specify the technical principles for the protection of surface and groundwater with the aim of meeting human demands while conserving the quality of water resources. On the other hand, Water Framework Directive (WFD) (EC, 2000) and its sub-directive Marine Strategy Framework Directive (EC, 2008) aim to achieve good

environmental status in all European water bodies. Turkey, as a candidate country to the EU membership should proceed in accordance with these directives.

The protection of coastal water quality is a fundamental part of the regulations; whose objectives are: (1) protection of potential water resources; (2) efficiently management of water resources; (3) prevention/elimination of water pollution. Principle of the regulations is based on the "polluter pays" principal. For this reason, polluters have to inform the authorities about the amount and content of their wastewaters and apply for a discharge permit in which the conditions for discharge and the amount of mandatory treatment are stipulated. Among other items, the regulations define the conditions of use of municipal sewerage and treatment systems, discharge standards and the conditions for payment. Provisions concerning hazardous wastes in aquatic environments are defined in the WPCR. Metropolitan municipalities are also authorized by Metropolitan Municipality Law enacted in 1981 (The Official Gazette No: 25531, 2004) to specify and apply within their boundaries the legislation required for the most efficient management of water and wastewater facilities.

Inland Water Quality

Surface Water Quality

Inland waters quality is classified of four classes based on WPCR (2004) from indicating the best quality (I) to indicating the worst quality (IV). However, revised SWQR in June 2021 is classifying water quality of three classes as Class I: very good, Class II: good and Class III: moderate. Quality criteria of inland surface waters are given in Table 1. In addition, same regulation classifies eutrophication status of lakes, ponds and reservoirs using Trophic Level Index from ultraoligotrophic to hypertrophic (The Official Gazette No: 28483, 2012).

The regulation also determines the sensitive region and sensitive water area in terms of trophic levels for both inland and coastal waters in order to stipulate the protection measures and control the nutrient pollution for the region/area. The criteria about trophic level are given in the regulation for inland and coastal waters for the Mediterranean, Aegean, Black Sea and Marmara Sea. Considering the degradation effect of eutrophication on water quality, some of the indexes are developed worldwide for monitoring and evaluating (Ülker et al., 2020). Trophic State Index (TRIX) is one of them and applied also in the Mediterranean, Aegean Sea, Marmara Sea and Black Sea between the years of 2014-2017 by the MoEU (MoEU, 2017).

Chemical and Physicochemical Quality Criteria of Inland Surface Waters

Quality Criteria	Water Quality Classes		
	I (very good)	II (good)	III (moderate)
Color (m^{-1})	RES 436 nm: ≤ 1.5 RES 525 nm: ≤ 1.2 RES 620 nm: ≤ 0.8	RES 436 nm: 3 RES 525 nm: 2.4 RES 620 nm: 1.7	RES 436 nm: > 4.3 RES 525 nm: > 3.7 RES 620 nm: 2.5
pH	6-9	6-9	6-9
Conductivity (µS/cm)	< 400	1000	> 1000
Oil and grease (mg/L)	< 0.2	0.3	> 0.3
Dissolved oxygen (mg/L)	> 8	6	< 6
Chemical oxygen demand (mg/L)	< 25	50	> 50
Biochemical oxygen demand (mg/L)	< 4	8	>8
Ammonium (mg NH_4^+-N/L)	< 0,2	1	>1
Nitrate (mg NO_3^--N/L)	< 3	10	> 10
Total kjeldahl-nitrogen (mg N/L)	< 0.5	1.5	> 1.5
Total nitrogen (mg N/L)	< 3.5	11.5	> 11.5
Ortho phosphate (mg o-PO_4-P/L)	< 0.05	0.16	> 0.16
Total phosphorus (mg P/L)	< 0.08	0.2	> 0.2
Fluoride (µg/L)	≤ 1000	1500	> 1500
Manganese (µg/L)	≤ 100	500	> 500
Selenium (µg/L)	≤ 10	15	> 15
Sulfur (µg/L)	≤ 2	5	> 5

Groundwater Quality

Groundwater quality has deteriorated due to over abstraction by domestic and agricultural use, which gave rise to salinization of the aquifers in coastal settlements. Monitoring of groundwater quality in Turkey is done in accordance with the Regulation on the Protection of Groundwater Against Pollution and Deterioration (The Official Gazette No: 28257, 2012). The purpose of this Regulation is to determine the necessary principles for maintaining the conditions of good groundwater, preventing its contamination and degradation and improving groundwater quality. This regulation determines the groundwater quality parameters and standards for threshold value.

Investment in hotel and summerhouse construction has resulted in a soaring volume of pollution that exceeded the assimilative capacity of some coastal waters. This accelerated influx to the coastal areas happened as a result of unearned and real

income expectations (e.g. Izmir, Antalya, Mersin). Water has been supplied mostly from groundwater and in excessive amounts to satisfy the demand of the newly developed settlements, lowering the water table and resulting in sea-water intrusion[1] in most of the coastal aquifers. Additionally, deterioration of water quality as a result of fertilizers and pesticides used in irrigated agriculture is another major problem in Turkey, especially in the Mediterranean, Aegean, Central Anatolia, and Marmara regions. Due to heavy fertilization, nitrate and nitrite contamination is very common in these regions, where the levels are above the standards (Burak et al., 2004).

River Basins Protection Action Plans (RBPAPs) and River Basin Management Plans (RBMPs)

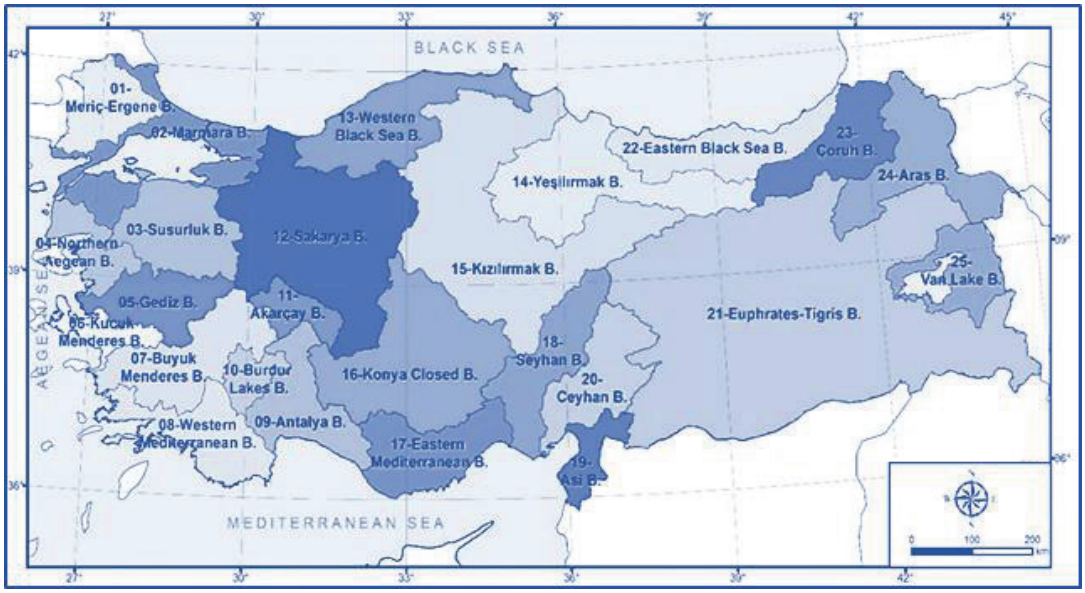
Turkey comprises of 25 hydrological watersheds (Fig. 1). Among them Konya, Akarçay, Van Lake and Burdur Basins are closed watersheds and Meriç-Ergene, Asi, Fırat-Dicle, Aras Basins are transboundary watersheds.

Within the scope of the harmonization Turkish legislation with that of the EU and WFD, regulations on the protection of watersheds and preparation of River Basin Management Plans (RBMPs) was first published on 17/10/2012 (The Official Gazette No: 28444, 2012). Then, it was amended on 28/10/2017 as a Regulation on Preparation, Implementation and Monitoring of the River Basin Management Plans (The Official Gazette No: 30224, 2017) and lastly revised in 11/01/2019. As a prerequisite of the management plans, the preparation of the RBPAPs were completed for all the 25 basins by the end of 2015 aiming at protection and planning of the river basins and wetlands with a holistic approach in terms of physical, chemical and ecological aspects. After the completion of RBPAPs, the RBMPs have being prepared. RBMPs of 8 basins including Gediz, Meriç-Ergene, Büyük Menderes, Konya, Susurluk, Burdur, Küçük Menderes and North Aegean Basins have been completed/issued by October 2021 (Ministry of Agriculture and Forestry [MoAF], 2021).

[1] Overexploitation of coastal aquifers causes the lowering of freshwater level and seawater to flow into the aquifer and to replace the freshwater- a phenomenon known as ‘saline intrusion’

Figure 1

Hydrological Watersheds of Turkey (MoFWA, 2013)



Marine and Coastal Water Quality

Marine and coastal waters of Turkey are under pressure by various types of pollution sources. According to United Nations Environment Programme/Mediterranean Action Plan (UNEP/MAP), approximately 80% of marine pollution is generated by land-based activities and 20% is ship-originated (UNEP/MAP, 2012). The sources of land-based pollution can be enumerated as: (1) river discharges carrying point and diffuse pollution; (2) untreated domestic, industrial wastewater, leakage from land-fills; (3) storm-water discharges; (4) pollution generated by ports and marinas; (5) cooling water of thermal power plants; (6) marine litter; (7) aquaculture farms. Pollution conveyed through transboundary sources from the Danube River and Black Sea has also a significant impact on marine and coastal waters of the inland Marmara Sea, in particular (Çiçekalan & Öztürk, 2018). Also, marine litter, oil spills, tanker and pipeline accidents are among the considerable sources of marine pollution (Doğan & Burak, 2007; Kunt et al., 2016; Priority Actions Programme/Regional Activity Centre [PAP/RAC], 2005; Ülker & Baltaoğlu, 2018).

Table 2

Water Quality Classes in Hydrological Watersheds and Total Point Loads (MoEU, 2017)

Basin No	Basin	COD	BOD	NH_4	NO_2	NO_3	Tot. P	Overall	Contribution of Pt. Loads to Total	
									TN	TP
11	Akarcay	I-II	III-IV	IV	IV	I	IV	IV	19	34
9	Antalya	I-II	I-II	I-II	I-II	I-II	II-III	II	9	22
24	Aras		I-II	I-II	I-II	I-II		I-II	8	20
19	Asi	I-II	I-II	III-IV	IV	I		IV	27	50
8	W. Mediterranean	I-II	I-II		I-II	I	II	I-II	10	27
13	W. Black Sea	I-II	I-II					II-IV	21	42
10	Burdur	I,IV		II, IV	IV	I		IV	4	4
7	B. Menderes	II-III		II-III	IV	I		III	12	16
20	Ceyhan	I		I, III	III-IV	I		III-IV	16	20
23	Coruh	I-II	I-II	I-II	II-III	I	II-III	II-III	5	21
17	E. Mediterranean	I	I	I-II	I-III	I		I-III	12	30
22	E. Black Sea	I	I	I	III	I	III	I-III	17	48
1	Ergene	IV	III	III	III-IV	I		III-IV	26	51
21	Euphrates&Tigris	I-II		I-IV				I-IV	19	39
5	Gediz	I-II	II-III	I-IV	III-IV	I		III-IV	26	44
15	Kizilirmak	I-II		II-IV	III-IV	I-II	II-IV	II-IV	12	15
16	Konya	III	III	II	IV	II		III-IV	4	12
4	N. Aegean	I-IV	I-IV	I-IV	III-IV	I-II		I-IV	17	31
6	K. Menderes	IV		IV	IV	I		IV	18	27
2	Marmara	I-IV	I-IV	I-IV	III-IV	I-II		II-IV	26	33
12	Sakarya	II-IV		II-IV		I	II-IV	III-IV	36	56
18	Seyhan	I		II-III	III-IV	I	II-IV	II-IV	10	11
3	Susurluk	I-II		II-IV	IV	I, III		III-IV	16	23
25	Van Lake		II	II	III-IV	I		I-IV	11	31
14	Yesilirmak	III-IV	III-IV	III-IV	III-IV	III-IV	III-IV	III-IV	10	15

Assessment of marine/coastal water quality is key to best management practices. Within this scope, Turkey developed joint research programs with white riparian countries and has become a party to the international environmental conventions like Barcelona Convention and Bucharest Convention. Regional monitoring studies were carried out according to these conventions, its protocols and programmes as MEDPOL (Mediterranean Marine Pollution Assessment and Control Programme) in Mediterranean/Aegean Sea, BSIMAP (Black Sea Integrated Monitoring and Assessment Programme) in Black Sea and MEMPHIS (Environmental Master Plan and Investment Strategy for the Marmara Sea Basin) in the Marmara Sea until 2011. Then, after the 2000s, the Water Framework Directive (WFD) and the Marine Strategy Framework Directive (MSFD), which emphases ecosystem-based management and integrated monitoring approaches, entered into force in the EU. Turkey has adopted these new approaches of monitoring strategies and within this context physical, chemical and biological characteristic of seawater, sediment and biota has been started to be monitored under "Integrated Marine Pollution Monitoring" programme by the Ministry of Environment and Urbanization since 2011 (Olgun Eker et al., 2016). So far, two monitoring periods (2014-2016 and 2017-2019) have been successfully completed and recent researches are on-going related to the classification of the Turkish marine/coastal water quality which will cover 2019-2022 period.

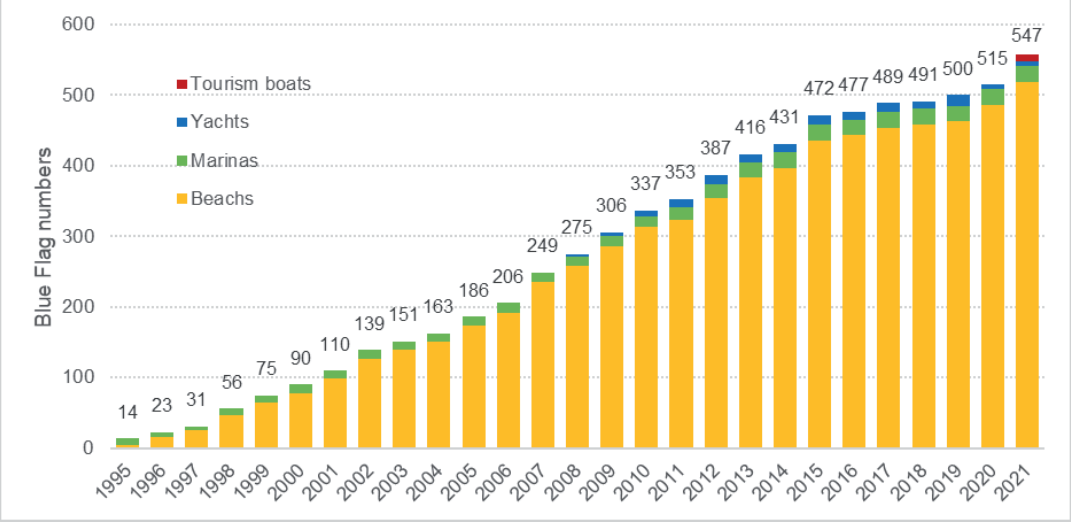
Bathing Water Quality and Blue Flag

Bathing water quality is monitored according to revised Regulation on the Management of Bathing Water Quality (RMBWQ) (The Official Gazette No: 30899, 2019). This Regulation was issued by taking into account the EU Bathing Water Directive (BWD) (2006/7/EC). Both have the same quality criteria and classifications for inland, coastal and transitional waters. Classification of bathing waters is done based on indictor bacteria (*E. coli* and intestinal enterococci) levels as very good, good, sufficient and poor. There are over 1500 coastal and inland bating waters which water quality is monitored by Ministry of Heath of Turkey. Data is available to the public through the Ministry of Heath, Bathing Water Quality Tracking System web page (Ministry of Heath, 2021).

Turkey has been participating to the Blue Flag programme since 1993, which has been a driving force to meet and maintain a series of stringent environmental, educational, safety-related and access-related criteria for qualifying the Blue Flag-awarded facilities. In total 547 beaches, marinas private yachts and tourism boats were awarded with the Blue Flag Certification in 2021. The total number has increased every year (Fig. 2) (Blue Flag, 2021).

Figure 2

Number of Facilities Awarded with Blue Flag over the Years in Turkey



Wastewater Pollution and Control

Construction of up-to-the-standards sewerage facilities began in the late 1960's initiated by the former Bank of Provinces (restructured as ILBANK). New sewerage projects have been designed on separate systems taking into account land development projections. In urban areas more than 75% of the population is connected to the sewerage network on the average. Due to high investment costs, storm water collection systems have been constructed only in limited flood prone areas of big cities (Burak & Demir, 2016). Today, wastewater management is carried out according to Urban Wastewater Treatment Regulation (UWTR) (2006) which covers the technical and administrative principles related to the collection, treatment and discharge of urban and certain industrial wastewater, monitoring, reporting and inspection of wastewater discharge (The Official Gazette No: 26047, 2006).

So far, in coastal settlements, the final disposal by deep-sea outfall of collected wastewater after primary treatment has been a common practice. This practice is mainly based on the optimum dilution and dispersion mechanism of wastewater in the marine currents. The deep sea discharges (marine disposal) of untreated or partially treated wastewater constitutes an alternative treatment and disposal strategy. In Turkey, this practice is a commonly used practice by the municipalities located on the Black Sea cost. Dispersion models are needed to estimate the dilution

of wastes because of mixing and transport. The degradation of organic matter and die-off of pathogens and viruses also effect the pollution reduction. The efficient mixing through adequate outfall diffusers is significant for the dilution of wastewater effluents in the immediate vicinity of the outfall (Uslu, 1985). Table 3 gives the discharge Criteria for Deep Sea Outfalls and Figure 3 gives the location of wastewater treatment plants all over the country.

Table 3

Discharge Criteria for Deep Sea Outfalls (MoEU, 2017)

Parameter	Limit	Notes
pH	6-9	
Temperature	35˚C	
Suspended Solid (mg/L)	350	
Oil and grease (mg/L)	15	
Floating substances	Should not be present	
5-day Biological Oxygen Demand (mg/L)	250	
Chemical Oxygen Demand (mg/L)	400	
Total Nitrogen (mg/L)	40	
Total Phosphate (mg/L)	10	
Methylene Blue Surface Active Agents (mg/L)	10	Note 1
Other parameters		Note 2

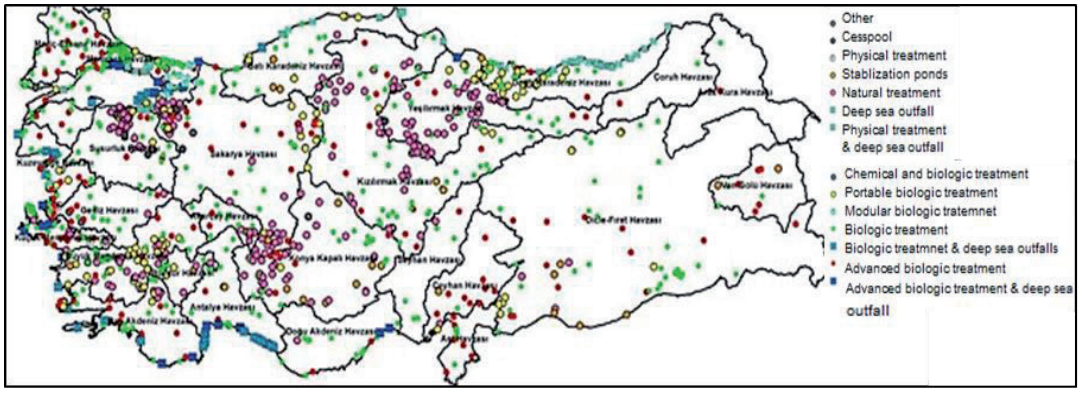
Note 1. Discharge of substances whose biodegradation does not comply with the Turkish Standards Institute is prohibited.

Note 2. It must comply with the limit values given for these parameters in the Regulation on the Amendment of the Regulation on the Control of Pollution Caused by Dangerous Substances in Water and its Environment (The Official Gazette No: 26040, 2005).

The treatment level of domestic wastewater to be discharged into the receiving media is assessed under three categories based on the population figures. The regulations prescribe a comprehensive list of effluent standards particular to domestic wastewater treatment works discharging directly to watercourses and sea, and individual industries. Areas of high ecologic importance and sensitive to environmental pollution must be given special importance as stipulated in the related clause of the Environment Act Advance treatment is gradually being introduced to the wastewater treatment plant design located in touristic coastal areas, special protected areas and water protection basins (Burak & Mat, 2020).

Figure 3

Location of Wastewater Treatment Plants (Evsel/Kentsel Atık su Arıtma Tesislerinin Mevcut Durumunun Tespiti, Revizyon İhtiyacının Belirlenmesi Projesi [TÜRAAT], 2017)



Discussion

After 2000, Turkey became an EU accession (candidate) country. The harmonization of the national legislation with that of the EU has accelerated legislative modifications with the promulgation of several regulations on river basin management and water quality, in particular. Among these, the followings can be cited as prominent achievements:

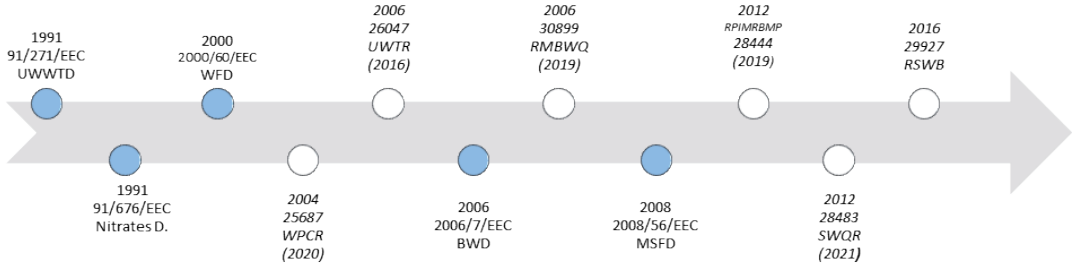
- Regulation on "Preparation, Implementation and Follow-up of Water Management Plans" issued in 2012 and the Communique on the establishment and duties of Basin Management Coordination Councils, in 2019, in relation with river basin management planning
- Regulation of Protection of Water Against Agricultural Nitrate Pollution (The Official Gazette No: 29779, 2016), Regulation on Monitoring and Implementation of Flood Management Plans (The Official Gazette No: 29710, 2016), Regulation on Protection of Groundwater Against Pollution and Deterioration (The Official Gazette No: 28257, 2012) and UWTR in relation with water quality.

The timeline of the EU directives and regulations in Turkey related to water management is given in Figure 4. Each directive indicates the requirements for the aim of achieving of good environmental status in inland, coastal and transitional waters. The criteria for the urban wastewater discharges were issued in 2006 in UWTR same with EU Urban Waste Water Treatment Directive (UWWTD) (1991), while WPCR (2004) has already more detailed criteria considering the population and BOI_5, COD and TSS load. EU BWD and MSFD are issued in 2006 and 2008, respectively and RMBWQ in 2019 is issued with the same criteria and classification of the EU BWD. The regulation was published in the Official Gazette No: 29927 dated 23.12.2016 with the name of "Regulation on Sensitive Water Bodies and the Determination of Areas Affecting these Bodies and Improving Water Quality (RSWB)" according to harmonization of the directives: WFD, UWWTD and Nitrates.

The achievement following the requirement for the EU/WFD has been (a) sound economic instruments for sustainable water management, (b) drought and flood management and preparedness together with climate change impacts inserted in planning documents, (c) improvement in institutional structure and legal framework integrated into national policy decisions (Burak & Margat, 2016).

Figure 4

Timeline of the EU Directives (Blue) and Regulations in Turkey (White)



*Years in parenthesis indicate last revision date.

However, current actions in pollution reduction and water resource management should be reinforced to remedy problems, some of which are river basin-specific and call for improved river basin management planning. Because although water-related legal and institutional structure of Turkey has been improving during the last decades as summarized in above, more improvement is needed to meet the requirements of the WFD which Turkey has to comply with in line with the

harmonization of her legislation. Most importantly, due to the fact that available groundwater and surface water reserves fall short to meet the demands of the growing population with regard to quantity and quality. Therefore, there is a need for a comprehensive legal and institutional structure, which is expected to be covered by the new Water Law. This has been agreed at all levels by all national instances to replace/update the existing laws (e.g. the Law on Waters) which do not respond adequately current water needs. Thus, it is expected that the new "Water Law" will be the prominent legal document for ensuring the needed improvement. The main objectives of the new "Water Law" are addressed as (i) protecting, upgrading and improving water resources; (b) ensuring sustainable water use based on priorities on the needs; (c) ensuring integrated water management by one fully responsible body on the basis of river basin management by taking water quantity and quality into account; (d) ensuring water use efficiently by promoting physical savings and quality savings by allocating water to appropriate uses; (e) allocating water use by one fully responsible body; (f) regulating the legal aspects of water by a Law; (g) ensuring compliance with EU legislation.

Currently in Turkey, there are three regulations (RBMPs, SWQR, RSWB) in force and harmonized with the EU WFD. However, it is recommended to establish and/or expand a monitoring network, including biological monitoring, as soon as possible to fully harmonize the routine monitoring activities with WFD (MoAF, 2019).

One of the main components of water quality management depends on an overall reliable wastewater pollution control strategy. Wastewater treatment standards in Turkey are regulated by two regulations, both are in force: WPCR (2004) and the UWTR (2006). These regulations with incoherent treatment standards cause confusion in practice.

> So far, the common practice has been to take from each regulation the more stringent standard for each parameter and to request municipalities to comply with these new sets of standards, which do not comply with either of the regulations in force (The World Bank, 2016).

As a result, some issues hinder the implementation of the EU Directives. The prominent issues are overlap and conflicts in regulations, planning and institutions that can be explained as:

- Regulatory: Although a comprehensive set of regulations exists with stringent standards, the enforcement is not satisfactory in many cases (e.g.

the operation and maintenance of public-owned wastewater treatment plants, two regulations in force, other standards applied in practice, all more stringent than the EU standards resulting in failure of enforcement in most of the cases).

- Institutional: Many institutions deal with aspects of the sector (Burak et al., 1994). At present, there are more than 10 institutions responsible for water related issues as per their legal framework/establishment law (e.g. the Ministry of Environment and Urbanization, Ministry of Agriculture and Forestry, Ministry of Health, Ministry of Energy and Natural Resources at central level and Metropolitan Municipalities, at local level) among others. They are assigned different, sometimes overlapping tasks in relation with their duties and responsibilities which convey to fragmented water management. As a result, this creates also various controversies in water management. Therefore, one of the targets of the new Water Law has been put forward as to improve the existing institutional fragmented structure in the water sector in order to ensure a more efficient management. A "Consultative Council on Water" was formed with the participation of representatives from all water-related governmental institutions, public institutions, NGOs, and private sector on 29 March 2021. The issue related to institutional shortcomings have also been discussed by the Consultative Council on Water finalized with a "Conclusion Statement" published on 21 October 2021 (MoAF, 2021). An in-depth institutional critical analysis and required improvement as put forward by the 28 items of the "Conclusion Statement" will be the subject of another study.

- Planning: Numerous action plans and investment programs overlap. Based on the above mentioned key issues, it seems obvious that there is a need for a vision clarity, a coherent articulation of strategic concerns, the formation of apparent responsibilities and incentives at each level of responsibility, setting out what should be subject to central regulation and consistent, national and enforceable standards considering economic affordability, and the implementation process (Burak & Ülker, 2018). In accordance with this requirement, reconsideration of the existing legislation is necessary according to real requirements in existing/planned fields based on a comprehensive assessment of conditions in Turkey and long-term data. Feasibility, implementation of enforcement and economic discourage should be priority in this process.

Conclusion

The Republic of Turkey has acquired a long experience since the promulgation of the Law on Waters (The Official Gazette No: 368, 1926) in 1926. Also, it has well equipped facilities, trained and experienced staff and potential financial possibilities to improve water resource management and related works that will comply with the obligations of the EU WFD. However, leadership and coordination responsibilities are not fully established yet and a lack of cooperation may exist because of undefined roles. Furthermore, experience related to RBMPs is expected to be gained as one of the outputs of recently finalized and ongoing projects related to "the Conversion of RBAPs into RBMPs". The implementation of the WFD offers a potential for improvement in this respect and opens different opportunities to stimulate the development of human resources, inter-institutional cooperation and coordination, international support and partnership which will be the building blocks of ongoing efforts. As stated in the "National River Basin Management Strategy (2014-2023)", the national vision is expressed as to "become a country that is water, food and energy secure and climate resilient". Therefore, on the way to comply with this strategy, managing and restoring aquatic ecosystems, goods and services together with a water-efficient and water-saving economy is considered of the utmost importance. To achieve this target, there is still substantial need for data collection and monitoring for carrying out comprehensive and reliable researchers for further improvement and development in the water sector.

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Extended Turkish Abstract
(Genişletilmiş Türkçe Özet)

Türkiye'de Su Kalitesi Yönetiminin Yasal Çerçevesi

Türkiye'de, doğal kaynakların ve insan sağlığının korunmasını kapsayan ilk kanun 1983'te yayınlanan 2872 sayılı Çevre Kanunu'dur. Çevre Kanunu'nun yasal yapısı, uygulama esaslarını belirleyen bir teknik düzenlemeler ve standartlar sisteminden oluşur. Daha sonraki yönetmeliklerin birçoğu Çevre Kanunu'na dayanılarak hazırlanmıştır. Günümüzde Su Kirliliği Kontrol Yönetmeliği (SKKY) (Resmi Gazete No: 25687, 2004) ve Yerüstü Su Kalitesi Yönetmeliği (Resmi Gazete No: 28483, 2012), su kaynaklarının kalitesini korumayı amaçlarken, insan taleplerini karşılamak amacıyla yerüstü ve yeraltı sularının korunmasına yönelik teknik esasları belirlemektedir. Ayrıca büyükşehir belediyeleri Büyükşehir Belediyesi Kanunu (Resmi Gazete No: 25531, 2004) ile su ve atık su tesislerinin en verimli şekilde yönetilmesi için gerekli mevzuatı kendi sınırları içinde belirleme ve uygulama yetkisine sahiptir. Yeraltı suyu kalitesinin izlenmesi ise Yeraltı Sularının Kirlilik ve Bozulmaya Karşı Korunması Hakkında Yönetmelik (Resmi Gazete No: 28257, 2012) uyarınca yapılmaktadır. Bu Yönetmeliğin amacı, iyi yeraltı suyu koşullarının sürdürülmesi, kirlenmesinin ve bozulmasının önlenmesi ve yeraltı suyu kalitesinin iyileştirilmesi için gerekli ilkeleri belirlemektir. Ulusal yönetmeliklere ek olarak Su Çerçeve Direktifi (SÇD) (Avrupa Komisyonu, 2000) ve onun alt direktifi Deniz Stratejisi Çerçeve Direktifi (MSFD) (Avrupa Komisyonu, 2008) tüm Avrupa su kütlelerinde iyi bir çevresel durum elde etmeyi amaçlamaktadır. Türkiye AB aday ülkesi konumunda olduğu için yönetmeliklerini mevcut AB direktifleri çerçevesinde güncellemektedir.

Havza Yönetim Planlarının Hazırlanması, Uygulanması ve Takibi Yönetmeliği (Resmi Gazete No: 28444, 2012) uyarınca Nehir Havzalarını Koruma Eylem Planları (NHKEP'ler) ve Nehir Havzası Yönetim Planları (NHYP'ler) hazırlanmıştır. Gediz, Meriç-Ergene, Büyük Menderes, Konya, Susurluk, Burdur, Küçük Menderes ve Kuzey Ege Havzaları olmak üzere 8 havzanın NHYP'leri Ocak 2021 itibarıyla tamamlanarak yayımlanmıştır. Son yıllarda, Entegre Su Kaynakları Yönetimi ve AB SÇD ilkelerine uyum konusunda Türkiye'de önemli ilerlemeler kaydedilmiştir. Bununla birlikte, kirliliğin azaltılması ve su kaynakları yönetimindeki mevcut eylemler yeterli değildir ve uygulamaların güçlendirilmesi gerekmektedir. Bu amaçla, Nehir Havzası Yönetim Planlarının Hazırlanması, Uygulanması ve Takibi Hakkında Yönetmelik çıkarılmıştır.

Türkiye'nin deniz ve kıyı suları, çeşitli kirlilik kaynakları tarafından baskı altındadır. UNEP / MAP'a göre, deniz kirliliğinin yaklaşık % 80'i kara kökenli faaliyetlerden ve % 20'si gemi kaynaklıdır (UNEP-MAP, 2012). Deniz / kıyı suyu kalitesinin değerlendirilmesi, en iyi yönetim uygulamalarının anahtarıdır. Bu kapsamda Türkiye, kıyıdaş ülkelerle ortak araştırma programları geliştirmiş ve Barselona Sözleşmesi ve Bükreş Sözleşmesi gibi uluslararası sözleşmelere taraf olmuştur. Bölgesel izleme çalışmaları, bu sözleşmeler, protokol ve programlarına göre Akdeniz / Ege Denizi'nde MEDPOL (Akdeniz Deniz Kirliliği Değerlendirme ve Kontrol Programı), Karadeniz'de BSIMAP (Karadeniz Entegre İzleme ve Değerlendirme Programı) ve MEMPHIS (Marmara Denizi Havzası için Çevresel Master Planı ve Yatırım Stratejisi) 2011 yılına kadar yürürlüğe girmiştir. Bunların yanı sıra 2000'lerden sonra ekosistem tabanlı yönetimi ve entegre izleme yaklaşımlarını vurgulayan SÇD ve MSFD yürürlüğe girmiştir. Türkiye'de benimsenen bu yeni izleme stratejileri yaklaşımları ile Çevre ve Şehircilik Bakanlığı tarafından "Entegre Deniz Kirliliği İzleme" programı kapsamında deniz kirliliği izlenmeye başlanmıştır (Olgun vd., 2016). Şimdiye kadar, iki izleme dönemi (2014-2016 ve 2017-2019) başarıyla tamamlanmış, 2019-2022 dönemini kapsayacak olan Türkiye deniz / kıyı suyu kalitesi sınıflandırmasına ilişkin son araştırmalar devam etmektedir.

Ülkemizde yüzme suyu kalitesi, 2019 yılında revize edilmiş olan Yüzme Suyu Kalitesinin Yönetimine Dair Yönetmelik (Resmi Gazete No: 30899, 2019) ile izlenmektedir. Sağlık Bakanlığı tarafından yüzme suyu kalitesinin izlendiği 1500'den fazla kıyı ve iç sular bulunmaktadır. Ek olarak, 2021 yılında toplam 547 plaj, marina, bireysel yat ve turizm teknesi Mavi Bayrak ile ödüllendirilmiştir (Mavi Bayrak, 2021).

Atık su kirliliği ve kontrolüne yönelik ise standartlara uygun kanalizasyon tesislerinin inşası, 1960'ların sonunda mülga İller Bankası tarafından başlatılmış, günümüzde İLBANK tarafından inşa edilmektedir. Günümüzde atık su yönetimi ise kentsel ve bazı endüstriyel atık suların toplanması, arıtılması ve deşarjı, atık su deşarjının izlenmesi, raporlanması ve denetlenmesi ile ilgili teknik ve idari ilkelerin yer aldığı Kentsel Atık su Arıtma Yönetmeliğine göre yapılmaktadır (Resmi Gazete No: 26047, 2006).

Sonuç olarak, bazı sorunlar AB Direktiflerinin uygulanmasını zorlaştırmaktadır. Mevzuat, kurumsal yapı ve planlamada öne çıkan hususlar şu şekilde açıklanabilir:

• Mevzuat: Sıkı standartlar içeren kapsamlı bir dizi yönetmelik mevcut olmasına rağmen, yaptırımlar çoğu durumda tatmin edici değildir.

• Kurumsal yapı: Günümüzde suyla ilgili konulardan sorumlu 10'dan fazla kurum (ör. Çevre ve Şehircilik Bakanlığı, Tarım ve Orman Bakanlığı, Sağlık Bakanlığı, Enerji ve Tabii Kaynaklar Bakanlığı, merkezi düzeyde ve Büyükşehir Belediyeleri, yerel düzeyde) bulunmaktadır. Bu kurumlar aktaran görev ve sorumlulukları ile ilgili olarak farklı, bazen örtüşen görevler verilmektedir. Bu durum da su yönetiminde de çeşitli tartışmalara yol açmaktadır. Bu nedenle, yeni Su Kanununun hedeflerinden biri, daha etkin bir yönetimin sağlanması için su sektöründeki mevcut kurumsal parçalı yapının iyileştirilmesi olarak ortaya konmuştur. 29 Mart 2021 tarihinde suyla ilgili tüm kamu kurumları, kamu kurumları, STK'lar ve özel sektör temsilcilerinin katılımıyla "Su Suraşı" düzenlenmiştir ve 21 Ekim 2021 tarihinde bir "Sonuç Bildirgesi" (MoAF, 2021) yayınlanmıştır.

• Planlama: Çok sayıda eylem planı ve yatırım programı birbiri ile örtüşmektedir. Bu doğrultuda Türkiye'deki koşulların kapsamlı bir değerlendirmesine ve uzun vadeli verilere dayalı olarak mevcut/planlanan alanlardaki gerçek ihtiyaçlara göre mevcut mevzuatın yeniden gözden geçirilmesi gerekmektedir. Bu süreçte fizibilite, yaptırımların uygulanması ve ekonomik caydırıcılık öncelikli olmalıdır.