REVIEW OF INTERNATIONAL GEOGRAPHICAL EDUCATION

ISSN: 2146-0353 ● © RIGEO ● 10(4), WINTER, 2021

www.rigeo.org

Research Article

The Water-Climatic Balance of Mosul Station and Al- Kut Station for the Period from (2010-2020)

Dr. Adnan Odeh Flaih[1]
Al- Muthanna University: College of Education for Human Sciences

Abstract

Since Iraq is located within what is known as a dry and semi-arid climatic region, this means its total dependence on running water, i.e. rivers, the mainstay of which is rainfall. Therefore, the process of its calculations, i.e. extracting the quantities of water between what falls and is lost (evaporates) was one of the important priorities and by following the most accurate and most successful mathematical methods, which indicate accurate results, especially using mathematical equations that lead to the desired results through the adoption of water budget methods and calculations, which varied according to the approved foundations and the areas in which Where these rates apply. And the matter becomes more important if we know the importance of the water budget accounts for economic activities, especially agriculture, and the activities associated with it for the population of Iraq, which is the first craft and since ancient times. Therefore, this study (the water-climatic balance of the Mosul and Kut stations) came to contribute, with other studies, to determining the amount of water needed for irrigation and estimating the size of the irrigation need and what is related to it...By applying the climatic budget rates that are in line with the location of Iraq and its climatic conditions, the following is shown:

- The researcher concluded, through the application of Ivanov's equation, that the water deficit and surplus amounted to a total of about (-110.12 + 162.4) mm at the Kut and Mosul stations, respectively.
- When applying Najib Kharoufa's equation to the same two stations for the same period, it was found that there was a water deficit in the Kut and Mosul stations, reaching (164.06 and 992.7) mm, respectively.

Keywords

To cite this article: Flaih D, A, O. (2020). The Water-Climatic Balance of Mosul Station and Al- Kut Station for the Period from (2010-2020). Review of International Geographical Education (RIGEO), 10(4), 815-824 Doi: 10.33403/rigeo. 791623

Submitted: 16-07-2020 ● **Revised:** 20-10-2020 ● **Accepted:** 25-11-2020

Introduction

The study of climatic water balances is of great importance because of its role in determining the relationship between the available water resources and the actual need for this wealth through the application of some mathematical equations. Climate, with its multiple elements, still affects many human activities, especially those related to water resources. As the population increases, the need for water increases to meet household, agricultural, and industrial needs. Therefore, the need arose to develop new sources of water, and to rationalize the available ones, which led to the importance of issues related to water, including the issue of climatic water budget, which is one of the topics studied by different types of sciences, including applied climatology. Because despite the many factors affecting the climatic water balance, the climate with its elements is the most important and most influential. Climate is also an important and influential factor in the latent evaporation / transpiration process, and in the effective amount of rain, which are an inevitable result of climate elements.

Research Problem

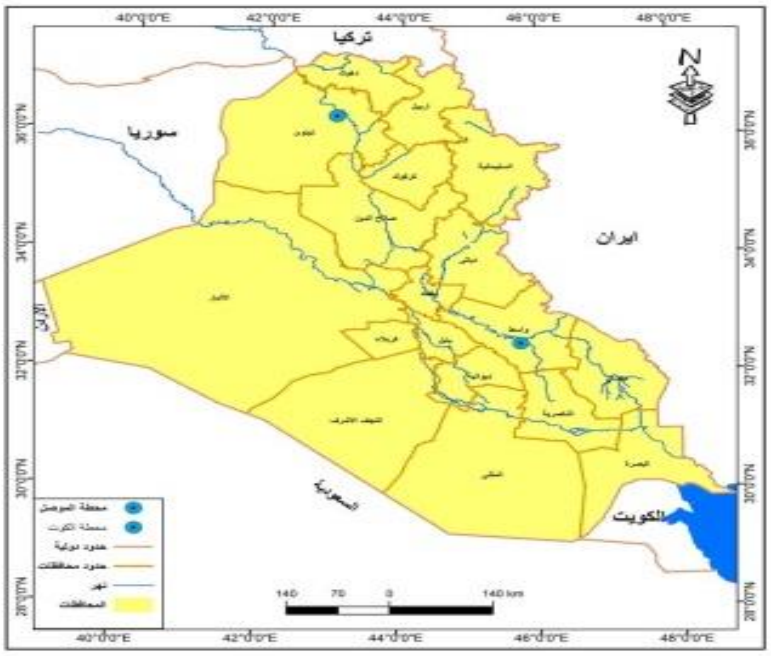
- Is there an impact of climatic elements on the quantities and distribution of water and the identification of lost ones?

Study Hypothesis

Climate elements influence the determination of the potential of the aquatic study area.

Study area boundaries

Mosul station is located in Iraq within the administrative border of the province of Mosul , between the longitude (36 ° 09 ') and latitude (36 ° 19 ') and the station of Kut , which lies on the latitude (5 35 90 ') and longitude , (5 57 06 ') notes map .(1)



Map (1) of the location of the Kut and Mosul station
Source: researcher based on program outputs Arc Map 10.4

Purpose of the study

Quantitative analysis of the water-climatic balance of the station (Kut and Mosul)

Study Methodology

The study adopted the quantitative analytical method in the study of the water budget for the study area.

First - the water-climatic balance Budget of Climatic Water

The climatic water balance can be defined as the quantitative relationship between precipitation and evaporation / transpiration (Ahrens, 1998) or it is the amount of difference between the amount of rain that actually reaches the surface of the earth in a particular place and the amount of the precipitation water that returns to the atmosphere due to evaporation, and its purpose is to Estimation of the amount of water surplus**.**Water Surplus**)**or water deficit**(**Water Deficit **(**in that place, in addition to determining the temporal and spatial need to use that water (Narasimhan, 2010), and when the amount of real evaporation / transpiration increases, the amount of difference between them affects the amount of water deficit of the place, as this leads to a decrease in the available moisture (*) in the soil, and therefore It needs to be compensated by using irrigation water, and at the same time it is possible to know the changes that occur in the moisture stock of the soil at any time. The amount of possible evaporation / transpiration, this leads to the presence of water deficit**)** water deficit which means the amount of water that the soil needs to supply the plant with its water needs in a certain period, and with the continuation of the deficit, the soil reaches the stage of drought**)** Drought **(**which means insufficient rainfall and soil moisture content (Al-Maliki & Derry, 2005) which leads to soil instability and thus be vulnerable to erosion processes

Climate elements affecting the climatic water balance

First: Solar radiation :Solar Radiation

Solar radiation is the main source of energy in the atmosphere, as it contributes up to (99.97%) of the energy exploited in the atmosphere, and on the surface of the Earth (Al-Rawi, 1999; Taher, 1989), the average brightness hours in the Mosul station was (55.1) and in the Kut station (58) hours / day It is noted in Table.(1) It can be noted that the Mosul and Kut stations receive annually large amounts of solar radiation , due to the large angle of radiation and the high amount of solar radiation to the study area in most days of the year ,especially in the summer , due to the verticality of the sun's rays in this season , as well as the lack of vegetation cover And the clarity of the sky ,which in turn leads to intense heating, raising air and soil temperatures, and high evaporation, and thus increasing water losses and widening the difference between the amount of precipitation on the one hand and the amount of water losses on the other.

Second: Temperatures :Temperature degree

The temperature of the important climatic elements of t affect the occurrence of the phenomenon of condensation and clouds, and thus affect the precipitation processes, evaporation and drought ,as well as its role in the many processes Kalnth, breathing, installation photosynthesis, absorption, and growth (Al Khanaifsawy, 2017; Mahmoud, 1988). The high temperature is the dominant feature of the study area ,because the two stations are located within the desert region in the dry region ,as the annual average of each of the average temperature in the Mosul station was° (21.6) C ,while Al-Kut station increased from the Mosul station by ° (2 ,(24) C ,and the rise in temperature played a major role in raising evaporation rates in return for a decrease in humidity rates and thus exacerbating the water deficit.

Third. Atmospheric pressure :Atmospheric Pressure

The atmospheric pressure of the most important climatic elements that affect the element of wind in terms of direction and speed, which affects indirectly in evaporation / transpiration process (Al Khanaifsawy, 2019; Anderson, 2021), and is the atmospheric pressure value (1013.2) millibars is the

boundary between air and high between the low air. Stood at atmospheric pressure values in the station of Mosul station Kut (0.8 1012 ,1012.5) mbar respectively notes Table 1 shows that the atmospheric pressure in the study area is relatively low ,which is reflected in the wind activity and high evaporation rates in conjunction with the decline Humidity rates, which raised the rate of water deficit.

Fourth. Wind

The movement of wind, especially fast ones working on the removal of saturated aerobics class with water vapor leads to increased evaporation / transpiration, while during sleep consists layer saturated Pulp x R lead to poor evaporation / transpiration process (Al-Khanaifsawy, 2016). The northwestern winds are the prevailing winds in Iraq ,especially in the study area ,and because of the presence of a low pressure area centered in central Asia and over the Indian subcontinent and the Arabian Gulf on the one hand, it is offset by high pressure based on the Anatolian plateau and over the Sahara desert. high around low pressure areas ,has been the annual rate was the year of wind speed station Mosul station Kut , respectively 3.9 - 1,9) m / sec (in m announcing the study, notes table ,(1) can be observed decline in the annual rate of station Mosul Because it is located in a low area, while we find high wind speed in Kut station. That the high speed of wind negative effects are reflected on the high evaporation rates due to the wind by removing moisture on the surface of the ground and thus increasing the rate of evaporation.

Fifth .Dust and dust storms:

These atoms reflect and propagate a portion of the solar radiation reaching them ,as well as the ability to absorb water vapor and the occurrence of many optical phenomena at sunrise and sunset (Al- Noori, 2019c). The rate of dust storms in Mosul station and Kut station reached (1.3 (8 ,8 - storms/days respectively. It is noted in Table (1), and it can be seen that the rates of dust storms in Mosul are lower compared to Kut, and this can be explained by the low rates of wind speed in Mosul station due to its location as well as soil quality. Dust storms have a negative and positive impact on humidity levels, as it provides condensation nuclei for rain on the one hand, and on the other hand contributes to increasing moisture loss rates ,especially if the winds are hot and dry.

Sixth. Relative Humidity :Relative humidity

The decrease in its percentage causes an imbalance in the water balance of the plant tissues due to the high rates of evaporation / transpiration compared to the rates of absorption that take place through the roots to compensate for the decrease in water needs .According to that content less than the proportion of water in the plant cells, as causing duck E in all development activities (Al- Noori, 2019b). The proportion of relative humidity reached in Mosul station and Kut (51.9 (% 6 .45 - respectively, notes table (1 ,(and can explain why low humidity rates due to the lack of precipitation on the one hand and increased evaporation on the other hand, which reflected negatively on the nature of the Water stock and water resources in general in the study area.

Seventh. Rain :Rainfall

Rain is one of the most important forms of precipitation, which is water droplets that occur because of condensation of water vapor in the air .Their diameters range between (0.5-8) mm. As it descends, its large droplets split into several smaller droplets (Al- Noori, 2019d). Rainfall reached in Mosul station and Kut (350.4 (9 .126 - mm respectively notes Table (1 , (can be seen an increase in total annual rainfall station Mosul compared to the station of Kut, and can be explained because of the geographical location between the two plants differ ,and b This) the factor of lack of rain and rise in summer temperatures (contributed to an increase in evaporation rates and a decrease in relative humidity ,making the region almost in a water deficit and drought , and that the percentage of what evaporates from it exceeds the amount of rain that falls on it.

Eighth. Evaporation :Evaporation

The evaporation process is one of the basic climatic elements that significantly affect the hydrological cycle or the water balance as an integral component of the process of precipitation, surface runoff and groundwater (Al- Noori, 2019d). The evaporation rate in the Mosul station and the Kut station reached (2242.6 - 4516.0) mm annually, respectively. Table (1). It can be noted that the evaporation rates in the Kut station are twice the evaporation rates in the Mosul station (almost), and this can be explained due to the low percentage of radiation and the degree of the temperature and wind speed, which led to this disparity between the two stations increased evaporation rates and hence higher water deficit ratio. From what presents us, we can conclude the following: The study area belongs to the environment, which is calculated on low and fluctuating rainfall, on the one hand and on the other hand, they are areas characterized by high thermal rates, high evaporation due to the vertical or semi-vertical sun as well as the

Table (1).
Climatic Elements of Mosul and Kut Station(2020-2010)

Evaporation mm/year	rain mm	relative humidity%	Dust storm rate/days	wind m /s	Pressure m to co mpare	Celsius te mperature	radiation	station
2242.6	350,4	51,9	1.3	1,9	1012.5	21,6	55,1	Mosul
0. 4516	. 126 9	6 . 45	8 .8	3,9	8 1012	2 . 24	58	Kut

Source: Researcher based on climatic data

Second - The water balance for the Kut and Mosul station, according to the equation of Ivanov and his sheep. There are several ways to measure the potential evapotranspiration possible (), researcher has used the method of Ivanov (Al- Noori, 2019a), because of their relevance to the climatic conditions prevailing in the region. Ivanov's method is represented by the following equation-:

$$PE = 0.0018 (T + 25) 2 (100 - A)$$

It represents E -: Monthly evaporation in (mm/month).
T -: Average monthly temperature in (C) .
A Monthly relative humidity.
As for the water deficit or surplus, according to the equation) P-PE ,(as it represents) P (Amount of precipitation (mm) ,(PE (represents the possible evapotranspiration (mm.(
Table (2) climatic water balance (mm , (according to Ivanov equation station in Kut for the period(2020 - 2010)
PE = 0.0018 (T + 25) ^{2} (100 - A)

Kut Station			Relative humidity	average temperature	the years
water deficit	Amount of potential evaporation	rain amount			
12 . 110	02 . 237	126. 9	6 . 45	2 . 24	-2010 2020

Source: researcher based on the data of climatic

When a table analysis (2) can be observed the amount of deficit water climate station in Kut , as it was 12 . 110 - -) mm) due to the nature of the prevailing climate in the study area, high rates of heat and high evaporation rates and lack of seasonal rains and fluctuations.

Naguib Kharoufa's equation

Najib was able Khrovh in 1985 from the derivation of the equation for dry areas, semi - arid and after making adjustments to the Pliny equation - Krydl Mtlavia and the use of the correction factor (Al- Noori, 2019a), have been adopted are as follows:

$$ETo = \frac{P}{3} C^{1.31}$$

So that:
ETo = latent evapotranspiration (mm).
P = Percentage of the number of monthly sunshine hours in relation to its annual number.
c = average temperature (°m).

Table(3) .
Annual rates of the amount of evaporation / transpiration latent (mm) according to the equation Najib Khrovh station Kut for the period(2020 - 2010)

ETo	P\3	P	C 1,31	C°	the years
2 , 175	7 ,2	3 ,8	9 , 64	2 , 24	2020-2010

Source: researcher based on climatic data

When a table analysis No (3) .shows that the results of the evaporation / transpiration likely recorded annual rates of the amount of evaporation / transpiration latent (175.2) mm , can be seen high evaporation rates of transpiration for the study, and the reason is due to the nature of the prevailing climate of rising temperatures , and varying rainfall rates.

Methods for calculating the actual value of rain

Effective rai : is part of the falling rain that seeps into the soil according Spun, installed, which loses all soft s evaporation for each site or a place to build on the characteristics of the soil and climatic conditions . Therefore, the actual value of rain means the remaining amount of rain minus the water losses. To estimate the actual value of rain and how to calculate it, there are more than one method, including) Coppen) ,(Lang) ,(Clydebayten) ,(Austin Miller ,(and) Demarton ,(and the best and easiest of these methods is to rely on the Thornthwaite equation, and the text of

$$PE = 115 \left[\frac{P}{T - 10} \right]^{9/10}$$

the equation is:
PE =Effective precipitation of Thorutite ,and is extracted through the following equation:
Whereas : P = ([1]) amount of precipitation / inch
([2]) T =heat rate / (F)

Table(4)
Effective precipitation of Thorntoite for Kut station for the period 2020 - 2010) (mm)

active rain	rain (ang)	rain (mm)	Batinah A At	temperature m °	the years
14 , 11	9 ,4	9 . 126	5 , 75	24,2	2020-2010

Source: Researcher based on climatic data

From the analysis of the data of Table ,(4) it is noted that there is a decrease in the amount of effective rain for the study area, as it reached (14 , 11) mm , and the reason is due to the high rates of temperature on the one hand, and the decrease and fluctuation and rates of precipitation in the study area due to its occurrence within the dry regions.

Calculating the water budget

It is the amount of difference between the water intake and the amount of water lost through evaporation / transpiration and the actual rain value was adopted) Pe)that is, the amount of rain that is actually utilized, and the water output, which is evaporation / transpiration((ETo ,to calculate the budget results.

Tabl(5) .
The water-climatic balance of the Kut station for the period (2020 - 2010) according to the equation of his sheep

Active rain - evaporation / transpiration W Pe – ETo-	evaporation/transpiration possible ETo	effective rain value Pe	the years
06 , 164 -	175.2	14 , 11	-2010 2020

Source: researcher based on climatic data

The results of applying Kharoufa's equation in Table No (5) .indicate a high percentage of water deficit , as the percentage of deficit reached (164.06-) mm. This can be explained by the rise in temperatures on the one hand, and the decrease in rain water revenues on the other hand, which negatively affected all natural and human activities in the study area. When analyzing equations the results of the station itself) Kut (shows that evaporation is possible (transpiration) station Kut , according to Ivanov equation reached (02 . 237) mm , while the potential evaporation rate (transpiration) according Khrovh equation for the same station 175.2)mm) , reaching a deficit station Kut annual using Ivanov (equivalent ,(12 . 110 - while the amount of the annual deficit according Khrovh equation (06 , 164 -) mm. The discrepancy can be observed in the results of the two equations for the same station, and this can be explained by the variance of the two equations variables. While the Ivanov equation used the amount of precipitation as a criterion and subtracted it from the possible evaporation (transpiration) value, the method of Kharoufa used the effective rain value criterion, as well as the difference in the mathematical method in extracting Results.

Table (6)
Water Balance Climate (mm , (according to Ivanov equation station in Mosul for the period (2020 - 2010)
$PE = 0.0018 (T + 25)^{2} (100 - A)$

Water deficit or surplus	Amount of potential evaporation	rain amountP	Relative humidity	average temperature	the years
162,4	188.0	350,4	51,9	6 , 21	-2010 2020

Source: the work of the researcher based on climatic data

The data in Table (6) indicates that there is no water deficit in the study area, according to Ivanov's equation, as the annual surplus amounted to (162.4) mm. It can be seen that the results differ for the same study area when applying Kharoufa's equation, as follows:

Table(7)
Monthly averages and the annual total amount of evaporation / transpiration latent (mm) according to the equation Najib Khrovh station Mosul for the period(2020 - 2010)

ETo	P\3	P	C 1,31	C°	the years
1022,9	18.3	55,1	55,9	21,6	2020-2010

Source: researcher based on climatic data

When analyzing Table No ,(7) .it appears that the results of potential evaporation /transpiration were recorded at (1022,9) mm, which is a relatively high percentage, and the reason goes back to the high annual rate of temperatures and the variation in precipitation rates, which led to a noticeable increase in evaporation rates.

Table(8)
Effective precipitation of Thorntwet station connector for the period(2020 - 2010)

active rain	rain (ang)	rain (mm)	Bafihrnh A At	temperature m °	the years
30,2	13,8	350,4	70,8	21,6	2020-2010

Source: researcher based on climatic data

The analysis of the data table (8) notes that there is a decline in the effective value of rain in the study area due to the occurrence of Mosul station within the range semi - tropical dry as it was (30.2) and the reason for this is the nature of the climate of the study area.

Table (9).
Water Balance climate station Mosul for the period (2020 - 2010) according to the equation Khrovh

Active rain - evaporation / transpiration W Pe – ETo	evaporation/transpiration possible ETo	effective rain value Pe	the years
992,7-	1022,9	30,2	2020-2010

Source: Researcher based on climatic data

The results of applying Kharoufa's equation in Table No (9) .indicate the high percentage of the annual deficit in the Mosul station, as it reached (992.7-) mm. When analyzing the results of the two equations for the climatic water balance for the same Mosul station, we notice that there is a discrepancy in the results of the two equations , while the Mosul station recorded a surplus in the climatic water balance according to Ivanov's method, as the size of the surplus amounted to ,(162.4)the same station recorded a deficit according to the method of Kharaf, as it reached-) ,(992.7and the reason for this is due to the nature of the mathematical steps used , as well as a discrepancy in the mathematical variables of the two equations , and Ivanov relied on the use of the amount of precipitation directly, while Kharefa resorted to using the value of effective rain , and he sees The researcher said that using a sheep's equation leads to more accurate results than using Ivanov's equation. When tracking the results of the water balance for the stations of the study area, it can be noted that the Mosul station is subject to the characteristics of the semi-arid climate of the tropical shows(BS) , As the results of the budget came by Ivanov and Khrovh (992.7- , 162.4)mm respectively , as well as characterized by the preservation of the purity of faces ,it which affects the amount of connecting the radiation solar ,Voaam fog in the city characterized by modest numbers ,it is worth mentioning that the rates of campers in the city is limited due to the lack of rain falling in the city and seasonal rainfall rainfall , the whole reflected on the results of climate and water budgets, and therefore the difficulty of adopting agricultural rain - fed them, as well as the rest of the water needs. It can be observed the results of the equations of water balance and climate according to Ivanov and Khrovh station of Kut ,showing the clear deficit as recorded (06 , 164 - , 12 . 110) mm respectively , as shown in which the climate of the study area is a desert climate hot, with rain falling mostly in The winter season made the study area suffer from an annual water deficit, due to the low annual precipitation rates on the one hand and the high temperatures on the other hand.

Conclusions

1. Climate elements such as solar radiation, temperatures, atmospheric pressure, winds, dust storms, dust storms, and moisture in all their forms control the latent evaporation / transpiration process .In terms of solar radiation, there is a direct relationship between the angle of incidence, the transparency of the gas envelope, the increase

in the amount of solar radiation falling per unit horizontal area, the increase in the number of theoretical and actual sun hours, and the amount of latent evaporation / transpiration .

2. The study showed that the climate of the study area is characterized by extremism, which is becoming increasingly evident in the Kut and Mosul station.
3. The study showed the variation in the annual rates of latent evaporation / transpiration according to the following equations :

- According to Ivanov , the equation station in Kut and Mosul (188.0 - 02 . 237) mm respectively.
- According to the equation of Kharoufa at the Kut and Mosul station 175.2) and (1022.9 mm, respectively.

4. The results of effective rain rates indicate the following :

- Reaching the rate of rain effective as Ivanov equation station in Kut and Mosul (0 . 121 , 9 . 126) mm respectively.
- The effective rain rate according to Kharoufa's equation in Kut and Mosul stations was (30.2 , 14 , 11) mm, respectively .

5. The results of the climate water budget showed the following:

- Showing through the results of the water budget climate station Kut by equation Ivanov said there is a clear deficit ,as the deficit rate (12 . 110 -) mm.
- Showing through the results of the water budget climate station Kut according to the equation Khrovh that there is a clear deficit ,as the deficit rate (06 , 164 -) mm.
- Through the results of the water-climatic balance of the Mosul station, according to Ivanov's equation, it was found that there is a surplus , as the deficit rate was (162.4) mm.
- It was found through the results of the water-climatic balance of the Mosul station according to Kharoufa equation that there is a clear deficit , as the deficit rate reached (992.7) mm.

Recommendations

The researcher proposes a number of recommendations through which it is possible to reduce losses through the latent evaporation / transpiration process , as well as reduce the water deficit, and increase the actual value of rain , as follows:

1. Paying attention to the collection of fallen rains ,and adopting the policy of water harvesting .
2. Adoption of drip irrigation and sprinkler irrigation methods . And stay away from traditional irrigation methods.
3. Improve soil fertility ,by adding organic fertilizers to it, which makes the soil Tanv J its moisture.
4. Improving irrigation channels for the purpose of reducing their losses through latent evaporation / transpiration, as well as reducing their seepage into the depths of the soil.
5. The use of some means of scientific and technological progress through artificially dropping rain, which leads to an increase in the amount of rain falling.
6. Disclosing the culture of the importance of water wealth among people and dealing with it wisely.
7. Directing farmers to irrigate crops at night instead of during the day to reduce losses in the latent evaporation / transpiration process , and take into account the actual need for water.
8. Cultivation of crops that do not require large amounts of water to suit the reality of the study area and the water deficit in it.

References

Ahrens, C. D. (1998). Meteorology Today: An Introduction to Weather, Climate, and the Environment. *Meteorologie,* 9(24), 74-75. doi: http://www.vliz.be/en/catalogue?module=ref&refid=316658

Al- Noori, B. S. M. (2019a). EFFECT OF STRATEGOPEDIA AND ATTITUDE OF IRAQI EFL COLLEGE STUDENTS IN DEVELOPING WRITING SKILLS. *International Journal of Research in Social Sciences and Humanities. Vol,* 9(3). doi: http://dx.doi.org/10.4304/jltr.2.5.1156-1161

Al- Noori, B. S. M. (2019b). IMPACT OF TEACHING GRAMMAR THROUGH ACTIVITIES TO IRAQI EFL PUPILS AND ATTITUDE OF TEACHERS TOWARDS ACTIVITIES. *Transylvanian Review, 27*(42). doi: http://dx.doi.org/10.13140/RG.2.2.21785.03686

Al- Noori, B. S. M. (2019c). TEACHİNG ENGLİSH THROUGH HUMOR AND JOKES. *International Journal of Advancement in Social Science and Humanity. Vol*(8).
Al- Noori, B. S. M. (2019d). Writing skills developed through Language Integrated Content. *Amazonia Investiga, 8*(19), 362-368. doi: https://amazoniainvestiga.info/index.php/amazonia/article/view/238
Al-Khanaifsawy, A. N. (2016). NVESTIGATING IRAQI EFL LEARNERS'USE OF THE SPEECH ACT OF AGREEMENT. *Adab Al-Kufa, 1*(27), 11-30. doi: https://www.iasj.net/iasj/article/112046s
Al-Maliki, A. S., & Derry, A. E. N. (2005). Estimate the climatic water balance in Iraq-a study in Applied Climate. *ADAB AL-BASRAH*(38), 171-198. doi: https://www.iasj.net/iasj/article/48654
Al-Rawi, A. S. (1999). Water and Climate Balance, An Applied Quantitative Study of Anbar Governorate. *Journal of the College of Education, 3*, 123.
Al Khanaifsawy, A. (2017). A stylistic study of euphemism in John Donne's selected poems. *The Islamic University College Journal, 1*(1), 35-38.
Al Khanaifsawy, A. N. A. (2019). A SOCIO-PRAGMATIC STUDY OF OFFER STRATEGIES MANIPULATED BY IRAQI DIALECT SPEAKERS. *The islamic college university journal, 8*(51), 25-40. doi: https://www.iasj.net/iasj/article/163855
Anderson, J. (2021). *Understanding cultural geography: Places and traces*: Routledge.
Mahmoud, J. H. (1988). *The Impact of Climate on Determining Fruit Production in the Central Region of Iraq.* (Master), University of Baghdad.
Narasimhan, T. (2010). Hydrological Cycle and Water Budgets. *Biogeochemistry of Inland Waters*, 51.
Taher, H. H. (1989). *Climate and its Relation to Cultivation of Oil Crops (Sunflower, Flax, Sesame, Maize) in Iraq.* (Master), University of Baghdad.