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Research Article

APPLICATION OF A CONCEPTUAL WATER BUDGET MODEL FOR SALDA LAKE, (BURDUR/ TURKEY)

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Anahtar Kelimeler
Salda Lake,
Water budget,
Lake water level

Abstract

Sustainable water resources management is a priority issue today. One of the major problems in the sustainable usage of lakes is the estimation of water budget components. The determination of the water budget of lakes is fundamental to an understanding of their hydrological characteristics. The Salda Lake is an inland closed basin and located within the Lake District of Turkey. In addition, the Salda Lake is one of the important wetlands of Turkey and is in the status of protected areas. Therefore, the Salda Lake is indispensable water source for region. The Salda Lake area is 44.7 km^2 and lake level is 1136.5 m. In this study, conceptual water balance model of the Salda Lake was developed. Recharge of the Salda Lake is supplied from especially precipitation, surface and groundwater inflow. The directly recharge from the precipitation was calculated as 22.04 (x10^6) m^3/year. The discharge components of the lake are evaporation. The evaporation amount from the lake was determined as 53.98 (x10^6) m^3/year. The unmeasured recharge from groundwater was calculated as 26.33 (x10^6) m^3/year. According to rainfall, evaporation and the lake water level relations, rainfall is dominantly effective on the lake water level change.

SALDA GÖLÜ İÇİN KAVRAMSAL SU BÜTÇE MODELİNİN UYGULANMASI, (BURDUR/TÜRKİYE)

Anahtar Kelimeler
Salda Gölü,
Su bütçesi,
Göl suyu seviyesi.

Öz

Sürdürülebilir su kaynakları yönetimi bugün öncelikli bir konudur. Göllerin sürdürülebilir kullanımındaki en büyük sorunlardan biri, su bütçesi bileşenlerinin tahmin edilmesidir. Göllerin su bütçesinin belirlenmesi, hidrolojik özelliklerinin anlaşılması için önemlidir. Salda Gölü, kapalı bir havza olup, Türkiye'nin Göller Bölgesi'nde yer almaktadır. Ayrıca, Salda Gölü Türkiye'nin önemli sulak alanlarından ve korunan alanlarından biridir. Bu nedenle, Salda Gölü bölge için sürdürülebilir yönetimi önemli bir su kaynağıdır. Salda Gölü'nün alanı 44.7 km^2, göl seviyesi 1136.5 m dir. Bu çalışmada Salda Gölü için kavramsal su denge modeli geliştirilmiştir. Salda Gölü'nün beslenimi, özellikle yağış, yüzey ve yeraltı suyu akışından sağlanmaktadır. Salda Gölü için yağıştan besleme 22.04 (x10^6) m^3/yıl olarak hesaplanmıştır. Gölün en önemli boşalım bileşeni buharlaşmadır. Gölün buharlaşma miktarı 53.98 (x10^6) m^3/yıl olarak belirlenmiştir. Yeraltısuyundan ölçülmeyen beslenim miktarı ise 26.33 (x10^6) m^3/yıl olarak hesaplanmıştır. Yağış, buharlaşma ve göl su seviyesi ilişkilerine göre, çalışma alanı için yağış, göl su seviyesi değişiminde baskın bileşendir.

Alıntı / Cite

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1. Introduction

Lakes are integrated into the global water cycle and are therefore influenced by precipitation, evaporation and water fluxes by groundwater or surface water (Burkert et al. 2004; Froehlich et al. 2005). Understanding these hydrologic processes is a fundamental key, for determining different parameters of the lake exists (Bocanegra et al. 2013). The determination of the water balance of lakes is fundamental to an understanding of their hydrological characteristics. This balance is the difference between the inflow and outflow, which is a function of the changes in reservoir levels. In general, the different components of the water balance of a lake should be approximately stable, which means that for similar climatological conditions, the variations in the lake's level should be the same. This, however, isn't the case when the cycle is altered by human intervention. But, the lake level is directly related to climatic factors in lakes which isn't human intervention.

The Salda Lake is located within the Lake District at latitude 42 59404-44 4624 N, longitude 17 99785-7 34837 E in southwest Turkey (Fig. 1). The Salda Lake is located within a closed basin situated on a tectonic pit about 6.8 km length and 9.186 km long and covers a lake area of 44.7 km^2. The altitude of the lake is approximately 1193 m above sea level. Salda Lake is one of the important wetlands of Turkey and is in the status of protected areas. Therefore the lake is extensively used for tourism and fishing. In addition, it is planned that the water of the Salda Lake will be used as drinking water in the future. The main purpose of the present study is to develop a preliminary hydrological model of the Salda Lake. The water balance of Salda Lake, has been calculated from the long-term meteorological data of rainfall, evaporation and river inflows. In most regions of the world, climate change is expected to significantly impact water resources. This effect has been discussed in this study.

2. Material and Methods

The water mass balance equation used in this study. Surface water flow, groundwater flow, precipitation and evaporation are the predominant components of the water balance. The water level data of Salda Lake were provided from State Hydraulic Works (SHW) for 1998-2015 periods. Rainfall and evaporation measurements were obtained from Turkish General Directorate of State Meteorological Service (SMS). The pan evaporation data were multiplied by 0.75 pan factor which was suggested by Turkish State Hydraulics Works (SHW) for obtain evaporation rates, Average annual rainfall of the lake basin is calculated by using Isohyetial method. The cumulative deviation from annual precipitation curve was plotted using the average annual rainfall data for the Burdur and Tefenni meteorological stations. In addition, meteorological drought analysis was performed using the Standardized Precipitation Index (SPI) method in the study area. The detailed description of the SPI method was explained below. Recharge–discharge balance of the lake is determined considering the difference between the sum of all water inputs and the sum of all water outputs from the lake.

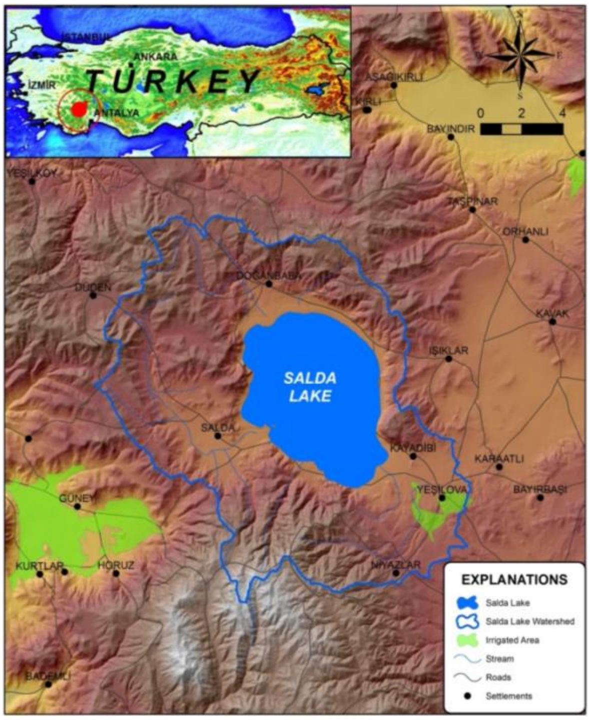

Fig. 1. Location map of the study area

3. Results

3.1. Changes of Level in the Salda Lake

The lake level measurements have been performed by SHW. The lake water levels measured between 1998-2006 years ranges between 1137-1136.2 m. The lake level dropped to 1135.4 m between 2006 and 2008. Between 2008 and 2010, the lake water has risen to 1136.8 m. The lake level is balanced at 1136.8-1136.5 m between the years of 2010 and 2015 (Table 1).

Table 1 Monthly water level changes of the Salda Lake

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	Aprl.	May	June	July	Agust.	Sep.
1998	1136.23	1136.21	1136.27	1136.26	1136.33	1136.33	1136.62	1136.64	1136.72	1136.65	1136.50	1136.43
1999	1136.41	1136.22	1136.20	1136.28	1136.43	1136.66	1136.84	1136.90	1136.89	1136.88	1136.77	1136.78
2000	1136.67	1136.56	1136.51	1136.46	1136.50	1136.58	1136.61	1136.69	1136.72	1136.62	1136.52	1136.37
2001	1136.20	1136.16	1136.12	1136.09	1136.07	1136.07	1136.08	1136.08	1136.04	1135.98	1135.90	1135.82
2002	1136.20	1136.16	1136.12	1136.09	1136.07	1136.07	1136.08	1136.08	1136.04	1135.98	1135.90	1135.82
2003	1136.19	1136.18	1136.20	1136.23	1136.33	1136.51	1136.63	1136.80	1136.89	1136.84	1136.76	1136.65
2004	1136.58	1136.37	1136.55	1136.58	1136.69	1136.79	1136.89	1136.97	1136.96	1136.87	1136.77	1136.69
2005	1136.60	1136.50	1136.48	1136.46	1136.45	1136.50	1136.53	1136.56	1136.53	1136.45	1136.36	1136.24
2006	1136.12	1136.04	1135.99	1135.99	1136.00	1136.04	1136.10	1136.18	1136.20	1136.16	1136.06	1135.98
2007	1135.87	1135.83	1135.79	1135.77	1135.79	1135.79	1135.79	1135.78	1135.70	1135.63	1135.49	1135.34
2008	1135.22	1135.20	1135.24	1135.31	1135.28	1135.33	1135.39	1135.35	1135.31	1135.23	1135.11	1134.99
2009	1134.90	1134.86	1134.93	1134.87	1135.02	1135.31	1135.50	1135.60	1135.62	1135.56	1135.47	1135.40
2010	1135.39	1135.36	1135.37	1135.50	1136.42	1136.68	1136.87	1136.34	1136.08	1136.05	1136.03	1135.86
2011	1135.77	1135.81	1135.86	1135.89	1135.97	1136.11	1136.22	1136.32	1136.49	1136.51	1136.41	1136.28
2012	1136.23	1136.15	1136.12	1136.17	1136.25	1136.34	1136.41	1136.46	1136.36	1136.19	1135.98	1135.75
2013	1135.75	1135.89	1136.08	1136.31	1136.44	1136.57	1136.67	1136.79	1136.80	1136.72	1136.62	1136.49
2014	1136.39	1136.38	1136.44	1136.44	1136.48	1136.53	1136.56	1136.58	1136.62	1136.58	1136.51	1136.44
2015	1136.39	1136.36	1136.27	1136.40	1136.52	1136.68	1476.92	1137.03	--	--	--	--

3.2. Recharge of the Salda Lake

Recharge parameters of the Salda Lake are precipitation, evaporation, surface and subsurface water inflow. Rainfall data measuring in Burdur and Tefenni SMS which are near in the Salda Lake were used. The rainfall map of the Salda Lake basin was prepared using measured annual rainfall data with isohyetial method (Fig. 2). Isohyetial method is considered as the most accurate method for computing mean rainfall. The mean rainfalls for the Salda Lake catchment area are estimated as 493.086 mm. The direct recharge from precipitation at the surface area of the lake is calculated with multiplying average rainfall value and surface area. Nowadays, the Salda Lake area is 44.7 km^2 and the directly recharge from the precipitation was calculated as 22.04 ($x10^6$) m^3/year.

The cumulative deviation curves from annual precipitation as plotted by using the mean annual rainfall data from the meteorological stations (Tefenni, Burdur) in the Salda Lake catchment area (Fig. 3). It can be seen from the graph of Tefenni that dry period between 1998 and 2000, wet period between 2000 and 2006, dry period again between 2006 and 2008, stable period between 2008 and 2015 (Fig. 3). Similarly, dry period between 1998 and 2006, wet period between 2000 and 2006 and stable period between 2008 and 2015 were observed in this graph of Burdur.

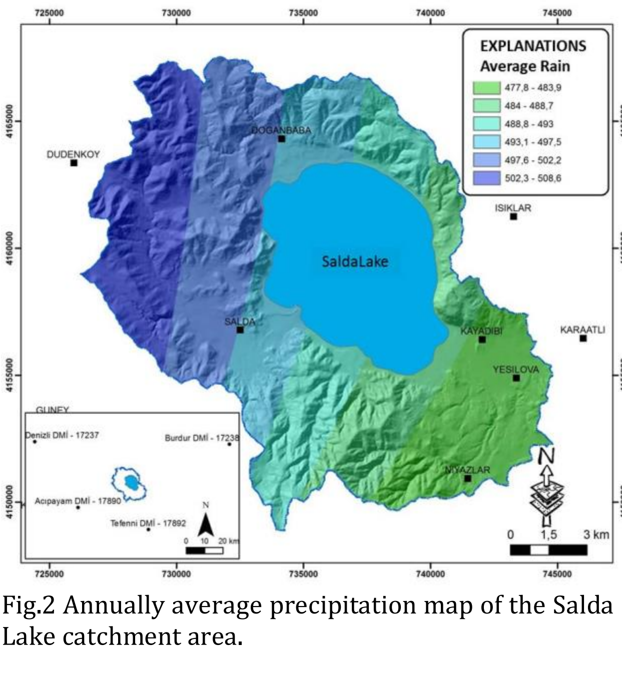

Fig.2 Annually average precipitation map of the Salda Lake catchment area.

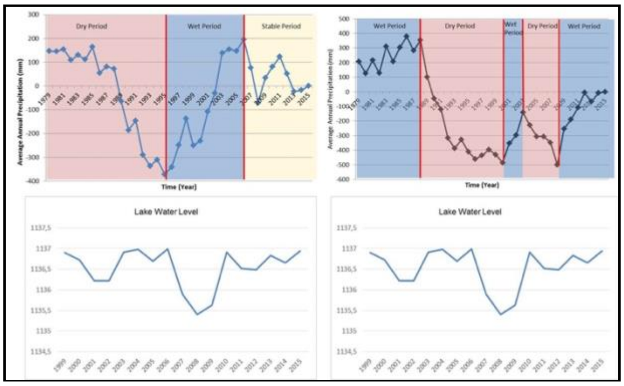

Fig. 3. The cumulative deviation curves and lake level variations a: Tefenni SMS b:Burdur SMS

The Salda Lake water levels and cumulative deviation from annual precipitation curves of Tefenni and Burdur meteorological stations were compared. Generally, precipitation curves and water level data of the lake are harmonic (Fig. 3). According to precipitation data, the wet periods were observed between 1998 and 2000. During these periods, although the discharge components of the lake did not changed (stable), the water level of the lake decreased approximately 1.5-2 m (Fig. 3). It is shown that recharge from precipitation has great influence on the changes of the lake water levels. Another recharge component of the Salda Lake is the continuous and seasonal surface flows.

The Salda Stream is the most important of the continuous streams in the basin. Flow measurements of the Salda Stream were made only by the SHW at between 2012 and 2015 years (Table 2). The average amount of water drained from the Salda Stream 5.604 (x10^6) m^3/year (Varol et al. 2017).

The Salda Lake is occurred in tectonic cavity with the gathering of surrounding waters and is in a closed basin. There is an alluvial unit around the Salda Lake. The alluvium unit consists of poorly sorted, poorly consolidated gravel, sand and mudstone levels in the basin. The unit with this feature has a porous structure and carries a good aquifer property. The aquifer thickness is seen that reached to 100 m at the wells that opened around Yeşilova. According to measurements made between May-October 2015 period in the basin, groundwater level changes between 0-13.20 m. Measurements representing the dry period at the October-2015, were observed level decrease between 0.4-4 m at groundwater level. These level changes are caused by the use of groundwater as irrigation water during the dry season. It has been determined that the flow direction is towards the Salda Lake (Fig. 4). According to the hydrogeological properties of the Salda Lake catchment area, the presence of groundwater inflow into the lake is determined. But, there have been no direct measurements of groundwater inflow into the lake. Groundwater inflow to a lake is one of the most difficult components of the water balance to measure. It is calculated by subtracting total recharge difference from total discharge. The unmeasured average recharge from groundwater was calculated as 26.33 (x10^6) m^3/year.

Table 2. Salda stream monthly average flow data (m^3/s)

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	Aprl.	May	June	July	Agust.	Sep.
2012	0.696	0.743	0.972	1.130	1.260	1.860	1.050	0.877	0.459	0.184	0.134	0.090
2013	0.107	0.138	0.192	0.386	0.583	0.625	0.680	0.521	0.324	0.208	0.146	0.178
2014	0.242	0.305	0.286	0.261	0.325	0.455	0.279	0.235	0.195	0.060	0.059	0.129
2015	0.175	0.234	0.292	0.666	0.863	0.829	0.892	0.587	0.614	0.362	0.303	0.227

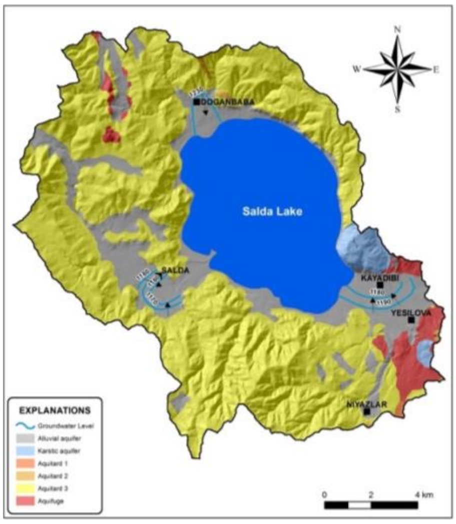

Fig. 4. Groundwater level map of the Salda Lake catchment

3.3. Discharge of the Salda Lake

Evaporation is the most important the discharge components of the lake. Evaporation from lakes is often the largest percentage component of the water budget, so its accurate determination is crucial for a reasonable estimate of the water budget. In the research area, evaporation which is measured on the basis of United States Class A pan values is used. The Yeşilova-Bedirli meteorological station data was used for evaporation calculations in the arithmetic mean method. According to Class A pan values, the annual average evaporation is 1725.2 mm for 1973-2000 periods. While the amount of evaporation from the lake partially decreased between 1973 and 1985, it increased as approximately 600 mm from 1985 until 1990 (Fig. 5). The average evaporation amount from the lake surface area is determined as 53.98 (x10^6) m^3/year.

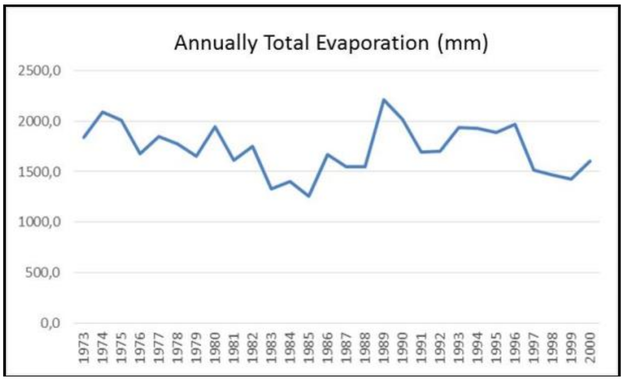

Fig. 5. The amount of evaporation from the lake surface area between 1973 and 2000 years.

3.4. Recharge-Discharge Balance of the Salda Lake

All water balance equations are based on the premise that the difference between water inflow and water outflow over a given time period for the hydrologic system of a lake must equal the change in water storage in that system (Kebede et al. 2006; Hayashi *et al*. 2007; Davraz et al. 2014). A water budget describes the various components of the hydrologic cycle. An appropriate conceptual site model is essential to evaluating water budget. The selection and application of a mathematical model must be based on a conceptual site model. In this study, conceptual water balance model of the Salda Lake was developed taking into consideration hydrological model of the Salda Lake. For clarify the processes of the hydrologic system in the Salda Lake basin, three dimensional digital elevation models was prepared to represent the basin. Geological and geological cross-sections were integrated on this model to create a conceptual model of the basin (Fig. 6). In this model, the location of the Salda Lake within the basin, surface waters recharging to the lake, situation of the alluvium aquifer and lithological units in the basin were presented. Hydrological budget elements are placed on the model.

A water budget is an accounting of all the water that flows into and out of a project area. The general lake water balance equation is (Hayashi et al. 2007):

$$Q_{in} - Q_{out} = A(dh/dt) \quad (1)$$

Where Q_{in} is the sum of all water inputs, Q_{out} is the sum of all outputs, A is the surface area of the lake, and dh/dt is the rate of water-level (h) change.

Recharge of the Salda Lake is supplied from especially precipitation, surface and subsurface water inflow. The discharge components of the lake are evaporation. The above equation was detailed according to hydrological conceptual model of the Salda Lake as follows.

$$P_{cp} + I_s + I_g - E \quad (2)$$

where P_{cp} is recharge from precipitation, I_s is recharge from surface flow, I_g is unmeasured recharge from groundwater, E is evaporation from the lake.

Summary information on the Salda Lake hydrological budget is given in Table 3.

Table 3. Salda Lake hydrological budget

Recharging	(x10^6) m^3/year	Discharging	(x10^6) m^3/year
Precipitiation	22.04	Evaporation	53.98
Flow	5.604		
Unmeasured groundwater	26.33		
Total	**53.98**		**53.98**

The budget can't make using volume changes due to is no bathymetry map of the lake. For many years level measurements of the lake show that there is no significant change in volume change. In the calculations taking into account the mathematical relationships of the hydrological parameters, the unmeasured recharge from groundwater was calculated as 26.33 (x10^6) m^3/year.

Thornthwaite method (Thornthwaite & Mather 1957) is one of the most reliable and applicable, among the available water-budget methods (Scozzafava & Tallini 2001). Meteorological water budgets for Burdur and Tefenni stations were calculated using Thornthwaite method. The average amount of water storage surplus in the soil calculated as 153.81 mm for Burdur and Tefenni in this method. Taking into account the topography of the basin and the location of the Salda Lake within the basin, the water surplus will be discharged by the subsurface inflow into the lake. The Salda Lake catchment area is 170.337 km^2 except for Salda Lake surface area (Varol et al., 2017). The water surplus was calculated as 26.20 (x10^6) m^3/year for the Salda Lake basin. This amount is approximately equal to unmeasured recharge from groundwater which is calculated with mathematical relationships of the hydrological parameters

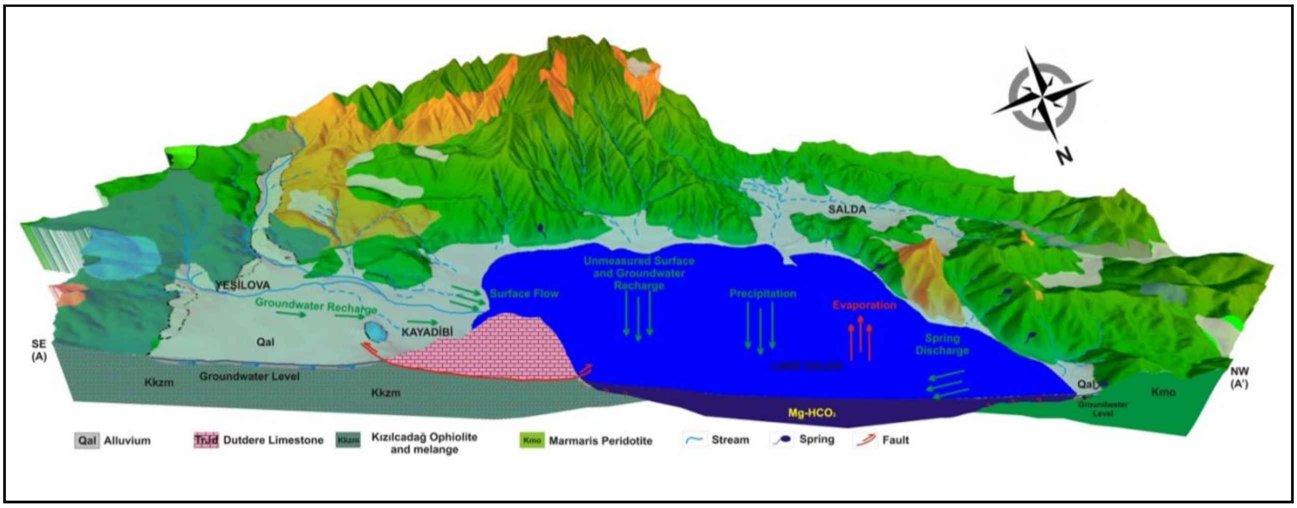

Fig. 6. Conceptual water balance model of the Salda Lake

3.5. Standard Precipitation Index (SPI) for Drought Analysis

The standardized precipitation index (SPI) is a probability-based indicator that depicts the degree to which the accumulative precipitation of a specific period departs from the average state. The SPI is space-independent and has a sound performance when representing precipitation anomaly (McKee et al. 1993). Compared with other indices and methods based on physical processes, the palmer drought severity index (PDSI) for example, SPI is easy to calculate and convenient to apply. It requires only precipitation as input data and escapes the problem of parameter calibration, thus is particularly suitable for drought/flood monitoring in areas where hydrological data is scarce (Yuan & Zhou 2004). Due to its robustness and convenience to use, SPI has already been widely used to characterize dry and wet conditions in many countries and regions, such as the United States (Wu et al. 2007); Canada (Quiring & Papakryiakou 2003); Italy (Piccarreta et al. 2004; Vergni & Todisco 2010); Iran (Moradi et al. 2011; Nafarzadegana *et al.* 2012); Korea (Min et al. 2003; Kim et al. 2009); and China (Du et al., 2013).

The Standardized Precipitation Index (SPI) was designed by McKee et al. (1993) to quantify the precipitation deficit for multiple time scales. These time scales reflect different water resources (Livada & Assimakopoulos 2007). They calculated the SPI for 3-, 6-, 12-, 24-, and 48-month scales to reflect the temporal behavior of the impact. The SPI provides a quick and handy approach to drought analysis. SPI can be calculated at various time scales on which precipitation deficits/surpluses can affect different aspects of the hydrologic cycle, which is the main advantage of the SPI. This advantage is crucial because it can reflect the natural lags in the response of different water sources, such as river discharge and storage, to precipitation anomalies (Paulo et al. 2003; Du et al. 2013). Other advantages of this approach are its relative simplicity and minimal data requirements. The SPI is defined for each of the above time scales as the difference between monthly precipitation on 3-, 6-, or 12-months' time scale (Xi) and the mean value (Xi^{ort}), divided by the standard deviation (σ),

$$SPI = \frac{X_i - X_i^{ort}}{\sigma} \quad (3)$$

Where Xi is the monthly rainfall amount and Xi^{ort}, σ are the mean and standard deviation of rainfall calculated from the whole time series of monthly values. The value of SPI indicates the strength of the anomaly. McKee et al. (1993) suggested a classification system to define the intensity of dry/wet phases (Table 4).

Table 4. Dryness/wetness categories according to SPI values (McKee *et al.* 1993)

Code	SPI values	Category
1	≥ 2	Extremely wet
2	1.50 ~ 1.99	Severely wet
3	1.00 ~ 1.49	Moderately wet
4	0.99 ~ 0	Normal
5	0 ~ -0.99	Near normal
6	-1.00 ~ -1.49	Moderately drought
7	-1.50 ~ -1.99	Severely drought
8	≤ - 2	Extremely drought

In this study, we tested the SPI for different climatic regions and investigated its potential use as a tool for monitoring drought in study area. SPI values have been computed for Burdur and Tefenni stations, and have been presented here for 12- month scales, covering 1964-2016 (Fig. 7). SPI values in the study area were calculated and were be classified based on Table 4 for to be more usable in water resources assessment and management, including for drought classification (Table 5).

According to the Burdur station data in 1964–2016 periods, there was a period of "*Extremely wet*" in 1969 and 2002 (% 3.55). "*Severely wet*" was only observed in 1979 (% 1.75). 1960, 1968, 1997, 1998, 2001, 2009 years represent the "*Moderately wet*" periods (% 10.52). Also, during the years 1972, 1986, 1990 and 1999 in the region experienced "*Moderate drought*" period (% 7.01). 1970, 1973, 1977, 1989, 1992, 2008 years have been periods of "*Severely drought*" in the region (% 10.52). There was no "*Extremely drought*" period in the area. In addition, there are periods during which the region is normal for 22 years (% 38.56) and near normal precipitation for 16 years (% 28.07) (Table 5; Fig. 7).

In addition, according to Tefenni station data in 1964–2016 periods, only "*Extremely wet*" period was experienced in 2009 (% 1.75). Likewise, in that region, the years 1965, 1968, 1979 and 1983 years are "*Severely wet*" period (% 7.01). The years 1966, 2001 and 2003 were a period of moderately precipitation (% 5.26). In the region, 1970, 1974, 1990 and 2008 years, there was "*Moderate drought*" (% 7.01). In 1992 and 1989, "*Severely drought*" and "*Extremely drought*" occurred in the region (% 1.75 and % 1.75 respectively). Also, other than these, during the 17 years and 21 years, "*Normal*" and "*Near normal*" precipitation periods were experienced (% 31.57 and % 36.84 respectively). SPI values of Burdur and Tefenni stations which are represented in the study area are compatible. Rainfall, evaporation data of these stations and lake levels with SPI values are also harmonicly.

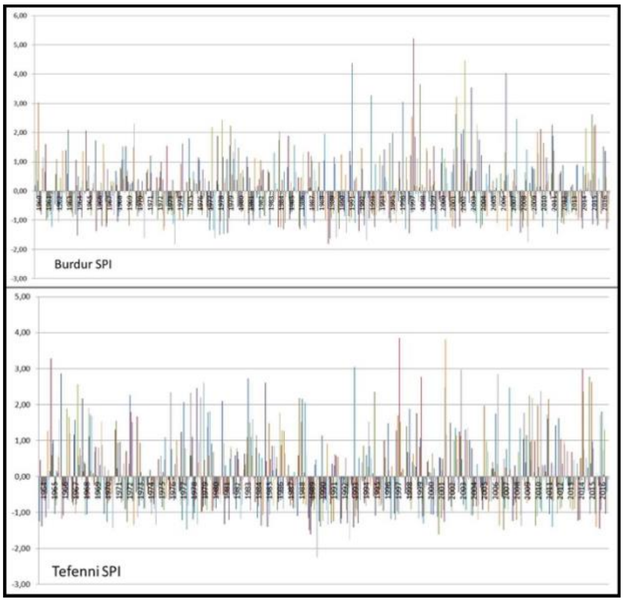

Fig. 7. SPI values based on 12 months scales for Burdur and Tefenni stations

4. Discussion and Conclusion

The water level in a lake is controlled by the balance between input and output. Precipitation and groundwater flow are the most important recharge parameters and evaporation is the most important discharge parameter in the Salda Lake. The Salda Lake has 44.7 km^2 in area. Difference between minimum and maximum the lake water levels were determined as 0.35 and 1.59 m between 1999 and 2015 years. Although fluctuations observed in the lake level between 1999 and 2015, the lake level in 1999 (1136.7 m) reached in 2014 year. Climate change is to significantly impact water resources.
Changing of rainfall is fairly suitable with the lake water level, but, changing of evaporation isn't as effective as rainfall on the lake water level. In this study, conceptual water balance model of the Salda Lake was developed taking into consideration hydrological model of the Salda Lake.

Table 5. Drought occurrence in study area at corresponding drought categories and 12 months scales.

SPI values	Category	Burdur Station	Time (%) 12-month	Tefenni Station	Time (%) 12-month
≥ 2	Extremely wet	1969, 2002	3.55	2009	1.75
1.50 ~ 1.99	Severely wet	1979	1.75	1965,1968, 1979,1983	7.01
1.00 ~ 1.49	Moderately wet	1960,1968,1997,1998, 2001, 2009	10.52	1966, 2001, 2003	5.26
0.99 ~ 0	Normal	22 year	38.56	18year	31.57
0 ~ -0.99	Near normal	16 year	28.07	21 year	36.84
-1.00 ~ -1.49	Moderately drought	1972,1986,1990,1999	7.01	1970,1974, 1990, 2008	7.01
-1.50 ~ -1.99	Severely drought	1970, 1973,1977,1989, 1992, 2008	10.52	1992	1.75
≤ - 2	Extremely drought	0 year	0	1989	1.75

The mean rainfalls for the Salda Lake catchment area are estimated as 493.086 mm using Isohyetial method. The directly recharge from the precipitation was calculated as 22.04 ($x10^6$) m^3/year. The Salda Stream is the most important of the continuous streams in the basin. The recharge amount from the Salda Stream is 5.604 ($x10^6$) m^3/year. Taking into account the topography of the basin and the location of the Salda Lake within the basin, the groundwater in the basin will be discharged by the subsurface inflow into the lake. There is an alluvial unit around the Salda Lake. The unit with this feature has a porous structure and carries a good aquifer property in the basin. Groundwater inflow to the lake was calculated as 26.33 ($x10^6$) m^3/year using mathematical relationships of the hydrological parameters. The average evaporation amount from the lake surface area is determined as 53.98 ($x10^6$) m^3/year.

The Salda lake level reduced to 1135.4 m between 2006 and 2008. According to SPI values for Burdur and Tefenni stations, moderately and severely drought was observed between 2006 and 2008 years. The lake water level increase to 1136.8 m between 2008 and 2010. In SPI values, these years "*normal*" and "*extremely wet*" precipitation periods were determined. Rainfall, evaporation data of these stations and lake levels with SPI values are also harmonicly.

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Conflict of Interest / Çıkar Çatışması

No conflict of interest was declared by the authors.

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