

## Standardised Water Accounting in Türkiye River Basins: A Case Study of Konya Closed Basin

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### Abstract

This paper assesses the feasibility of implementing the "General Purpose Water Accounting System," a water management accountability tool in Konya Closed Basin, one of the Türkiye River basins. This system draws inspiration from financial accounting and is designed to generate standardized and comprehensive water accounting reports using established financial accounting techniques. The paper argues that standardized water accounting represents a suitable approach for enhancing accountability and transparency among water managers. In this context, the authors prepared the "The Statement of Water Assets and Water Liabilities" one of the system's outputs, for the 2017-2018 hydrological year of the Basin and evaluated the system's applicability to other river basins in Türkiye. Consequently, there is a pressing need to establish a robust national water information system in Türkiye that can effectively furnish water-related data on a basin basis. Such an information system is imperative for successfully integrating water accounting practices within the country's water resources management framework.

**Keywords:** Accountability, Environmental Accounting, Water Accounting, Water Balance Sheets

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### Türkiye Nehir Havzalarında Standartlaştırılmış Su Muhasebesi: Konya Kapalı Havzası Örneği

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#### Özet

Bu çalışma su muhasebesi sistemlerinden biri olan “Genel Amaçlı Su Muhasebesi” sisteminin Türkiye nehir havzalarından Konya Kapalı Havzası’nda uygulanabilirliğini değerlendirmektedir. Bu sistem finansal muhasebeden yararlanarak, standart ve kapsamlı su muhasebesi raporları oluşturmak üzere tasarlanmıştır. Çalışmada standartlaştırılmış su muhasebesi sisteminin su yöneticileri açısından şeffaflığı ve hesap verebilirliği artıracak uygun bir yaklaşım olduğu ileri sürülmektedir. Bu bağlamda söz konusu su muhasebesi sisteminin çıktısı olan “Su Varlıkları ve Su Yükümlülükleri Tablosu” Konya Kapalı Havzası’nda 2017-2018 hidrolojik yılı için hazırlanmış ve sistemin Türkiye’de ki havzalara uygulanabilirliği çalışmada değerlendirilmiştir. Sonuç olarak, Türkiye’de su ile ilgili verileri havza bazında etkili bir biçimde sunacak ulusal su bilgi sisteminin kurulmasına acil bir ihtiyaç bulunmaktadır. Böyle bir bilgi sistemi su muhasebesi uygulamalarının ülkenin su kaynakları yönetimine başarılı bir şekilde entegre edilmesi için zaruridir.

**Anahtar Kelimeler:** Hesap Verebilirlik, Çevre Muhasebesi, Su Muhasebesi, Su Bilançosu

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## 1. INTRODUCTION

Water is a limited natural resource that affects economic, environmental, and social sustainability. This resource, which is essential for the maintenance of life, is running out, and the threat of water scarcity requires effective water management. This fact has drawn the attention of all stakeholders using water. Consequently, the transparency and accountability demand of stakeholders who use water for various purposes in water management has risen. To fulfill this demand to improve accountability and transparency, the importance of high-quality water-related information has gained prominence (Chalmers, Godfrey and Potter, 2012).

Water accounting has been developed as an information system in water management to meet interested parties' information demands about water and water rights. It can be described as identifying, quantifying, and documenting data about water movement within a system. It serves as the initial phase in designing productive and sustainable water management strategies for a region (Singh, Maheswari and Malano, 2009). The purpose of water accounting is to monitor inflows and outflows, assets, liabilities, storage and reserves for a particular spatial reference and temporal reference, and the results are essential for current and future decisions and policy analyses regarding water management (Karimi et al., 2013). Several water accounting methodologies with diverse viewpoints and features underpinned by different disciplines have been developed by the states and various international organizations to inform internal and external stakeholders and decision-makers about water (Chalmers, Godfrey and Potter, 2012).

One of these methodologies, known as the General Purpose Water Accounting System, has been developed by Australian accounting and water industry experts. This system employs financial accounting techniques for water-related matters, generating reports as its primary outputs. The widespread support for adopting a financial accounting approach, along with the utilization of standardized accounting principles and transparent methodologies for recording and disclosing water "transactions," was robust, especially among government agencies. This support stems from the system's outputs offering comprehensible, standardized data concerning water resources, thereby enhancing management performance (Tello, Hazelton and Cummings, 2016).

States typically either develop their water accounting methodologies or adopt suitable systems developed by external parties. However, Türkiye still needs to develop a water accounting system that will provide systematic information or needs to use one of the systems developed internationally.

According to historical analysis, local and national priorities and international and external pressures have shaped Türkiye's water management pattern. Since the inception of the Republic of Türkiye, an intricate framework of water-related legislation and a decentralized organizational structure have arisen (Kibaroglu, Sümer and Scheumann, 2012). Due to necessary water reforms on the agenda since the 1980s, and with the effect of the European Union (EU) candidacy process, the need for an integrated policy in water resources management has been recognized, and the efforts for structuring integrated management of water resources have begun in the country (Ulusal Su Planı, 2019). With all these affairs, Türkiye, as a candidate country, is aligning itself with, interchanging, and applying all the various European water and environmental acquis items. Türkiye must consent to the Water Framework Directive (WFD), and one of the essential items of the WFD is the adoption of the "river basin management" approach through the designation of "river basin districts" and the appointment of "competent authorities" to govern them (Kibaroglu, Sümer and Scheumann, 2012). WFD establishes a river basin-scale or water resource system scale for the integrated resource management system (Momb Blanch et al., 2014).

Given the aforementioned information, it becomes evident that water accounting methodologies should be relevant in a river basin or a water resource system. Nevertheless, the integration of

water accounting practices in Türkiye is lagging. Specifically, Türkiye still needs to establish a national water information system capable of delivering water-related data on a basin-by-basin basis (Ulusal Su Planı, 2019). This paper has elaborated on how the reports generated by the General Purpose Water Accounting (GPWA) system can effectively meet the information, presentation, and reporting requirements of pertinent institutions responsible for water management and stakeholders in Türkiye. The study specifically focuses on the Konya Closed Basin as its spatial reference, and it has presented "The Statement of Water Assets and Water Liabilities" for this basin by utilizing the water accounts provided by the GPWA system. Additionally, the paper has delved into the feasibility of implementing the system and highlighted the challenges of Türkiye's legal regulations and institutional structures.

## **2. ENVIRONMENT AND WATER POLICY OF TÜRKİYE**

Türkiye is one of the regions where water-related problems are felt the most due to its location. Although seas surround the country on three sides, since it is in a semi-arid climate zone, it cannot be labeled as a rich country regarding water resources. Türkiye's water resources include natural lakes, rivers, reservoirs, and underground waters. The country's annual amount of usable water per capita is 1,346.00 m<sup>3</sup>, which means that Türkiye is experiencing water stress with the amount of water per capita (Hakyemez, 2019). According to State Hydraulic Works (Turkish acronym: DSI), Türkiye has a net water potential of 112 billion m<sup>3</sup>, 94 billion m<sup>3</sup> of surface water; groundwater constitutes 18 billion m<sup>3</sup>.

Following World War II, the establishment of the DSI marked a significant phase characterized by substantial investment in infrastructure projects since the late 1960s. During this period, the government actively propagated the concept of state-driven water resources development. During this period, managing resources was a matter of public agencies (Kibaroglu, Sümer and Scheumann, 2012). Especially after the 1970s, significant changes began to occur in Türkiye's water policy. The liberalization and deregulation of public resources and administration have led to the adopting of private management models. The shift towards a free-market economic framework has been influenced by powerful international financial institutions like the World Bank and IMF, which have supported the government's decentralization, liberalization, and deregulation initiatives. In addition to these factors, the country's aspiration to become a member of the EU has also affected its water policy (Kibaroglu, Sümer and Scheumann, 2012).

Since its establishment, the complex and fragmented legal and institutional structure of the country's water management has brought a comprehensive restructuring to the schedule. Unifying the multi-part legal structure under a single roof has led to starting studies to create a new and comprehensive legal framework. In this context, studies have started operationalizing the country's holistic water resources management approach. Parallel to these developments in the country, the reform process encountered within the scope of the requirements of being a member of the EU also supported all this restructuring. At the beginning of the 2000s, it has become clear that the complexity of authority in water management in Türkiye has reached a point where the adequate protection and sustainable development of water resources are at risk. In the second half of the 2000s, the EU has become the actor influencing the decision-making processes in Türkiye's water management. These developments led to efforts to publish the draft water law under the leadership of various foundations and organizations (Sümer, 2012).

### **2.1. Tools for Water Information Reporting in Türkiye**

There are 25 river basins in Türkiye. Managing water resources based on these basins is the most basic approach to rationally using these resources by protecting them. In this frame, a draft water law is prepared. This law aims to protect, use, improve, and develop water resources sustainably;

promote the collecting and monitoring of water-related information properly; support the preparation of the studies and plans based on the basin; determine the usage priorities and make allocations from a single authority, regulate the principles and procedures to ensure efficiency and participation in water management. These are the deductions from the principles of the draft water law:

- Water resources are under the control and disposal of the state (Article 3).
- The water potential of each basin should first be evaluated within itself (Article 4). Water information systems should be structured, and water-related information should be recorded (Article 16).
- National Water Plan (NWP) and River Basin Management Plans should be considered the primary documents in all works and transactions related to water resources (Articles 6, 7).

According to Sümer (2012), these articles aim to realize the systematic management of water resources based on a plan.

- DSI allocates water throughout the stakeholders by considering the basin-based sectoral water allocation plans (Article 14).

In addition to the draft water law, the schedule of harmonizing the EU WFD with its national legislation in Türkiye's EU candidacy process brought new content to the country's water policies. According to the Directive, Türkiye should be performed in the following areas (Kıbaroğlu, Sümer and Scheumann, 2012):

- Developing a reliable record of the condition of water bodies,
- Implementing effective surveillance mechanisms,
- Establishing pricing structures for all sectors
- Enabling the involvement of all stakeholders in formulating water development strategies,
- To formulate comprehensive plans for managing river basins.

In this respect, the articles regarding the drawing up of river basin plans in the draft water law are compatible with the requirement of the WFD. However, according to the Türkiye National Water Plan published in 2019, the following limitations regarding the water-related information are stated (Ulusal Su Planı, 2019).

- The National Water Information System still needs to be structured.
- Due to the organizational structure of the institutions, separate administrative units have yet to be established for each basin. This structuring complicates the production of basin-based information.
- Since the different authorized bodies produce the data, there is no standardization in the data format. Therefore, this causes reiterative data.
- The produced data is not available in a single online environment.
- The data is not eligible for temporal and spatial analysis of water resources.
- The framework law prepared to regulate all these have yet to enter into force.

All these factors mentioned above make water management challenging. Water users' information demands about water rights and allocations cannot be met due to a lack of a water information system, even though the role of qualified information in management processes is well understood. Türkiye urgently needs to configure an information system that will present this information in a standard format. All stakeholders should have access to this information to make decisions about allocating resources (Hughes, Corral and Muller, 2012).

### 3. MATERIALS AND METHODS

Even though there are several water accounting approaches, such as the System of Environmental-Economic for Water (SEAW), and the Water Footprint Accounting (WFA), this paper supports the idea that General-Purpose Water Accounting is prosperous for improving accountability and transparency in a river basin. Australia has been leading the world in the development of GPWA. The system is developed by Australian accounting and water industry experts and designed to report information on water and rights to water to the interested parties who cannot demand this information from the reporting entity (Chalmers, Godfrey and Lynch, 2012).

GPWA is the most beneficial water accounting methodology for integrated water resources management. The system's outputs are reports, and they should be published regularly to inform external parties about the allocation of resources so that they can make decisions about these resources. Therefore, analyzing the evolution of water management and resources through these communication tools will be possible. The Australian Water Accounting Standard (AWAS) governs the preparation of reports that provide specific information to water users to make and evaluate decisions on allocating water resources. The information provided by the system's reports can also assist in observing River Basin Management Plans (Momblanch et al., 2014). This system could present better control and transparency and enhance water management (Andreu et al., 2012).

#### 3.1. Australian Water Accounting Standards

Between 1997 and 2010, known as the Australian Millennium Drought, the government gave rise to extensive reforms related to water management. The primary aim of these reforms was to establish efficient water markets to reallocate scarce resources. The government identified the need to create a standard water accounting system to control the evolving markets better (Momblanch et al., 2014).

The Australian Water Accounting Standard 1 (AWAS 1) was published by the Water Accounting Standards Board (WASB). This standard prescribes the basis for preparing and presenting general-purpose water accounting reports. It shall be applied in preparing and presenting general-purpose water accounting reports for a water report entity. Stakeholders who want to decide about the management or trade of water and water rights or obligations over time or the provisions of water-related services can benefit from these reports (WASB, 2012).

The outputs of the Australian methodology lay out on the Framework for the Preparation and Presentation of Financial Statements (Chalmers, Godfrey and Lynch, 2012; Momblanch et al., 2014). According to General Purpose Financial Reporting, the information must be accurate, complete, comparable, and understandable. Hence, the nature of the information of General-Purpose Water Accounting mirrors those requirements of financial reporting (Mungatana and Hassan, 2012). The Water Accounting Conceptual Framework provides the framework for formulating AWAS and preparing GPWA reports. The report comprises three main statements (WASB, 2012):

- a Statement of Water Assets and Water Liabilities (S1)
- a Statement of Changes in Water Assets and Water Liabilities (S2)
- a Statement of Water Flows (S3)

The elements of the GPWA reports are water assets, water liabilities, net water assets, changes in water assets and changes in water liabilities (WASB, 2009; WASB, 2012). The system has been piloted in many countries such as Australia, Spain (Andreu et al., 2012; Momblanch et al., 2014),

South Africa (Hughes, Corral and Muller, 2012). In this paper, Konya Closed Basin in Türkiye has been chosen as the spatial reference to apply GPWA to the whole water resources of the basin.

### 3.2. Study Area: Konya Closed Basin Water Resources, Türkiye

Konya Closed Basin is located in the Central Anatolian Region of Türkiye with an area of 4,980,534.00 hectares and constituting approximately 7% of Türkiye. Within the borders of the basin, the regions of the provinces Konya, Niğde, Isparta, Aksaray, Ankara, Karaman and Nevşehir take place. In addition, some non-residential regions of the provinces Mersin and Antalya are also within the borders of the basin. In terms of area, the largest share belongs to the province of Konya with 57.3%.

There are nine hydrological sub-basins in Konya Closed Basin: Beyşehir, Konya-Çumra, Karaman-Ayrancı, Niğde-Ereğli-Bor, Aksaray, Altınekin, Cihanbeyli-Yeniceoba-Kulu, Şereflikoçhisar, Misli Sub-basin (Fig. 1).



**Figure 1.** Sub-basins of Konya Closed Basin

Water plays a central role in the basin's environmental challenges due to its unique geographical position. This region stands out as one of the driest areas in Türkiye, receiving minimal rainfall. It possesses a mere 2% share of the country's accessible surface water resources. However, in contrast, it boasts a substantial 17% share of Türkiye's groundwater potential due to its expansive and closed nature (WWF, 2014).

### 3.3. Data Sources

This section delves into the sources from which data is collected for statement preparation. In Türkiye, due to the absence of automatic data-gathering systems in river basins, there is an urgent need to enhance the number of observation and monitoring stations. Consequently, achieving more precise measurements is crucial to furnish valuable and accurate information. As per the National Water Policy (NWP), institutional capacity needs to be improved, particularly concerning data gathering, storage, and analysis at the local level (Ulusal Su Planı, 2019).

To determine the status of water bodies as required by the WFD, The Ministry of Agriculture and Forestry has defined the monitoring network for the Basin. In the monitoring network defined for surface waters, 77 sites are allocated to 92 water bodies; 24 are allocated to operational areas,

43 to surveillance areas, and 10 to protected areas. The basin has 18 groundwater bodies and 48 monitoring stations for groundwater (KNHYP, 2018). The primary data sources for this paper consist of the plans developed explicitly for the basin. These include the River Basin Management Plan, the Sectoral Water Allocation Plan, and the Drought Management Plan. In addition to these sources, statistical data from the DSI website has also been utilized to compile the statement.

### **3.4. Application to Konya Closed Basin, Türkiye**

According to AWAS 1 guidelines, the study requires a depiction of the water reporting entity (WRE), encompassing its legal and climatic status. In this context, the designated WRE is Konya closed basin, with the reporting entity encompassing all water resources.

The Australian system takes its inspiration from financial accounting (Momb Blanch et al., 2014), and according to paragraph 10 of AWAS 1, except for S3, other reports shall be prepared using the accrual basis of water accounting. Like the accrual basis of financial accounting, the accrual basis of water accounting means that the impacts of water transactions, transformations, and events are recognized when the decisions or commitments that give rise to them occur. In other words, the accrual basis of water accounting ensures that transactions, transformations, and events are recorded in S1 and S2 in the reporting periods they relate (WASB, 2012).

According to AWAS 1, "S2 need not be presented for a water report entity if it has only flows of water and no changes in any of its water assets and water liabilities arising from accruals. In such circumstances, S2 is not presented because the water report entity has no changes in any of its water assets and liabilities arising from accruals." Therefore, Konya Closed Basin has remained the same in its water assets and water liabilities arising from accruals; there is no need to prepare S2 for the basin. WRE has only flows of water and no accruals; S3 is sufficient to provide users with information about all transactions, transformations and events that give rise to changes in water assets and water liabilities during the reporting period (WASB, 2012).

It can be deduced the following meaning for the countries that cannot implement an accrual basis of water accounting like Türkiye; it is enough to prepare S3 to inform water users for river basins.

S1 has been presented in this paper, and it is equivalent to the Statement of Financial Position (or Balance Sheet) in the context of a company's financial reporting. The Balance Sheet is one of the core financial statement in accounting; it discloses the assets and liabilities of a company. This output serves as a snapshot of the company's overall financial position and financial health (Momb Blanch et al., 2014). In this case, the assets of the WRE are the water resources owned physically or granted rights. Table 1 illustrates the assets in reservoirs and aquifers at 1,505.00 hm<sup>3</sup> and 2,595.00 hm<sup>3</sup> respectively. These data obtained from River Basin Management Plan, Sectoral Water Allocation and Drought Management Plan prepared for Konya Basin, and DSI statistics.



**Table 1.** Statement of Water Assets and Water Liabilities for Konya Closed Basin

	2018 (hm <sup>3</sup> )	2017 (hm <sup>3</sup> )
<b><u>WATER ASSETS</u></b>		
1.Surface water assets		
Surface water storage- unregulated		
Unregulated major storages > 1 hm <sup>3</sup>	905.00	1,142.00
Surface water storage- regulated		
Regulated major storages > 1 hm <sup>3</sup>	1,505.00	1,505.00
<b>TOTAL SURFACE WATER ASSETS</b>	2,410.00	2,647.00
2.Groundwater assets		
Groundwater storages		
Unconfined aquifer	2,595.00	2,595.00
<b>TOTAL GROUNDWATER ASSETS</b>	2,595.00	2,595.00
<b>TOTAL WATER STORAGE (1)</b>	5,005.00	5,242.00
3.Other water assets		
Water Rights	0.00	0.00
<b>TOTAL OTHER WATER ASSETS</b>	0.00	0.00
<b>TOTAL WATER ASSETS (2)</b>	5,005.00	5,242.00
<b><u>LIABILITIES</u></b>		
4.Allocation Remaining		
5.Other Water Liabilities	0.00	0.00
<b>TOTAL LIABILITIES (3)</b>	0.00	0.00
Net Water Assets		
Opening net water assets (5)	5,242.00	5,242.00
Changes in net water assets (6) = (4) - (5)	-237.00	0.00
Closing net water assets (4) = (2) - (3)	5,005.00	5,242.00

Paragraph 28 of AWAS 1 states that the water assets have been presented separately from water liabilities (WASB, 2012). The statement presents that the total surface water potential of the basin has lessened compared to the previous year, while the total groundwater potential is the same.

The basin observes most of the annual precipitation in winter. The average precipitation is approximately 454.00 mm; the average evaporation is approximately 761.00 mm per year. Over the reporting period, evaporation, transpiration, precipitation, and surface flow are the essential processes in the hydrological cycle. The total amount of water in the loop remains unchanged, even though its distribution among the various processes constantly changes (KNHYP, 2018). After segmenting the water balance sheet into its constituent parts, the primary components revolve around precipitation and evaporation because the flow of the basin is the difference between these two. Nevertheless, there is a requirement for consistent data regarding the quantities of precipitation and evaporation associated with the chosen basin. These data have been obtained as long-term annual average precipitation and evaporation as, respectively, 14,889.80 hm<sup>3</sup> and 14,714.00 hm<sup>3</sup> from the Drought Management Plan of the basin.

As the measurement area expands, the margin of error increases. Because as the surface area of the spatial reference expands, calculations related to parameters that cannot be measured directly increase the margin of error (Andreu et al., 2012).

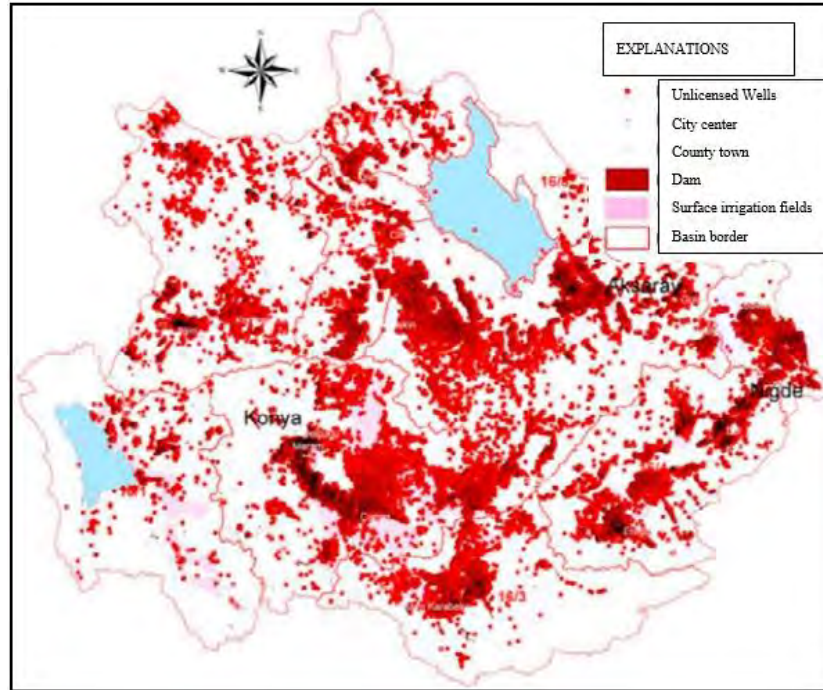
#### 4. RESULTS AND DISCUSSION

S1 may need modification to adapt to Türkiye's water management pattern. For instance, the account 'Water Rights' may not be shown in the Turkish versions of the water balance sheets as water users' rights and limits to those use rights in Türkiye are not stated obviously in the proposed draft water law. Even though such rights are especially important for irrigation management organizations and farmers, most users have not sought licenses. Consequently, there is a potential risk of jeopardizing their water access due to agreements between the DSI and private entities involved in constructing hydroelectric dams. Should water allocations be granted to water users, there will be a need to strengthen the protocols for quantifying and documenting water abstractions. Given the existing weaknesses, the daily volume of water abstracted from river and groundwater sources remains to be determined (Kibaroglu, Sümer and Scheumann, 2012). According to legal regulations in Türkiye, there is no clear criterion to determine usage rights. Once the water rights agreements are evaluated in the context of hydroelectric dams, they are guaranteed on behalf of the private sector. These agreements prioritize water use only in terms of hydroelectric generation. At this point, the private sector is responsible for the risks associated with using water resources (İşlar, 2016).

As stated in the study of Momb Blanch and colleagues (2014) and Andreu and colleagues (2012), the account related to water liabilities may also be adapted according to states' water management patterns. In Türkiye, water entitlements are not extended to the next period to be used by the same demand as in Spain. The allocated water not supplied in the reporting period is considered part of the available resources for the next period. On the contrary, in Australia, the fraction of the volume allocated to the demands not supplied during the period is considered a carryover and extended to the next period to be used by the same demand. Thus, it means non-supplied water is considered a saving and contributes to the assets for the next period without being linked to any specific demand in Türkiye and Spain (Momb Blanch et al., 2014). Consequently, 'the allocation remaining' account may not be disclosed as a water account in Turkish versions of reports.

In Türkiye, published plans such as river management, sectoral water allocation, drought by the water management authorities and legal regulations regarding water rights and water management must support and complement the GPWA to ensure useful information. The messy and repetitive structure of water information provided by mentioned plans makes the information useless, insufficient, and inaccurate. Instead of publishing water resources information over multiple databases, GPWA reports are on accounting for all storage, movement, returns, and water use within the system annually (Hughes, Corral and Muller, 2012). Therefore, integrating information in Türkiye river basins like Konya Closed Basin via the outputs of the GPWA system would be straightforward. Thereby, the information would be comparable over the years and spatial references.

Despite the constraints tied to the availability and precision of water resource information in Türkiye, a primary challenge confronting the Konya Closed Basin is its status as the country's most abundant basin in terms of underground water resources. With over one hundred thousand underground draw wells in the basin, assessing the current water condition becomes increasingly complex. The estimated count is projected to reach a hundred and thirty thousand wells, encompassing those beyond the DSI inventory scope, comprising roughly 30,000.00 licensed wells. The remaining wells fall into the unlicensed category (Figure 2) (WWF, 2014).



**Figure 2.** Konya Closed Basin Unlicensed Draw-Wells

The growing prevalence of unlicensed wells in the Basin poses significant challenges when quantifying water consumption and utilization. Additionally, the Konya Basin region, situated in the Mediterranean Region, is susceptible to the impacts of climate change, leading to a gradual decline in water resources. This decline is particularly concerning given the intense agricultural production in the Basin. A striking 88% of the Basin's water is allocated for agricultural purposes, with 61% of this demand being met from underground water sources.

As a result, it becomes imperative to enhance the quality of water management reports and plans, with a specific focus on the Konya Closed Basin. Ensuring that water resources information for the Basin is disseminated and comprehensible is crucial for effective water resource management in this region.

## 5. CONCLUSION

This study supports the idea that the GPWA system will be beneficial in making water information qualified for all stakeholders in Türkiye. A standard approach will enhance the comparability, transparency, and accountability of the water information of 25 river basins in the country.

The first criterion for an ecological and democratic water policy is to discuss with all segments of society how much and how water assets will be used by those who demand it (Ayboğa, 2017). The outputs of GPWA are valuable tools to meet this criterion and improve accountability and transparency. The contribution of the system to transparency and accountability is prominent. Another valuable aspect of the system reports is that water accounts of the statements are adaptable according to the water management patterns of the countries. It is a kind of supportive mechanism in integrated water management. This tool may also be seen as an intermediary system for implementing the participatory management principle of WFD because the system outputs are understandable for all users.

However, there are some difficulties in adapting this system as an accountability tool in Türkiye's water management. Adopting the radical changes and reforms in water management, especially

in the last 30 years, was a bit tough for a country like Türkiye, which has followed the same management structure for more than 60 years. A free market economy, liberal and neoliberal policies, increasing water-related transactions and removing water from public property are among the issues that Türkiye has experienced for 30 years. The managers in Türkiye also recognize the increasing demand of various stakeholders for water information. However, the problem stated in this study is that despite the increasing demand for information, the water information system has not yet been configured in the country. Due to Türkiye's water scarcity, implementing water accounting is imperative to ensure the efficient and sustainable management of water resources across the country. As stated in the National Water Plan, water information must be provided over a single online database in a standard and understandable way.

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