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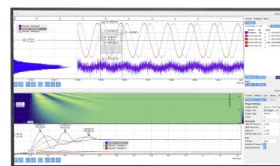
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Development of Renewable Energy Projects Using Geographic Information Systems: an Applied Study to Calculate Solar Irradiance in Samawah Desert, Iraq

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Abstract. Aim to Search to apply Programs Geographic information systems to determine the most appropriate places That you congregate on Solar energy in the Samawah desert And that fall In the western part of Al-Muthanna governorate . And it takes advantage of solar energy In renewable energy projects such as (electric power generation). Stimulate Agriculture and investment in a desert Samawah. Where it is considered Solar radiation The Main Source Renewable energy And theEnvironmentally friendly. The results of the study showed that the amount of solar radiation in the Samawah desert Located Its amount In the range (5751.1 to 5953.2) watt-hours / m², which is an excellent value. And theThis result was obtained through the use of geographic information systems software As that method Calculate the incident solar irradiance Depends On the spatial resolution of the digital model usedinterval Temporale To fall radiation . And theReadings were taken during June and July 2019 Because these months represent the peak solar radiation fall into a desert Samawah. As that Temperatures are high during this period and an interval (two hours) is taken for taking readings. It is found by the search results That there is a high value of solar radiation Who is falling on Samawah desert.

Keywords: Solar radiation, GIS, DEM, renewable energy. Samawah.

INTRODUCTION

As we move north away from the equator, the number of hours of sunrise decreases during winter days And the this difference in the number of hours of sunrise affects the amount of solar radiation incident on Earth as well as different Number Hours of sunrise during Today from The day is different from the months of the year See through Important studies in this field , we find that the duration of sunrise in Al Muthanna Governorate Be Long during all months of the year to arrive to me (14 hours and 40 minutes) during One day and The month of June is considered Of the very hot months and As shown in Table (1) and this is a positive indicator to take advantage of amount Dropp off rays The sun on the desert of Western Samawah. Where the sun is considered from Most important The main sources of renewable energy as well she a source of store energy And The Resources The Others such as (oil and coal) Where Solar energy began to occupy a large area in the field a study Renewable energy to preserve the environment and eliminate the greenhouse effect resulting from the use of traditional energy sources. that Alternative or renewable energy sources she Durable, naturally available and clean And theThere are efforts from Countries The world to invest solar energy in the production of electric energy This move is for a purpose aTo take advantage of renewable energy for fear of force Resources Like conventional energy (Oil) In the future The sun Be Environmentally friendly It can be used to reduce pollution from conventional energy .

TABLE 1. The duration of the sun's rays according to latitude in the middle of each month. Source [13]

Units	0 °	° 10	20 °	30 °	40 °	50 °	60 °	70 °	80 °	90 °
June	12 00	12 42	13 20	04 14	15 00	16 20	18 14	21 00	24 00	24 00
Hr. M										
July	12 00	12 40	13 16	13 56	14 42	15 38	13 31	21 00	24 00	24 00
Hr. M										

Place of Study

The study area is located in Al-Muthanna Governorate, to the west of the city of Samawah, and it is called the Western Samawah Desert. It is a sandy desert region. Specific With coordinates Geography of its value (45 ° East, 30.25 ° North), this area is characterized by a lack of human activity and with large areas that could be exploited for the purpose of establishing stations. The energy umbrella as well as an open and currently unexploited area and can stimulate planting in which for the abundance of ground water, as such shown in Figure 1.

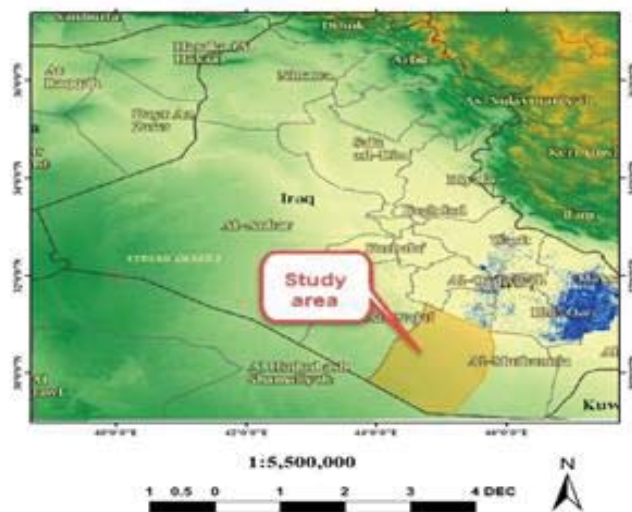


FIGURE 1. Place of study

The research required the following materials:

- 1- A digital image of the US Geological Survey 2016 digital elevation with a resolution of 30 meters for the study area.
- 2- ARC MAP software for data analysis and study area mapping.

Materials and Methods

In the search Use of materials next:

- 1- Picture Digital For height Digital To device The survey Geologist American 2016 And accuracy 30 meter For an area studying.
 - 2- a program ARC MAP .v10 .for analyze data And draw maps Area studying.
- Has also been DarkenEd The method of analysis on the image of digital elevations using the ARC MAP program to study and estimate the incident solar radiation in the Samawah desert to obtain Was obtained On the following results.

Topographic Map

A topographic map of the study area was drawn, as shown in the figure 2. Based on an elevation map at Digital with a contour interval of 2 m, the lowest elevation in the area is 10 m and the highest elevation is 22 m above sea level. This indicates that a large part of the Samawah Desert is a regular, high and harmonious area.

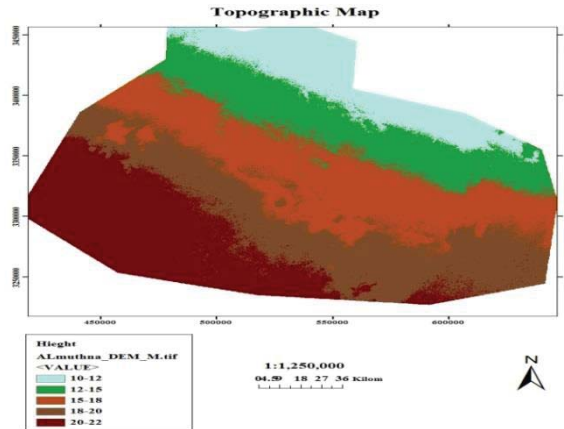


FIGURE 2. Topographic map of the study area

The Slope

The slope is the division of the height difference between two points by the horizontal distance between them. The slope map was produced as shown in the figure number 3. Turns out Most of the trends in the study area are limited between 4 to 12 degrees. When comparing the results according to the DAMEC Classification Table 2, there is a moderate slope in the study area that rises as we move west. As that The land in the study area is undulating, and this encourages the use of the area to invest in implementing future solar energy projects and improving environmental life.

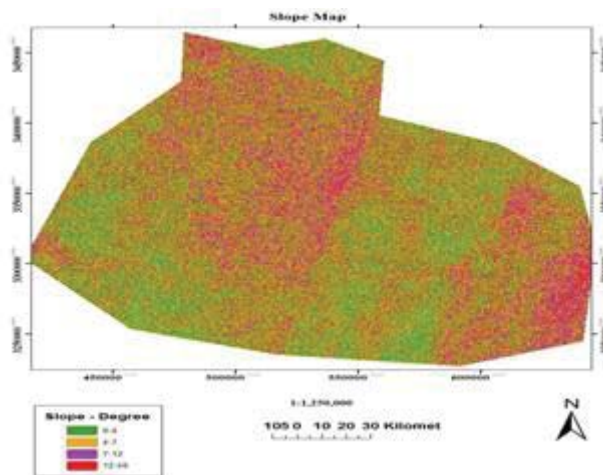


FIGURE 3. Map of land slopes

TABLE 2. Classification DAMEK Source Falah Shaker Black Objective maps University of Baghdad, Baghdad 1991 p. 92.

The Angle of Slope is in Degrees	Earth Shape
0 – 2	Flat ground
2-5	Easy land
5 – 15	Earth ripples
15 – 35	Low hills
35—55	High hills
> 55	High mountains

Solar Radiation Distribution Map

Using the arc maps program and by analyzing the digital elevation map, a computational map of the solar radiation that fell in the Samawah desert within the specified study area was obtained as shown in the figure. number 4. It was the minimum of Values Irradiance 5751.074499 W / h. And the Highest value (5953.188581 W / H / m2) As the solar radiation increases as we move towards higher areas and this is A good indication of the availability of solar radiation in the Samawah desert for the purpose of exploitation in the field of renewable energy. .

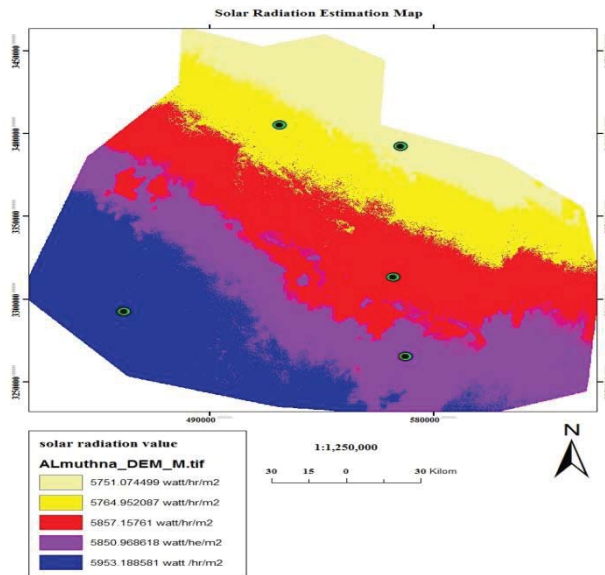


FIGURE 4. It represents the amount of incident solar radiation

DISCUSSION AND CONCLUSION

- 1-Show through The research indicates that there is a high value of solar radiation falling on the Samawah desert.
- 2- The use of a GIS program in estimating the amount of solar radiation falling on the unit area is an important method when compared to the previously used methods that require effort and a high cost of materials. Used.
- 3- The values of the incident solar irradiance in a particular region are affected by the weather and the altitude Attributed Earth and fall angle rays the sun.
- 4 - The average solar radiation falling on the study area he is (5835.1468279) Wath / m2 which is an excellent value.
- 5 - The study showed that the largest amount of radiation Solar Fall out during the months (June and July. and surely (Landsat 6 satellite images) is one of the main sources that give high accuracy in studying the fall of solar radiation falling within Unit area .
- 6- Climatic factors affect the amount of incident solar radiation per unit area.

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