



IWA-PPFW 2017

2nd IWA Regional Symposium on Water,
Wastewater and Environment

The Past, Present and Future of the World's Water Resources
22-24 March 2017, Cesme - Izmir

PROCEEDING BOOK

EDITORS

Alper BABA

Orhan GÜNDÜZ

Gökmen TAYFUR

PREFACE

The 2nd Regional IWA Symposium on water, wastewater and environment is hosted by the Izmir Institute of Technology in Çesme-Izmir, Turkey between the dates of March 22 and 24, 2017. Following the previous IWA conferences, the theme of this conference was ‘The past, present and future of the world’s water resources’ which established the trend of thinking of the participants and determined the composition of the papers those were presented. Inspired by the IWA’s vision that is ‘A world in which water is wisely managed to satisfy the needs of human activities and ecosystems in an equitable and sustainable way’ the community of professionals concerned with water, presented their experiences for sustainable urban and basin-related water solutions.

The purpose of the symposium was to highlight water as a source of life and to stress the need for water cooperation between all actors in society to protect its value and exchange ideas between academia and industry on various forms of water cooperation that are fundamental to water use and water management. Also to identify good practices for water cooperation and demonstrate its merits for poverty eradication, economic development, environmental sustainability and peace.

The conference technical programme was organized in the following general areas: Water Treatment; Ancient Water Systems; Water Resources; Hydrology and Hydrogeology; Modeling and Simulation; Water Quality; Waste Management; Ecotoxicology and Health Risks and Water Reuse. We hope that the contents of the related papers will be beneficial source of information on water, wastewater and environment related engineering applications.

211 abstracts were presented in 30 sessions during the three days of the conference. We wish to acknowledge and express our sincere gratitude to the Organizing Committee for their valuable efforts and to the Scientific Committee for their precious time spent in reviewing of the submitted papers.

On behalf of the Organizing Committee

Prof.Dr.Alper BABA

ORGANIZING COMMITTEE

ALPER BABA	IZMIR INSTITUTE OF TECHNOLOGY/TURKEY	CHAIRMAN
GOKMEN TAYFUR	IZMIR INSTITUTE OF TECHNOLOGY/TURKEY	VICE-CHAIRMAN
ANDREAS N. ANGELAKIS	INSTITUTE OF IRAKLION/GREECE	PROGRAMME ORGANIZER
ORHAN GUNDUZ	DOKUZ EYLUL UNIVERSITY/TURKEY	COMMITTEE SECRETARY
MUSTAFA DEMIR	IZMIR INSTITUTE OF TECHNOLOGY/ TURKEY	
ALPER ELCI	DOKUZ EYLUL UNIVERSITY/TURKEY	
SEBNEM ELCI	IZMIR INSTITUTE OF TECHNOLOGY/TURKEY	
IOANNIS KALAVROUZIOS	HELLENIC OPEN UNIVERSITY/GREECE	
BERGUZAR OZBAHCECI	IZMIR INSTITUTE OF TECHNOLOGY/TURKEY	
CELALETTIN SIMSEK	DOKUZ EYLUL UNIVERSITY/TURKEY	
M. SINAN YILDIRIM	IZMIR INSTITUTE OF TECHNOLOGY/TURKEY	

SCIENTIFIC COMMITTEE

HAFZULLAH	AKSOY	ISTANBUL TECHNICAL UNIVERSITY / TURKEY
ANDREAS N.	ANGELAKIS	INSTITUTE OF IRAKLION, IRAKLION / GREECE
GEORGIOS P.	ANTONIOU	UNIVERSITY OF PATRAS / GREECE
MUSTAFA	ARAL	GEORGIA INSTITUTE OF TECHNOLOGY / USA
NAJET	AROUA	INSTITUT MÉDITERRANÉEN D'ETUDES AVANCÉES MARSEILLE,MARSEILLE / FRANCE
ALPER	BABA	IZMIR INSTITUTE OF TECHNOLOGY/ TURKEY
WERNER	BALDERER	SWISS FEDERAL INSTITUTE OF TECHNOLOGY (ETH) / SWITZERLAND
SERDAR	BAYARI	HACETTEPE UNIVERSITY / TURKEY
MOHAMED	BAZZA	FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS / ITALY
HANANE	BENGLILOU	INTERNATIONAL INSTITUTE FOR WATER AND SANITATION IEA / MOROCCO
PROSUN	BHATTACHARYA	KTH ROYAL INSTITUTE OF TECHNOLOGY/ SWEDEN
CONSTANTIN	CANAVAS	HAMBURG UNIVERSITY OF APPLIED SCIENCES / GERMANY
MARIA C.	CUNHA	UNIVERSITY OF COIMBRA / PORTUGAL
MUSTAFA M.	DEMIR	IZMIR INSTITUTE OF TECHNOLOGY/ TURKEY
WALTER	DRAGONI	PERUGIA UNIVERSITY / ITALY
MEHMET	EKMEKÇİ	HACETTEPE UNIVERSITY / TURKEY
ALPER	ELCI	DOKUZ EYLUL UNIVERSITY/ TURKEY
SEBNEM	ELCI	IZMIR INSTITUTE OF TECHNOLOGY /TURKEY
FATMA	EL-GOHARY	NATIONAL RESEARCH CENTRE / EGYPT
MUSTAFA	ERSÖZ	SELÇUK UNIVERSITY / TURKEY
SAEID	ESLAMIAN	ISFAHAN UNIVERSITY OF TECHNOLOGY / IRAN
OKAN	FISTIKOĞLU	DOKUZ EYLUL UNIVERSITY / TURKEY
ANDREA	GARDUNO	NOTTINGHAM UNIVERSITY, NOTTINGHAM / UK
ORHAN	GUNDUZ	DOKUZ EYLUL UNIVERSITY /TURKEY
MOOYOUNG	HAN	SEOUL NATIONAL UNIVERSITY / KOREA
JESSICA A.	HARRISON	UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN / USA.
BENOIT	HAUT	UNIVERSITÉ LIBRE DE BRUXELLES / BELGIUM
BLANCA	JIMENEZ	SECRETARY OF THE INTERNATIONAL HYDROLOGICAL PROGRAMME (IHP) UNESCO / FRANCE
PETRI S.	JUUTI	UNIVERSITY OF TAMPERE / FINLAND
IOANNIS	KALAVROUZIOS	HELLENIC OPEN UNIVERSITY / GREECE

ADNAN	KAPLAN	EGE UNIVERSITY, IZMIR / TURKEY,
TAPIO S.	KATKO	TAMPERE UNIVERSITY OF TECHNOLOGY / FINLAND
KONSTANTINA	KATSANO	UNIVERSITY OF PATRAS / GREECE
LEVENT	KAVVAS	COLLEGE OF ENGINEERING / UC DAVIS
MUSTAFA E.	KESKİN	SÜLEYMAN DEMIREL UNIVERSITY / TURKEY
İBRAHİM	KOCABAŞ	KATIP ÇELEBI UNIVERISTY / TURKEY
ALBERT	KOENING	THE UNIVERSITY OF HONG KONG / CHINA
DEMETRIS	KOUTSOYIANNIS	NATIONAL TECHNICAL UNIVERSITY OF ATHENS / GREECE
JENS	KRASILNIKOFF	AARHUS UNIVERSITY / DENMARK
ARUN	KUMAR	INDIAN INSTITUTE OF TECHNOLOGY / INDIA
YUSUF	KURUCU	EGE UNIVERSITY / TURKEY
NIKOLAS	LAMBRAKIS	UNIVERSITY OF PATRAS / GREECE
PIETRO	LAUREANO	IPOGEA, ITALY
SHRIKANT D.	LIMAYE	GROUND WATER INSTITUTE (NGO), PUNE / INDIA
LARRY	MAYS	ARIZONA STATE UNIVERSITY / USA
BERGUZAR	OZBAHCECI	IZMIR INSTITUTE OF TECHNOLOGY / TURKEY
JACINTA	PALERM	COLEGIO DE POSGRADUADOS DE CHAPINGO / MEXICO
MANZOOR	QADIR	UNITED NATIONS UNIVERSITY,INSTITUTE FOR WATER / CANADA
RIIKKA P.	RAJALA	UNIVERSITY OF TAMPERE / FINLAND
ALEXANDER	REYES-KNOCHE	LATIN AMERICA CONSULTANT COMPANY, LADENBURG / GERMANY
SALAR	REZAPOUR	UNIVERSITY OF URMIA / IRAN
PAOLO	ROCCARO	UNIVERSITY OF CATANIA / ITALY
MIQUEL	SALGOT	UNIVERSITAT DE BARCELONA / SPAIN
ZEKAI	SEN	ISTANBUL TECHNICAL UNIVERSITY / TURKEY
CELALETTIN	SIMSEK	DOKUZ EYLUL UNIVERSITY/ TURKEY
AYSUN	SOFUOĞLU	IZMIR INSTITUTE OF TECHNOLOGY / TURKEY
MARCO	TALLINI	L'AQUILA UNIVERSITY / ITALY
GOKMEN	TAYFUR	IZMIR INSTITUTE OF TECHNOLOGY/ TURKEY
VLADIMIR	VISSIKIRSKY	NATIONAL ACADEMY OF SCIENCES OF UKRAINE / UKRAINE
KOSTAS	VOUDOURIS	ARISTOTLE UNIVERSITY / HELLAS
HEIKKI S.	VUORINEN	UNIVERSITY OF HELSINKI / FINLAND
STAVROS	YANNOPOULOS	ARISTOTLE UNIVERSITY OF THESSALONIKI, THESSALONÍKI / GREECE
HASAN	YAZICIGİL	MIDDLE EAST TECHNICAL UNIVERSITY / TURKEY
WANG	YINGHUA	CHINA INSTITUTE OF WATER RESOURCES AND HYDROPOWER RESEARCH / CHINA
İRFAN	YOLCUBAL	KOCAELI UNIVERSITY / TURKEY
ZHENG X.	YUN	PRESIDENT OF INTERNATIONAL WATER HISTORY ASSOCIATION / CHINA
DANIELE	ZACCARIA	COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES / USA

TABLE OF CONTENT

ID NO	TITLE OF PAPER	NO
2981	HISTORICAL WATER WORKS IN TURKEY	7
2810	ANALYSIS AND COMPARISON OF SPATIAL RAINFALL DISTRIBUTION APPLYING NON-GEOSTATISTICAL/DETERMINISTIC INTERPOLATION METHODS: THE CASE OF PORSUK RIVER BASIN, TURKEY	13
2811	AN INVESTIGATION AND COMPARISON OF HYDROELECTRIC ENERGY POTENTIAL: A STUDY OF PORSUK RIVER BASIN, TURKEY	22
2947	DETERMINING LINEAR AND AREAL ORPHOLOGICAL CHARACTERISTICS OF MELEN WATERSHED IN TURKEY	30
2630	ADOPTING A STRATEGIC FRAMEWORK FOR TRANSBOUNDARY WATER RESOURCES MANAGEMENT IN AFGHANISTAN	41
2978	WATER MANAGEMENT IN THE HAMAMS OF ANCIENT CORINTH (PELOPONNESE) DURING THE OTTOMAN TIMES	58
2852	IMPLEMENTATION OF EUROPEAN UNION WATER FRAMEWORK DIRECTIVE IN TURKEY - MANAGEMENT OF DANGEROUS SUBSTANCES	70
2986	THE OTTOMAN AQUEDUCT SYSTEM OF KOS, GREECE	76
2979	OCCURRENCE OF PLESIOMONAS SHIGELLOIDES FROM WATER ENVIRONMENTS IN DUZCE/TURKEY	88
2952	BIM FOR 7DS' MANAGEMENT OF WATER DISTRIBUTION NETWORK A CASE STUDY FOR TUMAKURU TOWN, KARNATAKA, SOUTH INDIA	91
2631	TREND ANALYSIS OF STREAMFLOW IN THE EUPHRATES-TIGRIS BASIN	104
2987	TREATMENT OF OPIUM ALKALOID WASTEWATER VIA HYDROTHERMAL GASIFICATION	111
2904	MANGANESE SPECIATION STUDIES IN RAIN WATER: APPLICATION OF HIGH PERFORMANCE LIQUID CHROMATOGRAPHY-INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY	121
2934	EFFECTS OF HYPOLIMNETIC OXYGENATION ON IRON AND MANGANESE CONCENTRATIONS IN RESERVOIRS	126
2802	SIMULTANEOUS SEPARATION OF BORON AND LITHIUM FROM GEOTHERMAL WATER BY ADSORPTION-MEMBRANE FILTRATION HYBRID PROCESS	136
2380	EXPERIMENTAL ANALYSIS OF CONTAMINANT INTRUSION INTO WATER DISTRIBUTION NETWORK DURING FLUCTUATING PRESSURE EVENTS	141
2805	A BRIEF HISTORY OF WATER REUSE	150
2792	TREND DIRECTION CHANGES OF TEMPERATURE AND PRECIPITATION TIME SERIES IN TRARZA REGION OF MAURITANIA FOR PERIOD OF 1970-2013	162
2838	METEOROLOGICAL DROUGHT ANALYSIS FOR LASHKARGAH AND GARDANDIWAL STATIONS OF HELMAND RIVER BASIN, AFGHANISTAN	177
2961	CARBON FOOTPRINT FROM WASTE WATER TREATMENT PLANTS	190
2926	CHANGE-POINT IDENTIFICATIONS OF KEY WATER QUALITY PARAMETERS IN LAKE TAIHU	194
2967	PAST, PRESENT AND FUTURE OF TOILET FLUSHES - AN APPRAISAL THROUGH WATER SCARCITY, WATER QUALITY AND "FIT FOR PURPOSE" USE	204
2942	CONTOUR AND 3-DIM REPRESENTATION OF FOOD ADDITIVE REMOVAL PERFORMANCES OF CATALYTIC WET AIR OXIDATION AS A GREEN WASTEWATER TREATMENT METHOD	214
2845	ASSESSMENT OF WATER QUALITY RELATED TO LEAD/ZINC MINES IN UMURBEY DAM BASIN, NORTHWESTERN TURKEY	224
2861	PRODUCTION OF ACTIVATED CARBON FROM OILSEED RESIDUE BIOCHAR BY CHEMICAL ACTIVATION AND ITS USABILITY TO ABSORB REACTIVE DYESTUFF	231
2862	THE REMOVAL OF PESTICIDE FROM AQUEOUS SOLUTIONS BY USING ACTIVATED CARBON OBTAINED FROM FRUIT JUICE INDUSTRY SOLID WASTE	242

2855	REMOVAL OF SOME PHENOLIC MICROPOLLUTANTS FROM RAW HOSPITAL WASTEWATER BY BIOLOGICAL AND MEMBRANE PROCESSES	253
2660	TREATMENT OF WASTEWATER CONTAINING ANTIBIOTIC WITH A NEW KIND OF COMPOSITE VIA ADSORPTION	266
2965	VISIBLE LIGHT PHOTO-FENTON OXIDATION OF TARTRAZINE IN THE PRESENCE OF BISMUTH OXYHALIDE CATALYSTS	268
2922	RAPID AND EFFICIENT COAGULATION AND FLOCCULATION OF DOMESTIC WASTEWATERS WITH HYBRID SYSTEMS	277
2844	UTILIZATION OF ACTIVATED CARBON PREPARED FROM PUMPKIN SEED SHELL FOR THE REMOVAL OF DYESTUFF FROM AQUEOUS SOLUTIONS AND WASTEWATER BY MICROWAVE RADIATION	283
2815	OPTIMIZATION OF MICROBIAL POLYHYDROXYBUTYRATE (PHB) PRODUCTION UNDER AEROBIC DYNAMIC FEEDING REGIME AT DIFFERENT CARBON AND NITROGEN LOADINGS	292
2816	TREATMENT OF RAW TEXTILE WASTEWATER BY SULFATE REDUCING BACTERIA IN MICROBIAL FUEL CELLS	303
2841	WASTEWATER PIPELINE DESIGN IN ACCORDANCE WITH SEA-PIPE-SOIL INTERACTION	313
2920	REMOVAL OF CATIONIC DYE (METHYLENE BLUE) FROM AQUEOUS SOLUTION WITH ACTIVATED BIOSORBENTS	322
2829	WASTEWATER ANALYSIS BY USING ICP-OES	332
2867	REDUCTION DYE IN PAINT AND CONSTRUCTION CHEMICALS WASTEWATER BY IMPROVED COAGULATION FLOCCULATION PROCES	336
2738	MICROFILTRATION CERAMIC MEMBRANES WITH BIOCIDAL PROPERTIES OF THE SURFACE	341
2937	THICKENER WATER NEUTRALIZATION BY FLY ASH OF SILOPI THERMAL POWER PLANT - SLURRY AND TREATMENT	349
2653	ACTIVITIES FOR REDUCTION OF ENERGY CONSUMPTION IN SEWAGE TREATMENT PLANTS BY 50%	359
2803	REMOVAL OF METHYLENE BLUE FROM AQUEOUS SOLUTION BY ADSORPTION USING BENTONITES	370
2950	TAGUCHI OPTIMIZATION METHOD FOR 2,4,5 TRICHLORO PHENOLS FROM AQUEOUS SOLUTION USING TURKISH SWEETGUM (LIQUIDAMBAR ORIENTALIS) BARK	379
2661	BIOSORPTION OF REACTIVE BLACK 5 DYE FROM AQUEOUS SOLUTION BY CHEMICALLY MODIFIED PARSLEY STALK: A KINETIC ANALYSIS	388
2662	EQUILIBRIUM STUDIES RELATED TO THE BIOSORPTION OF A TOXIC TEXTILE DYE BY MODIFIED WASTE MATERIAL	390
2650	REMOVAL OF ANIONIC AZO DYE FROM WASTEWATER ONTO MESOPOROUS CARBON MATERIAL AT DIFFERENT ADSORPTION TEMPERATURE	392
2651	KINETIC STUDIES OF BASIC VIOLET 3 DYE ADSORPTION FROM AQUEOUS MEDIA USING AGRO-INDUSTRIAL BASED ACTIVATED CARBON	395
2893	EFFECT OF ANTISCALANT CONCENTRATION ON PERMEATE FLUX IN A PILOT-SCALE SUBMERGED MEMBRANE BIOREACTOR (MBR) FOR INDUSTRIAL WASTEWATER TREATMENT	398
2923	REMOVAL OF CR (VI) USING ACTIVATED CARBON PREPARED	403
2807	HYDRAULIC AND HYDROLOGICAL INVESTIGATION ON THE ANCIENT FOUNTAINS OF HZ SULEYMAN MOSQUE	414
2798	ANCIENT WATER SUPPLY SYSTEMS AND WATERWAYS; KEHRIZ SYSTEM IN ŞANLIURFA	420
2799	HISTORICAL WATER STRUCTURES OF ŞANLIURFA; FOUNTAINS	430
2817	INVESTIGATION OF HISTORICAL WATER STRUCTURES OF SANLIURFA: BATHS AND PUBLIC BATHS	440
2977	ROMAN WATER INTAKE STRUCTURES AT THE JADRO RIVER SPRING	454
2848	A BRIEF HISTORY OF WATER WELLS FOCUSING ON BALKAN, INDIAN AND CHINESE CIVILIZATIONS	465
2969	ASSESSMENT OF THE PRESENT STATE AND PERSPECTIVES OF THE OLD	477

	DAM OF RELLEU (MARINA BAIXA, ALACANT, SPAIN).	
2856	RECHARGE-DISCHARGE MECHANISM AND GROUNDWATER FLOW DYNAMICS OF KARST AQUIFER IN THE WATERSHED OF YUVACIK DAM (KOCAELI, TURKEY)	487
2956	PREDICTING FLOOD PLAIN INUNDATION FOR NATURAL CHANNELS HAVING NO GAUGED STATIONS	497
2925	FREQUENCY ANALYSIS OF LOW FLOWS	509
2935	A METHOD FOR LOW FLOW ESTIMATION AT UNGAUGED SITES: A CASE STUDY IN TURKEY	518
2928	FLOW DURATION CURVE MODEL FOR UNGAUGED BASINS	529
2929	EXPERIMENTAL ANALYSIS OF SEDIMENT INCIPIENT DEPOSITION IN RIGID BOUNDARY OPEN CHANNELS	537
2879	AREAL VARIABILITY OF L-MOMENT RATIOS FOR PEAK DISCHARGES IN TURKISH RIVERS	550
2963	THE CONSTRUCTION AND MAINTENANCE OF ANCIENT KAREZ SYSTEM	557
2973	TREND ANALYSIS OF PRECIPITATION, TEMPERATURE AND WIND DATA IN SAMSUN (TURKEY)	566

Historical Water Structures of Şanlıurfa; Fountains

Kasım Yenigün^{1,a}, Cihat Kürkçüoğlu², Mahmut Karakaş³, Reşit Gerger¹ Mustafa H. Aydoğdu⁴ and Veysel Gümüş¹

1. Harran University, Engineering Faculty, Civil Eng. Department, Şanlıurfa, Turkey

2. Harran University, History of Art Department, Şanlıurfa, Turkey

3. Researcher, Historian, Writer, Şanlıurfa, Turkey

4. Harran University, Agricultural Faculty, Şanlıurfa, Turkey

a. Corresponding author (kyenigun@hotmail.com)

ABSTRACT: Şanlıurfa, one of the oldest city in the world, is hosting several civilizations throughout the history since 11500 BC. The archaeological findings says that the city is hosting very important water supply experiences. Many of them, which can be classified as the pre-Islamic (Roman) and post-Islamic (Ottoman) Period, were constructed in the center. Turkish baths, aqueducts, reservoirs, charity structures, cisterns, maksems (water distribution structures), bridges, wells and fountains are some of these structures. Architectural effects of Roman period can be observed in the Ottoman Periods water structures. One of the most important display of architectural influences in the late Ottoman Empire and in the early times of the Republican period is the fountains. The fountains, sequenced on the ancient water transmission systems that called “kehriz” in the center, are the ones still living as important ancient water structures of Şanlıurfa. As a part of detailed investigation of the ancient water supply, transmission and usage systems in Şanlıurfa province, in this research, some of the fountains have been investigated and documented in their location, inscription, historical and newest photographs with technical details.

1. INTRODUCTION

Şanlıurfa which is called Urfa or Edessa in Roman Periods is in Southeastern Anatolia region of Turkey (Figure 1). Şanlıurfa where the roots of life go back to 11500 BC, is known the oldest city of the world. In the historical scale of Şanlıurfa, the Mitanni Period was in the 2nd millennium BC, Hittites, Assyrian, Persian and the early Roman periods were in the 1st millennium BC, the Imperial Roman and Byzantine eras were in the first millennium of our era. The Arab period had started in the 7th century and continued through the Seljuk, Safavid and Akkoyunlu periods to the 15th century. The Turkish period began in the 16th century and continues until today (Figure 2), (Yenigun et al. 2012; 2013).

There are many structures in Şanlıurfa such as water lines, aqueducts, galleries, cisterns, wells and fountains from the ancient civilizations. City center is decorated with water heritages such as Turkish public baths, aqueducts, water distribution structures called maksems, wells, cisterns and fountains (Kurkcuoglu et al, 2012; 2013; Gerger and Kurkcuoglu, 1997).

Although it is located on the hottest part of Turkey, many historical literatures has identified Şanlıurfa as a ‘water abundant city’. As a famous old name of Şanlıurfa, ‘Orhay’ is known as distorted version of ‘Kallirrhoe’ (beautiful city of watercourses), or from Sami language ‘wrh’ (water), or from Arabic language ‘wariha’ (abundant in water) (Çeçen and Gökçek 2005; Segal 2005).

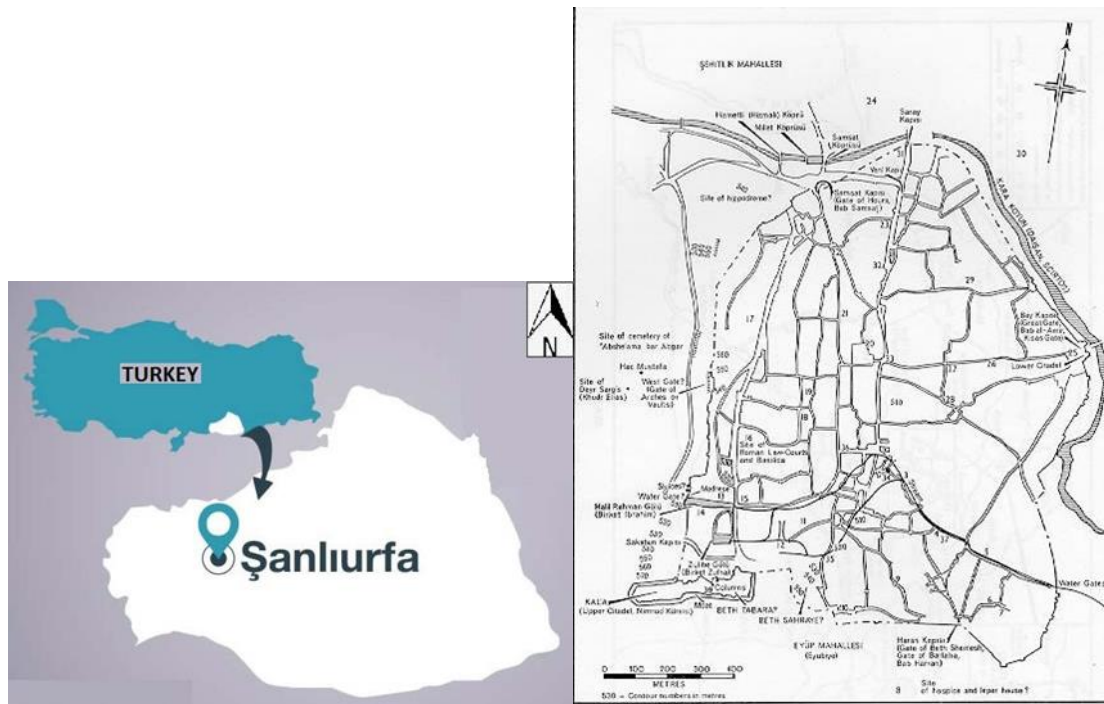


Figure 1. The place of Şanlıurfa City in Turkey. **Figure 2.** Map of Old Şanlıurfa rovince (Segal, 1970)

Historical water structures of Şanlıurfa, especially the fountains, have been mentioned in the literature related on the history of the city works partially. (Kurkcuoglu, 1990; 2011). Especially, the literature in terms of engineering is scarce. Detailed information on architectural features and structural status of the fountains did not take place in scientific sources. The aims of this paper are to describe the ancient fountains of Şanlıurfa and to define some of their technical details, locations, updated positions and to establish an archive about them.

2. FOUNTAINS

The fountains are a small water distribution system from which people can drink or use water easily. The fountains are made of stone, marble or similar materials with a tap on the front side and have a hidden reservoir. Fountains obtain the water either from groundwater or collect a water that comes from a spring to the small tank.

The fountains are important water structures in ancient cultural heritage. According to Mays (2010), the Romans used water as a matter of luxury and prestige building mega water projects using aqueducts to transfer water to their public fountains and baths.

Nowadays, there are fifteen active fountains in Şanlıurfa city and most of them are still in use (Önge, 1983; Kürkçüoğlu, 1992).

Here, some of which are listed below, are investigated (Figure 3), (Karakas, 2009; Kurkcuoglu, 1992).

- 1) Adile Hanım Fountain
- 2) Ebeler Street / Sütçü Abdurrahman Efendi Fountain
- 3) Firuzbey Fountain
- 4) Gömüzkade Hafız Süleyman Efendi Fountain
- 5) Hekimdede Fountain

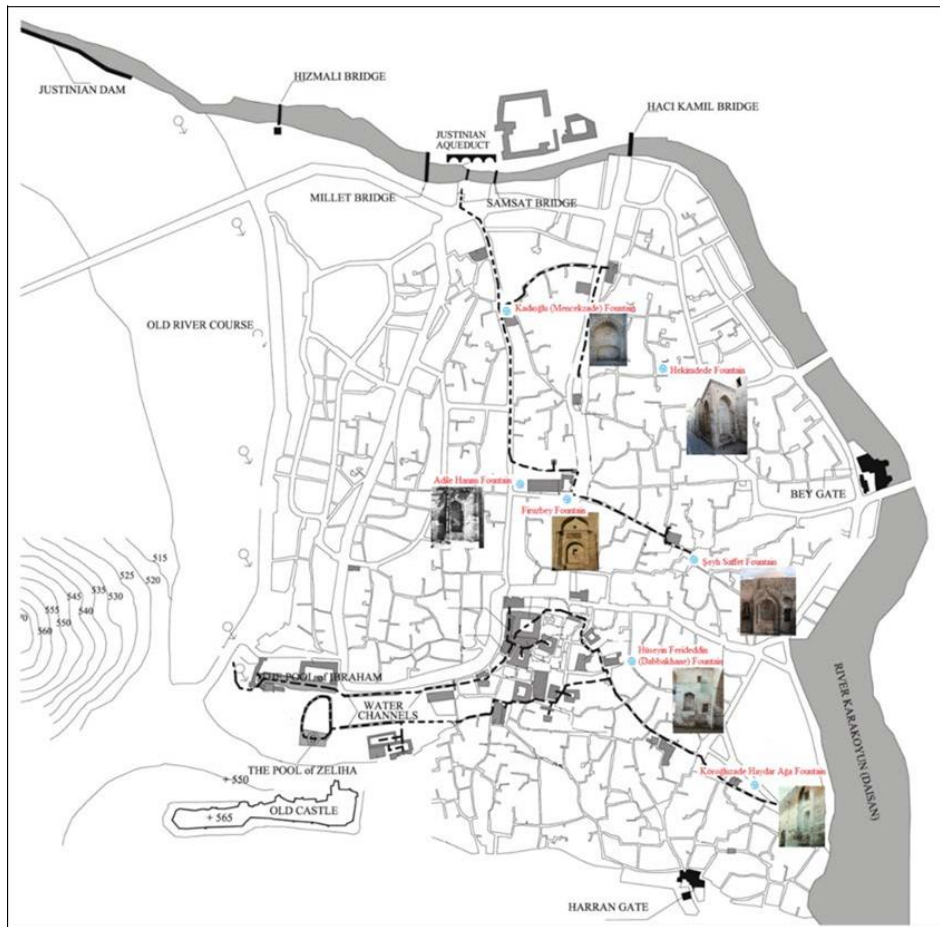


Figure 3. Location of some fountains in old Urfa (Developed from Temizsoy, 2005)

Adile Hanım Fountain; the fountain was built in 1870 by Adile Hanım at West of Grand Mosque. It is destroyed in 1980 while widening the Street (Figure 4).

Ebeler Street / Sütçü Abdurrahman Efendi Fountain; the fountain takes place in Gölbaşı District, Ebeler Street. It is made of regularly cut Urfa stone. There is no information about its inscription. It was restored by the Governorship of Şanlıurfa in 1996 (Figure 5).

Firuzbey Fountain; the fountain was built in 1870 by Firuz Bey on the southern wall of Eyyubi Madrasa at the end of the Grand Mosque. It is written on inscription that the water flows here which is called “kehriz water” that comes by historical waterways (Figure 6).

Gömüzkade Hafız Süleyman Bozan Efendi Fountain; the fountain was built in 1882 by Hafız Süleyman Efendi on the east side of the entrance of Siverekli Mosque (it is using as a house in today's) which takes place in Hekimdede District, Akyol Street (Figure 7).

Hekimdede Fountain; the fountain was built in 1708 by Arifi Ahmed Efendi at the northwest corner of Hekimdede Mosque. The inscription is not read clearly due to it is destroyed. It is the only example in the city with two sided fountain (Figure 8).

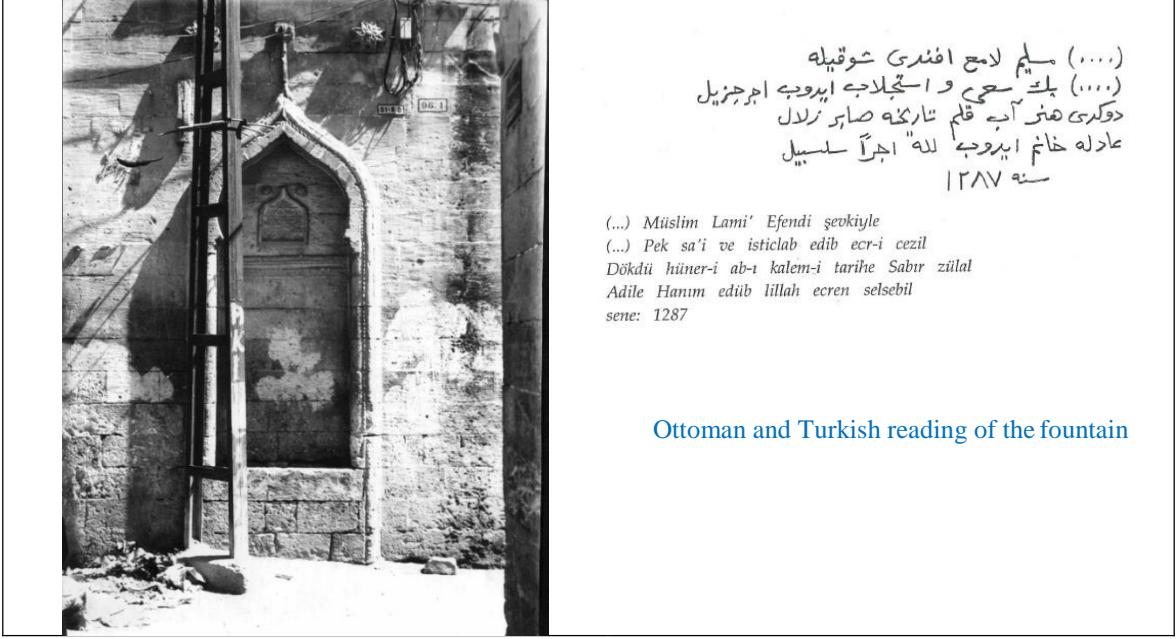
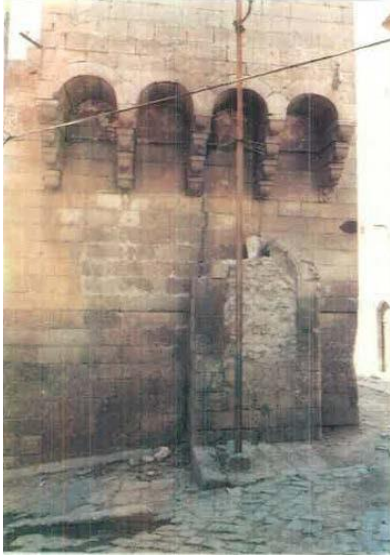
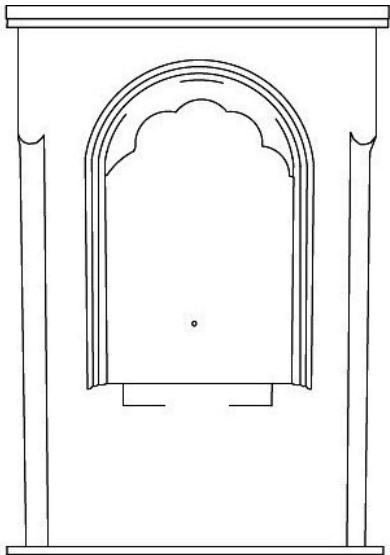


Figure 4. Old picture of Adile Hanım Fountain (Photo by Kurkcuoglu, C.)



Old picture of Ebeler Street Fountain (Photos by Kurkcuoglu, C.)



Typical plan of the fountain (Gelener, 2011)



Fountain in today

Figure 5. Ebeler Street Fountain



Firuz Bey Fountain in 1900's. (G. Bretocq, 1919-20) Firuz Bey Fountain in 1900's. (Oppenheim, 1900)



Firuz Bey Fountain in today
(Photo by Kurkcuoglu, C.)



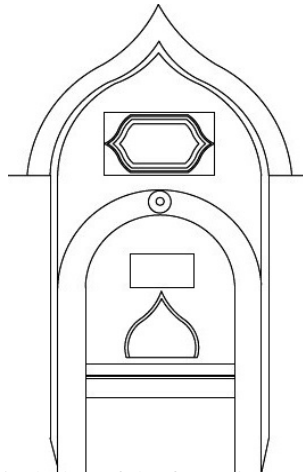
*Kapucıbaşı dergah-i celil el-uyun
Hacı Firuz Beg ol menba'ı ihsan sehâ
Rakka'nın eyledi her sūyine lütfun câri
İşte bu deri ile kıldı (güfta) irvâ
Hacet-i hayre su gibi akıdub mal-i kesir
Köşe be-köşe oldu Ruha me'va bihişt
Biri çıkdı dedi tarihin bir kaddi
Kevser'in aynı değil mi bu sebil-i evfâ
fi sene 1196*

Ottoman and Turkish reading of the
fountain inscription (Karakaş, 2001)

Figure 6. Firuzbey Fountain



Pictures of Gömükzade Hafız Süleyman Efendi Fountain (Photos by Kurkcuoglu, C.)



Typical plan of the fountain (Gelener, 2011)



The fountain in today's (Gelener, 2011)



Original inscription of the fountain



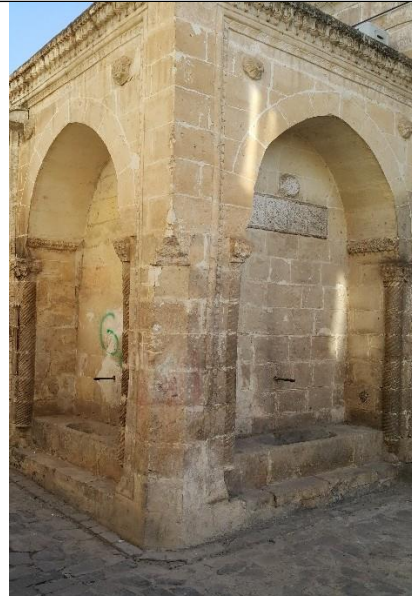
"We made from water every living thing."
From Koran, 21/30

عمر هذو سبيل حافظ سليمان بوزان افندي
ابن واعظ محمد افندي كوموك نرادو سنه ١٣١١

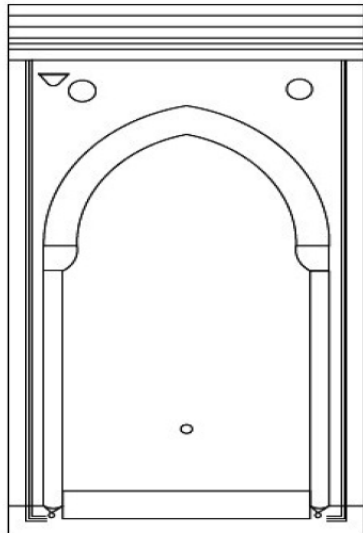
Ottoman and Turkish reading of the fountain inscription (Karakas, 2001)

"Ammere hazihî selsebil Hafız Süleyman Bozan Efendi
ibni Vaiz Muhammed Efendi Gömükzade. sene 1300"

Figure 7. Gömükzade Hafız Süleyman Efendi Fountain (Photos by Kurkcuoglu, C.)



Pictures of Hekim Dede Fountain at past and today (Photos by Kurkcuoglu, C. and Gerger, R.)



Typical plan of the fountain (Gelener, 2011)
fountain



Original inscription of the

کاتب حضرت دیوان وزیر اکرم
عارفی احمد افندی سر ارباب فضولی
ساحهء جامع پر فیض ولی مطلق
یعنی حکمت دده سر دفتر ارباب فضول
آبه اول مرتبه لب تشنه تر حسرت ایدی
صله یه تشنه نه دکلو ایسه ماء موصول
ماء جاری گتوروب خیرله سیر آب ایتدی
اولدی همرن گ بهشت ایلدی کوثر چو د خول
دل نابی گبی آب آقدی دیدی تاریخین
اثر احمد افندی ایده الله قبول

۱۱۲۰

Ottoman and Turkish reading of the fountain inscription (Karakas, 2013)

Kâtib-i hazret-i divan-i vezir-i Ekrem
'Ârifî Ahmed Efendi ser erbâb-ı kabûl
Sâha-i câmi'-i pûr feyz-i veliyy-i mutlak
Ya'ni Hikmet Dede ser defter-i erbâb-ı füzûl
Âba ol mertebe leb-teşneter hasret idi
Silaya teşne ne denlû ise mâ-i mevsûl
Mâ-i cârî getürüb hayr ile sîr-âb etdi
Oldu hem reng-i bihişt eyledi Kevser çü dühûl
Dil-i Nâbî gibi âb akdı dedi târihin
Eser-i Ahmed Efendi ede Allah kabûl
1120

Figure 8. Hekimdede Fountain

3. RESULTS AND DISCUSSION

There are many structures in Şanlıurfa such as water lines, aqueducts, galleries, cisterns, wells and fountains from the ancient civilizations. City center is decorated with water heritages such as Turkish public baths, aqueducts, water distribution structures called maksems, wells, cisterns and fountains.

Water structures of the city, especially fountains, were partially mentioned in the studies and literary works about the history of the city. The fountains, sequenced on the ancient water transmission systems that called “kehriz” in the center, are the ones still living as important ancient water structures of Şanlıurfa. As a part of detailed investigation of the ancient water supply, transmission and usage systems in Şanlıurfa province, in this research, the fountains are evaluated and documented in their location, inscription, old and today's photograph with technical details. As one of the most important display of architectural influences in the late Ottoman Empire and in the early times of the Republican period, the fountains are still standing and they continue to tell us about our past.

REFERENCES

- Bretocq, G., 1919-20, (Archives départementales de l'Eure. Fonds Gabriel Bretocq).
<http://www.houshamadyan.org/en/mapottomanempire/vilayetaleppo.html>
- Çeçen, S. & Gökçek, L. G. 2005, Traces of our Culture History in the Sumerians. Journal of Academy Diaries – Social Researches 1 (1), 5–12, Ankara, Turkey (in Turkish).
- Gelener, M.A., 2011, “Şanlıurfa İli Tarihi Su Yapılarının Belirlenmesi ve Teknik Özellikleri”, Harran Üniversitesi, Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, Şanlıurfa. (In Turkish)
- Gerger, R. and Kurkcuoglu, C. 1997, “Ş.Urfa’daki Tarihi Su Yapıları”, Türkiye İnşaat Müh. 14. Teknik Kongresi, İzmir (in Turkish).
- Karakaş, M. 2009, Urfa’nın Kültür ve İnançlar Serüveni, Publication of Provincial Culture and Tourism Directorate, Şanlıurfa. (In Turkish)
- Karakaş, M., 2001, Şanlıurfa ve İlçelerinde Kitabeler, Publication of Şanlıurfa Municipality, Şanlıurfa. (In Turkish)
- Karakaş, M., 2013, Hekimdede Çeşmesi Kitabeleri, Şurkav Dergisi, Yıl: 6, Sayı: 15, ISSN: 1308-3449. (In Turkish)
- Kurkcuoğlu, A. C. 1990, From Ruha to Urfa 1780–1980.Şanlıurfa Belediyesi, Kültür ve Eğitim Müdürlüğü (in Turkish).
- Kurkcuoğlu, A. C. 1992, Water Architecture in Şanlıurfa. Ministry of Culture, Ankara (in Turkish).
- Kurkcuoğlu, A. C. 2011, Urfa; Previous Times with Photographs. Municipality of Şanlıurfa, Şanlıurfa (in Turkish).
- Kurkcuoglu, A. C., Yenigün, K. and Yazgan, M.S., 2012, "Justinian Dam: One of the Oldest Flood Control Facilities in the World", IWA Specialized Conference on Water and Wastewater Technologies in Ancient Civilizations, 22-24 March, Istanbul, Turkey.
- Kurkcuoglu, A. C., Yenigün, K. and Yazgan, M.S., 2013, "Justinian Dam: One of the Oldest Flood Control Facilities in the World", Water Science & Technology: Water Supply, 13(3), pp 683–691.
- Mays, L.W., 2010, “Lessons from the Ancients on Water Resources Sustainability”, Ancient Water Technologies, Springer, New York.
- Önge, Y. 1983, Water and its Importance in Foundation Organization. 1. Foundation Week Activities, Ankara, Turkey (in Turkish).
- Oppenheim, M.V., 1900's, web: <http://www.arachne.uni-koeln.de/drupal/?q=en/node/197> (Access: 10 November, 2016).
- Segal, J. B. 1970, Edessa ‘The Blessed City’. Oxford University Press, UK.
- Temizsoy, A. 2005, Architectural significance of original water supply systems: Şanlıurfa (Turkey) as a case. In: 31st International Symposium on Water Supply and Drainage for Buildings, 14 –16 September 2005, Brussels, Belgium.
- Yenigun, K., Kurkcuoglu, A. C., Yazgan, M.S., Gerger, R. and Ulgen, U., 2013, "From Ancient Time to Present: Development of Drinking Water Supply System in Şanlıurfa", Water Science & Technology: Water Supply, 13(3), pp 646–655.

Yenigun, K., Kurkcuoglu, A. C., Yazgan, M.S., Gerger, R. and Ulgen, U., 2012, "From Ancient Time to Present: Development of Drinking Water Supply System in Şanlıurfa", IWA Specialized Conference on Water and Wastewater Technologies in Ancient Civilizations, 22-24 March, Istanbul, Turkey.



IWA-PPFW 2017

Organizing agency is ALBEDO Tourism

