Climate and Consumption Pattern -Demand and Supply of Water District concessionaires

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Abstract— *This study aimed to describe the climate and consumption pattern-demand and supply in Santa Rosa, Nueva Ecija of Water District Concessionaires from the year 2016-2018. It looked into which season and year have a high or low water supply and consumption. The descriptive research design was utilized and gathered data were primarily taken from the Monthly Data Sheet from Production Division of Santa Rosa (N.E.) Water District. The demand presented the meter billed while the supply illustrated the production of the Santa Rosa (N.E.) Water District. The study revealed that the concessionaires were consuming more in the dry season rather than in the rainy season. They have the highest water supply in 2018 with 3,355,162 cubic meters while 2016 has the lowest with 2,792,392 cubic meters. As to the percentage consumption, the respondents consume 82.37% of supply in 2018 (2,763,679/3,355,162x 100%), 86.44% in 2017 (2,581,267/2,986,165 x100%) and 85.13% in 2016 which disclosed that the respondents consume more water percentage in 2017 than in 2016 and 2018.*

Keywords— *Climate change, flooding, Government-Owned Controlled Corporation.*

I. INTRODUCTION

Climate change is an inevitable event that happens because of pollution. It is a change in global or regional climate patterns. It affects water reserves especially in tropical countries such as the Philippines. When summer season, water reserves tend to evaporate quickly because of excessive heat trapped by the greenhouse effect in the ozone layer and when it's a rainy season to much rain pours in the sky that results in flooding in the lower places in the Philippines; thus, water reserves tend to replenish too much the limit of a dam can hold [1].

Water is an essential need for human life because up to 60% of the human body is made up of water. It is so essential because we cannot live without water. We use it in our daily activities such as taking a bath, washing clothes and dishes, and etc. [2].

Santa Rosa (NE) Water District is a Government-Owned Controlled Corporation (GOCC) and is an autonomous unit politically and economically independent from the local government. The Board of Directors formulated the policies, rules and regulations of the water district. Management of the operation of the water district is handled by the General Manager who is appointed by the Board of Directors [3].As of December 2019, the district has a total of 12,059 service connections operating 24 hours a day. Through the hard work and dedication of its personnel, SRWD was able to withstand the hardships and challenges of times and was able to make use of its resources in order to achieve its goal and objectives in giving the best water service to the people of Santa Rosa [3]. In Santa Rosa(N.E) Water District, water reserves come from the groundwater which is easily depleted as the rate of recharge of deep wells is less than the Consumption of the concessionaires.

The usage of water is greatly affected by the changes in climate because people will tend to use more water when the season is summer and tend to consume less when its rainy season.

This research shows the climate and supply and consumption pattern of Santa Rosa (N.E.) Water District concessionaires and to see which season has a high or low consumption/supply in two seasons.

II. METHODOLOGY

This study utilizeda descriptive research design wherein the monthly water consumption and supply data were gathered through the monthly datasheet from 2016 to 2018.According to [4] as cited in [5], a "descriptive survey can systematically

describe a situation, problem, phenomenon, service or programs, or provide information or describe the attitude towards an issue". Selected concessionaires who were chosen purposively [6]were asked about their consumption and supply patterns.The data were analyzed using frequency and percentage.

III. RESULTS AND DISCUSSION

1. Temperature and Rainfall from 2016-2018

Table 1. Average Temperature and Rainfall for 2016-2018 [7]

Month	Temperature °C		Rainfall
	Minimum	Maximum	(m³)
January	17.4	33.2	0.0
February	17.0	34.5	5.4
March	19.4	37.0	2.5
April	19.4	38.8	0.2
May	21.8	38.5	90.7
June	22.0	36.7	297.6
July	22.0	34.7	513.4
August	22.6	33.6	552.8
September	22.2	33.1	993.7
October	21.0	35.0	514.1
November	19.3	33.6	33.9

December	19.0	35.1	16.2
TOTAL	**243.1**	**423.8**	**3018.0**
Average	**20.3**	**35.3**	**251.5**

The table shows that the average that rainy season falls between the months of June – October with a monthly average rainfall of 574.22m³ and the average annual temperature ranges between 20.26°C and 35.32°C. March, April and May are the dry and hot months, marked by an almost absence of rain and temperature reads at an average of 30°C.

2. Monthly Consumption and Supply from 2016-2018

Table 2 shows that 2018 has the highest supply of water with 3,355,162 cubic meters while 2016 has the lowest with 2,792,392 cubic meters. As to the consumption, the respondents consume 82.37% of supply in 2018 (2,763,679/3,355,162x 100%), 86.44% in 2017 (2,581,267/2,986,165 x100%) and 85.13% in 2016. This finding shows that the respondents consume more water in 2017 than in 2016 and 2018.

The table alsoreveals the consumption and supply of 2016 with a peak of consumption and supply in July which is 211,267m³ and 253,995m³, respectively, it shows that even in rainy season consumption and supply of water is still in rising but there is a large amount of usage in water between the month of March-Maywith an average of 202,915m³ while the average monthly usage of January, February and June-December is lower with an average monthly consumption of 196,476m³shows that more concessionaires are consuming in the dry season rather than Rainy Season.

Table 2.Monthly Consumption and Supply for 2016-2018 [8]

	2016		2017		2018	
MONTHS	CONSUMPTION (METER BILLED) in m3	SUPPLY (PRODUCTION) in m3	CONSUMPTION (METER BILLED) in m3	SUPPLY (PRODUCTION) in m3	CONSUMPTION (METER BILLED) in m3	SUPPLY (PRODUCTION) in m3
JANUARY	184,978	222,992	189,968	228,672	202,319	251,420
FEBRUARY	179,400	215,950	187,781	214,484	210,695	260,718
MARCH	208,319	242,896	218,458	257,926	233,834	285,571
APRIL	210,238	238,571	228,665	250,610	239,291	298,514

MAY	190,188	230,068	225,279	250,479	243,840	303,828
JUNE	204,254	238,764	216,621	244,876	228,545	285,588
JULY	211,267	253,995	214,347	249,119	225,608	273,590
AUGUST	190,193	228,218	222,751	252,924	235,787	290,646
SEPTEMBER	194,033	226,025	208,293	248,340	226,708	268,107
OCTOBER	205,481	235,447	235,750	264,800	244,232	283,995
NOVEMBER	185,867	222,698	191,999	239,724	218,491	270,710
DECEMBER	212,811	236,768	241,355	284,211	254,329	282,475
TOTAL	2,377,029	2,792,392	2,581,267	2,986,165	2,763,679	3,355,162

As to the consumption and supply of 2017, with a peak of consumption and supply in December which is $241,355m^3$ and $284,211m^3$, respectively, it shows that even in rainy season consumption and supply of water is still in rising but there is a large amount of usage in water between the month of March-May with an average of $224,134m^3$ while the average monthly usage of January, February and June-December is lower with an average monthly consumption of $212,096.11m^3$ shows that more concessionaires are consuming in the dry season rather than Rainy Season.

In 2018, the table presents with a peak of consumption in December which is $254,329m^3$ and a peak in supply in May which is $303,828m^3$, respectively, there is a large amount of usage in water between the month of March-May with an average of $224,134m^3$ while the average monthly usage of January, February and June-December is lower with an average monthly consumption of $212,096.11m^3$ shows that more concessionaires are consuming in the dry season rather than Rainy Season

IV.   CONCLUSIONS

The result of the data which were the Monthly Data Sheet from Production Division of Santa Rosa (N.E.) Water District provided some evidence about how the climate impacted the demand and supply on the concessionaires on the area. It was shown more concessionaires are consuming in the dry season rather than in rainy season from the year 2016-2018.They have the highest water supply in 2018 and consume more water percentage in 2017.

REFERENCES

[1] Union of Concerned Scientists. (2010). Water and climate change.https://www.ucsusa.org/resources/water-and-climate-change

[2] Better Health Channel (2014). Water-Vital Nutrient https://www.betterhealth.vic.gov.au/health/healthyliving/water-a-vital-nutrient

[3] Sta. Rosa. (NE) Water District. http://santarosawater.gov.ph/index.php/about-us

[4] Kumar, R. (2014). Research Methodology: A Step-byStep Guide for Beginners (4th ed.) SAGE. CA: Thousand Oaks.

[5] Zabala Jr., B., Gutierrez, M. and Subia, G. (2018) Needs Assessment of Barangay Tanawan, Dingalan, Aurora towards a Proposed Oplan Development Program. International Journal of Environment, Agriculture, and Biotechnology, 3, 2163-2167. https://doi.org/10.22161/ijeab/3.6.28

[6] Subia, G. (2018) Comprehensible Technique in Solving Consecutive Number Problems in Algebra. Journal of Applied Mathematics and Physics, 6, 447-457. doi: 10.4236/jamp.2018.63041.

[7] R.C. Sarker, S. Gato-Trinidad and and M. Imteaz. 2013. Temperature and Rainfall Thresholds corresponding to water consumption in Greater Melbourne, Australia. 20th International Congress on Modelling and Simulation, Adelaide, Australia.

[8] Production Division of Sta. Rosa Nueva Ecija Monthly Data Sheet (2016-2018)