LOCATIONAL CHARACTERISTICS OF WIND ENERGY IN GADAG TALUK, KARNATAKA.

Shridhar Mudakavi*, Mulimani A. A.**
*Research Scholar, Department of Geography, Karnatak University, Dharwad.
** Professor, Department of Geography, Karnatak University, Dharwad.

Abstract
The present paper is focused on the locational characteristics of wind energy and its utility in the Gadag Taluk of Karnataka State. The alternative energy is gaining much significance for all kind of human activities. The conventional energy is deteriorating on one hand and the amazing growth of population with vibrant socio-economic activities are rapidly increasing on other hand resulted into utilize the alternative energy. As a result, the conventional energy is acute shortage in the economy. The deficiency of the conventional energy is paved the way for generation of wind energy which is also one of the alternative energies. To overcome this, there is a need of the hour to use alternative energy and accordingly, the wind energy is also to be generated to compensate the gap. The study area is being the drought prone characteristics and influence of the rugged topography with a geographical area of 1097 square kilometers fallowed by the population of 3,68,473 distributed into 66 settlements. The density of population is 303 and literacy rate is 75.95 percent as per 2011 census. There are 413 wind turbines have been installed and functioning by producing 322.200 megawatts energy which is very significant in the study area. The main objective of the study is to focus on the locational aspects and its production of wind energy. The study is based on the secondary source of information and has been collected from the Karnataka Renewable Energy Development Limited, Bangalore and the analytical method has been employed and accordingly analyzed.

Key words: Location Characteristics, Wind Energy and Drought-prone area.

Introduction

The alternative energy is gaining much significance not only to the economic point of view but also to the all the activities of the human being in the world. The conventional energy is deteriorating due to the over exploitation and cater to the need of the requirement of the people in the modern economy. The vibrant socio-economic activities have been multifold along with the techno-professional activities. The shortage of conventional energy leads to the deficiency and paved the way for generating wind energy to compensate the deficiency of the energy in the study area.

Wind energy as an alternative to fossil, renewable and widely distributed in specific characteristics of the location. It has such a characteristics to generate the energy with acquiring little space and no greenhouse gas emission during the operative and less problematic. The energy from the wind cannot be obtained directly. Therefore, to extract the energy from the wind turbine, which converts the kinetic energy of the wind into mechanical energy is converted into electrical energy, which is a prominent, natural and sustainable energy source.

Denmark is one of the leading countries in the world which generating the energy from the wind more than quarter of its electricity requirements. There are 83 countries in the world are using wind energy as an alternative to supply the electricity from the grid including India. In 2010, the wind energy production was over 2.5 percent of total worldwide electricity usages and growing rapidly at more than 25 percent per annum.

India is also one among the 83 countries and has fifth ranks as far as wind energy production is concerned, followed by China, U.S.A, Germany and Spain and has emerged as a global wind energy market.

Wind energy is generating in almost all States in India, where Karnataka is also one of the leading states to produce the wind energy. The production of wind energy is not possible in all the locations of any geographical space but nature has set the specific location and accordingly generated. The high elevation area, hilly topography and wind velocity are most suitable locations of the wind energy. The direction of wind is the main mechanism of wind energy generation. Therefore, the authors have made an attempt to study the wind energy in Gadag district, which is the second highest installation and production of wind energy in the State fallowed by Chitradurg. The study area is being the taluka headquarter and drought prone characteristics extended with a geographical area of 1097 square kilometers fallowed by the population of 3,68,473 distributed into 66 settlements. The density of population is 303 and literacy rate is 75.95 percent as per 2011 census. There are 413 wind turbines have been installed and functioning by producing 322.200 megawatts energy per day which is very significant in the study area with ranging height of 30 to 80 meters and 660 meter above the mean sea level.

Study Area

Gadag Taluk is being the study area and located in the western part of northern Karnataka lies between 15º 15' to 15º 40' North latitude and 75º 15' to 75º 45' East longitudes. It has the boundary between Ron and Nargund talukas are in the North, Ron Taluk in the Nartheast, the Koppal district in the East, Mundaragi Taluk on the Southeast, Shirahatti Taluk is the South , the Haveri district is the Southwest, the Dharwad district is the South and by Nargund Taluk is the Northwest. Gadag is situated at 660 meters above the mean sea level wind speed remains in the range of 4 knots to 7 knots, according to meteorological department. The Karnataka Renewable Energy Development Limited (KREDL) has also approved the wind velocity as suitable for wind power generation in the district. The present study is mainly focusing on the locational characteristics, production and distribution of wind energy in the study area. (Fig-01)

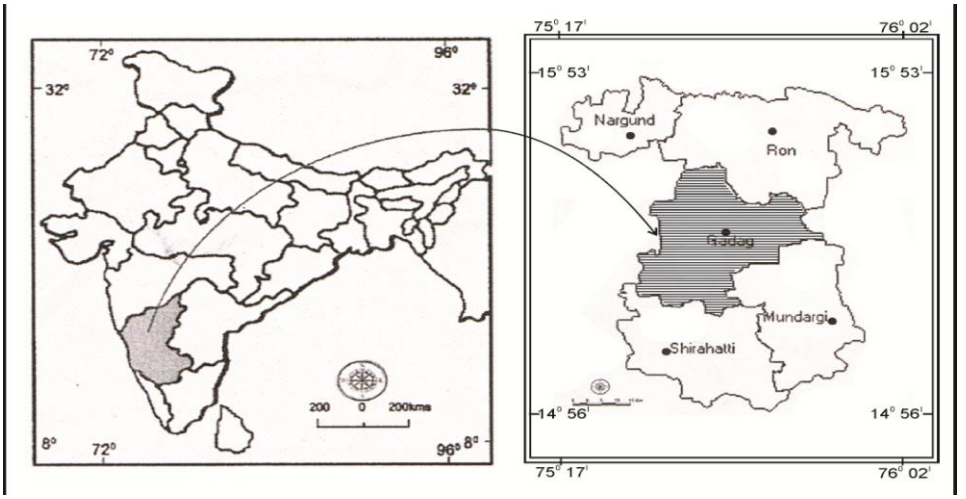

Figure 1. Location map.

Objectives

The present study is mainly focusing on the locational characteristics, production and distribution of wind energy in the study area.

Hypothesis

The study has formulated the hypothesis that the wind energy is substantially compensate as an alternative energy to carry out the socio-economic activities.

Data Base

The study is purely based on the secondary source of information collected from the Karnataka Renewable Energy Development Limited, Bangalore, related to the location of wind turbines, installation, production, velocity of wind etc. The general information is obtained from toposheets.

Methodology

The analytical method has been employed and accordingly analyze through the map and tables based on the available evidence.

Analysis

As, it has been already discussed that the importance of wind energy and its utility to carry out the socio-economic activities of study area. The study area has 66 settlements where, 21 settlements have 396 wind turbines with ranging between 01 to 83. The Nabhapur settlements has only 01 wind turbine and the Harti village has 83 wind turbines, which is the highest number of wind turbines in the study area. As per as the production is concern, it has 322.200 mega watts per day energy is being produced which compensate the deficiency of the conventional energyin the study area. There are 413 wind turbines have been installed in these settlements with an elevation ranging from 655 meter to 670 meters above the mean sea level. Further, it has been carefully observed that the production of energy is fluctuating from different wind turbines. Generally, there is notion that the more of installation is responsiblefor more production of energy has been ruled out in the study. As compared to the installation and production is not perfectly correlated, for instance, Nabhapurhas only one wind turbine and its production is 4.200 mega watts as compared to Nagavi had two installations and its production is 1.600 mega watts and the 10 installation village namely Shirunji is being produced 2.250 mega watts which is very less production. Therefore, there is no similarity between the number of installation and production. This is happened mainly the fluctuation of wind energy. As a result, there is no perfect correlation between two parameters. (Table no: 01 Fig No: 02)

Even, in the average production of wind energy is taken into consideration, it is also very insignificant and also clearly reflected that the production of the energy is not to the expected level. However, whatever energy is being produced by the wind turbines is to be treated to compensate the energy as a substitute. Therefore, the hypothesis is partially accepted with evidence discussed above. It is hearting to note that 348 wind turbines have been installed in the agriculture land of 1,25.524 hectors which is not a productive land for agriculture. Hence, it is one of the issues crept from the environmental point of view.

Table 1. INSTALLATION OF WIND TURBIEN IN GADAG TALUKA

Sl no	Name of the village	Geographical area (Square Kilometers)	Population	Installation of Wind Turbines	Total Installation Capacity (Mega Watts Per day)	Hub Height (Meters)	Elevation of Mean see level (Meter)
01	Advisomapur	8.684	3758	22	17.600	56	660
02	Asundi	6.577	3862	06	4.800	56	655
03	Beladhadi	4.011	1868	56	24.550	30-80	650
04	Binkadakatti	8.881	3302	07	5.600	56	660
05	Harti	24.830	4005	83	66.400	56	660
06	Hosur	8.349	2149	18	14.400	56	655
07	Hulakoti	23.764	11075	11	8.800	56	650
08	Kalasapur	15.040	3510	65	52.000	56	655
09	Kanavi	5.520	3132	17	13.600	56	655
10	Kurtakoti	59.965	10702	27	21.600	56	655
11	Malasamudra	16.364	3598	09	2.650	30	670
12	Mulagund	51.815	18763	23	18.400	56	675
13	Nabhapur	13.093	322	01	4.200	80	660
14	Nagavi	9.549	3475	02	1.600	55	655
15	Narsapur	5.554	1076	04	0.900	30	660
16	Papanasi	5.009	1296	05	4.000	56	660
17	Sambhapur	7.448	1790	03	2.400	56	655
18	Shirol	2.510	614	02	0.500	41.2	660
19	Sirunji(Sirund)	7.680	2027	10	2.250	50	660
20	Venkatapur	4.294	55	09	2.250	50	655
21	Yelishirur	8.296	2837	33	52.700	80	660
	Total			**413**	**322.200**		

Source: Compiled from census of India, 2011 and Karnataka Renewable Energy Development Limited, 2016.

Conclusion

The study has concluded that the wind energy is substantially compensated in the study area to encourage the socio-economic activities and the techno-professional environment along with the convention energy prevailing in the study area. The agriculture land being utilized under the production of wind energy by installing the 348 wind turbines which is not viable from the environmental point of view.

References

Aras H., 2003., Wind energy status and its assessment in Turkey : Renewable Energy 28(14):2213–20.

Archer & Jacobson., 2003., Spatial and temporal distributions of U.S. winds and wind power at 80m derived from measurements. Journal Geophysical Research 108 (D9), 4289.

Kamau, Kinyua & Gathua, 2010., 6 years of wind data for mars bit, Kenya average over 14m/s at 100m hub height; an analysis of the wind energy potential. Renewable Energy: An International Journal,35(6),1298-1302.

Milligan, M. & Artig, R., 1998., Reliability benefits of dispersed wind resource development. National Renewable Energy Laboratory, NREL/CP-500-24314, 11.

Uchida T. Ohya Y., 2008., Micro-sitting technique for wind turbine generator by large-eddy simulation. Journal of Wind Engineering and Industrial Aerodynamics, 96(7), 2121-2138.