Sustainable water management in university: From fountain to campus

All of the university campuses in Turkey utilize local city water resources besides a unique example in Turkey. Muğla Sıtkı Koçman University has its own water system independent from the city resources where local governance providing. Muğla is located in western cost of Turkey and has university founded in 1992. In 2001 university constructed a water line from 52 km away to campus from Sandras Mountain with its own efforts. The high quality drinking water is well enough to drink and use for campus utilization. From 1200 m high mountain level to 670 m. campus water flows from its own body without any other energy usage such as water pumps. Biologically treated body of water is tap drinkable in campus. In this humble paper I will provide the unique information of this aqua project in Muğla.

Muğla Province of Turkey

At 1,100 km (680 mi), Muğla's coastline is the longest among the Provinces of Turkey and longer than many countries' coastlines, (even without taking any small islands into account). Important is the Datça Peninsula. As well as the sea, Muğla has two large lakes, Lake Bafa in the district of Milas and Lake Köyceğiz. The landscape consists of pot-shaped small plains surrounded by mountains, formed by depressions in the Neogene. These include the plain of the city of Muğla itself, Yeşilyurt, Ula, Gülağzı, Yerkesik, Akkaya, Çamköy (tr) and Yenice). Until the recent building of highways, transport from these plains to either the coast or inland was quite arduous, and thus each locality remained an isolated culture of its own. Contact with the outside world was through one of the three difficult passes: northwest to Milas, north to the Menderes plain through Gökbel, or northeast to Tavas.(Wikipedia, 2017)

History of Muğla

In ancient times in Anatolia, the region between the Menderes (Meander) and Dalaman (Indus) rivers in the south was called Caria. The inhabitants were Carians and Leleges. In his Iliad, Homer describes the Carians as natives of Anatolia, defending their country against Greeks in joint campaigns in collaboration with the Trojans.

A major city of ancient Caria, Muğla is known to have been occupied by raiding parties of Egyptians, Assyrians and Scythians, until eventually the area was settled by Ancient Greek colonists. The Greeks inhabited this coast for a long time building prominent cities, such as Knidos (at the end of the Datça Peninsula) and Bodrum (Halicarnassos), as well as many smaller towns along the coast, on the Bodrum Peninsula and inland, including in the district of Fethiye the cities of Telmessos, Xanthos, Patara and Tlos. Eventually the coast was conquered by Persians who were in turn removed by Alexander the Great, bringing an end to the satrapy of Caria.

Muğla Sıtkı Koçman University: A Young University with Challenging Targets

Muğla Sıtkı Koçman University was established in 1992 as a state university with four proposed faculties: the Faculty of Arts & Sciences and Humanities, the Faculty of Economics and Administrative Sciences, the Faculty of Technical Education and the Faculty of Fisheries. Mugla School of Management, founded in 1975, originally affiliated with the Ankara Academy of Economics and Administrative Sciences, was the first higher education institution in Muğla. It then became the first faculty of Muğla Sıtkı Koçman University upon its establishment. In addition, Muğla Vocational School, founded in 1989 as part of Izmir Dokuz Eylül University, joined Muğla University.

When first founded, the aim of the university was to support contemporary instruction and research in various areas of the social, natural, and pedagogical sciences, as well as the arts and humanities, in conjunction with vocational training. At that time, Muğla Sıtkı Koçman University had only 1,128 students in one department and three programmes. Over the past 20 years, the university has grown to include nine faculties, three graduate schools, four schools, nine vocational schools, and thirteen research and application centres:

1993: Muğla Sıtkı Koçman University officially begins academic activities with two active faculties and one vocational school.

1994: Ula Vocational School and Ortaca Vocational School open their doors

1995: Milas Vocational School and the School of Physical Education and Sports join the university

1997: Muğla School of Health and the Faculty of Technical Education welcome their first students

1998: Fethiye Vocational School begins academic activities

1999: Dalaman Vocational School founded

2001: The Faculty of Education and School of Tourism and Hotel Management begin academic activities

2002: Fethiye School of Health opens

2004: The Faculty of Fine Arts, the Faculty of Fisheries, and Yatağan Vocational School open.

2006: The Faculty of Engineering and Datça Vocational School open and welcome their first students

2007: The Faculty of Medicine joins the university

2010: The Faculty of Arts & Sciences and Humanities divides into two faculties: the Faculty of Science and the Faculty of Letters and Humanities.

Since its establishment, Muğla Sıtkı Koçman University has been in pursuit of quality higher education and research in order to contribute to the sociocultural, scientific, and technological development of Turkey. Developing a systematic and comprehensive education programme for the thorough dissemination, discovery, and application of knowledge requires a competent infrastructure. As such, Muğla Sıtkı Koçman University embarked on a fast advancement and investment project in 1994. The benefactor of the university, Sıtkı Koçman, whose financial contributions to education deserve great admiration, has also supported this push for growth. Today, Muğla Sıtkı Koçman University encompasses a two million square metre campus surrounded by a spectacular mountain view and smaller university sites and schools across the province. Currently, the university services over 32,000 students and employs over 1,300 full time academic staff.

Campus Own Spring

From the very beginning university campus was using local municipality scarce water resources which are not enough to utilize increasing number of students and faculty. In 2000 university rectorate decided to solve the water shortage problems in campus facilities. The idea was to construct a new pipe line designated for campus usage from nearby regions. For this purpose Köyceğiz Sandras Mountain is perfect choice with rich and pure fountain resources in highlands. The construction of water pipe line finished in 2001. Since local municipal is reluctant and inefficient in water project, University governance, Muğla governorship and Turkish doyen businessman Sıtkı Davut Koçman cooperated to finance the project. Later in 2012 the official name of the University changed as Muğla Sıtkı Koçman University to the honor of that businessman who passed away in 2005. The coast of the project is around 1 milion USD in 2001 figures. The line weight is 300mm. with a capacity of 80 liter per second. It is more than enough to the 1500 ton daily consumption of university and according to some sources even to Muğla city with proper construction planning with high tech new lines.

The length of water line is 53,6 km from Sandras Mountain to campus. The fountain is 1252 meter high and campus is above 670 from sea level. Thus 582 m. height difference enables flow of pure water without any other extra energy consumption. So even if there is power cut in any part of the route of line there wasn't any water shortage for consumption. This is simply assures the sustainability of water resources in case of emergency.

There are 2 water tanks with the total capacity of 1500 cubic meters. So, before consumption whole water resources passes through chlorination process. It keeps purity of resources since there was no other chemical filter before serving to consume. The capacity of spring is high enough to meet to daily 1500 ton water consumption in campus. The Sandras Mountain in Köyceğiz village has several companies for bottled fountain water. The quality of rich water resources are well known in all around Turkey. That is focal point of campus water resource that has actually the same quality with well-known spring bottle brands in market. As shown in chemical analyses of laboratory test results in appendix the quality of resources are well enough to fit universal standards.

Conclusion

Water is becoming a very scarce resource in Turkey like all over the world. Sustainable resource management is key issue in all parts of life in order to minimize negative side effects of this problem. There are macro policies in country wide for problem solving İn Turkey. In this paper I rather concentrated on regional application in micro level for resource allocation solutions. My university provided pure, drinkable spring water resources to daily needs of campus with 35.000 staff and students by constructing private line from fountain to campus.

References

Wikipedia (Muğla) entry, (20.1.2017)

Muğla Sıtkı Koçman University web page, www.mu.edu.tr

Construction company data for project

MSKU Industrial Laboratory results

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MSKÜ KAMPÜS İÇİ İÇME SUYU DENEY RAPORU

Sayı: 50353905-602.04.02.00/ *Rapor No:* *07122016* - *1*

Müşteri Adı / Adresi *Customer Name / Address*	Muğla Sıtkı Koçman Üniversitesi
Numune / Rapor İstek No *Sample Order No*	07122016001
Numune Tipi /Alım Şekli/ Alındığı Yer *Sample type /Description of sample receipt/ Location*	Doğal Kaynak Suyu / Anlık / 500 Ton'luk Klorlama Su Deposu içi
Numunenin Teslim Özellikleri /Miktarı *Characteristics of sample delivery/ Amount*	Depodan Steril Cam Şişe/500ml ve 500ml HDPE
Numune Alım Tarihi ve Alan Kişi *Date of sampling and person taking sample*	07.12.2016 Biyolog Altan TOPAL
Laboratuvar Kabul Tarihi *Field sample receiving date and lab. acceptance date*	07.12.2016
Deneylerin Yapıldığı Tarihler *Dates of tests*	07.12.2016 - 16.12.2016
Açıklamalar *Remarks*	Numuneler ayrı ayrı alınarak yarım saat içinde laboratuvara teslim edilmiştir.
Rapor Sayfa Sayısı *Number of pages of the report*	Toplam 2 sayfa

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DENEY SONUÇLARI VE KULLANILAN METOTLAR:

Parametre Adı	**Birim**	**Deney Metodu Standart Adı**	**Standart Metot No**	**TS 266 Limit Değer (Max)**	**Deney Sonucu**
pH	---	Elektrometrik Metot	SM 4500 H^+ B	6.5-9.2	8,99
Fransız Sertliği	FRs	EDTA Titrimetrik Metot	SM 2340 C	5-10 10-20	18

Sıcaklık	°C	Elektrometrik Metot	----	15-25	22,1		
Çözünmüş Oksijen	mg/L	Elektrometrik Metot	----	----	7,77		
İletkenlik	µS/cm	Elektrometrik Metot	----	2500	290		
Toplam Askıda Katı Madde	(mg/L)	Gravimetrik Metot	SM 2540 D	----	<10		
Nitrat Azotu	(mg/L)	2,6 Dimetilfenol Spektrometrik Metot	TS 6231	50	< 1		
Nitrit Azotu	(mg/L)	Kolorimetrik Metot	SM 4500 NO_2^- B	0,5	< 0,01		
Amonyak Azotu	(mg/L)	Fenat Metot	SM 4500 NH_3 F	0,05	------		
Ortofosfat Fosforu	(mg/L)	Askorbik Asit Metodu	SM 4500 P E	0,4	< 0,1		
Fenol	(mg/L)	Fotometrik Metot	SM 5530 B ve D	----	<0,01		
Bulanıklık	(NTU)	Nefelometrik Metot	SM 2130 B	5	0,29		
Serbest Klor	(mg/L)	İyodometrik Metod	SM 4500 Cl B	0,5	0,03		