

INSTALLATION OF WIND TURBINES IN AGRICULTURAL LAND OF GADAG DISTRICT : AN ENVIRONMENTAL APPROACH

Dr. Shridhar Mudakavi

Guest faculty, Department of Geography,
Karnatak Science College, Dharwad,
Karnataka State. India.

Dr. Aravind A. Mulimani

Professor and Chairman, Department of Geography,
Karnatak University, Dharwad,
Karnataka State. India.

Abstract: The attempt has been made in this paper to discuss the locational characteristics of wind turbines and different types of land used for installation of wind turbines. Energy is required to the human being, plant and animals for their survival in any geographical space in the world. The amazing growth of population is required variety of the economic activities to be carried out in any geographical space and to cater to need of the people for their prosperity. Hence, the energy is an indication for the overall development. The overall development of the nation is depends upon the energy, which is more used in the field of agriculture, mining activities, transportation and industries. The study region is located in western part of northern Karnataka with typical physical characteristics. It has an area of 4656 Square Kilometers with a population of 10,64,570 as per 2011 census. Agriculture is main occupation in the Gadag district. The Black and Red soil found in considerable variety in different parts of the region which is responsible for the cultivation of varieties of Food crops, Pulses, Cereals and Commercial crops along with vegetables and fruits. In the study region, there are 750 wind turbines has been installed in different type of land such as, agriculture land (394), barren land (10), hilly area (132) and forest area (214) turbines have installed in various settlements. The main object of the study is focused on the different types of land used for installation of wind turbines. The study is based both primary as well as secondary sources of information and have been collected from the Karnataka Renewable Energy Development Limited (KREDL) and the formers who have proved the land for the installation of wind turbines have been interviewed. The analytical method has been employed and accordingly analyzed.

Key Words: Locational Characteristics, Agricultural Land and Wind Turbines

I) INTRODUCTION:

Energy is required to the human being, plant and animals for their survival in any geographical space in the world. Energy is essential to fulfil the basic needs of human beings like food shelter, clothing, health, sanitation, etc. The overall development of the nation is depends upon the energy, which is more used in the field of agriculture, mining activities, transportation and industries. It is a basic input required to sustain economic growth and to provide basic amenities of life to the entire population of a country. Energy can be an effective weapon in the battle against the poverty, in the country like India (Varadrajana, 1993).

Energy is not only the basic need of the people but also an important requirement for the modern world. The rapid development is due to the amazing growth of a population and their multiple activities has paved the way for generation of energy to meet out the requirement of the people in the world. There are many countries have been threatened their welfare and economic activities due to the shortage of energy. There is a big question mark on future of conventional energy as the petroleum sources are dwindling fast and use of coal based thermal power and nuclear energy is trapped with serious environmental concerns. Thus, the ultimate source of energy for long term sustenance is going to be the non-conventional energy (Kaul S N, 2012). Today, electricity has become an essential and common source of energy to carry out various activities by the human beings such as Wind, Solar, Geo-Thermal, Water, Biomass, Atomic, Nuclear, Coal, Petroleum and Natural Gas etc. Energy is to serve the fundamental need of the society to perform the activities of agriculture, industry, transport and services mainly depend on the availability of

power. Hence, no country will not prosper without the supply of adequate energy. A wind energy park or wind farm is that where large number and several types of wind turbines are located in an area having the required velocity of wind for power generation. Generally, areas where annual mean wind speed is at least 18 km/ph, preferably above 20 km/ph are viable for harnessing the wind power economically (Rangarjan, 1995). The wind speed is required between 4 m/s and 30 m/s for driving wind turbine generator and producing electrical energy.

II) STUDY AREA:

The study region is located in western part of northern Karnataka with typical physical characteristics. It has extended between 14° 56' to 15° 53' North latitude and 75° 17' to 76° 02' East longitudes. It has an area of 4656 Square Kilometers with a population of 10,64,570 as per 2011 census. There are 346 settlements and nine urban towns have been distributed in the five talukas of the study area (Fig No : 1). Agriculture is main occupation in the Gadag district. The Black and Red soil found in considerable variety in different parts of the region which is responsible for the cultivation of varieties of Food crops, Pulses, Cereals and Commercial crops along with vegetables and fruits. The total geographical area of the district is 465715 hectares. Of the 465715 hectares, net sown area is 377535 hectares, forest area 32614 hectares, current fallow 29597 hectares, land not available for cultivation 22367 hectares, permanent pasture 2592 and cultivable waste 1010 hectares.

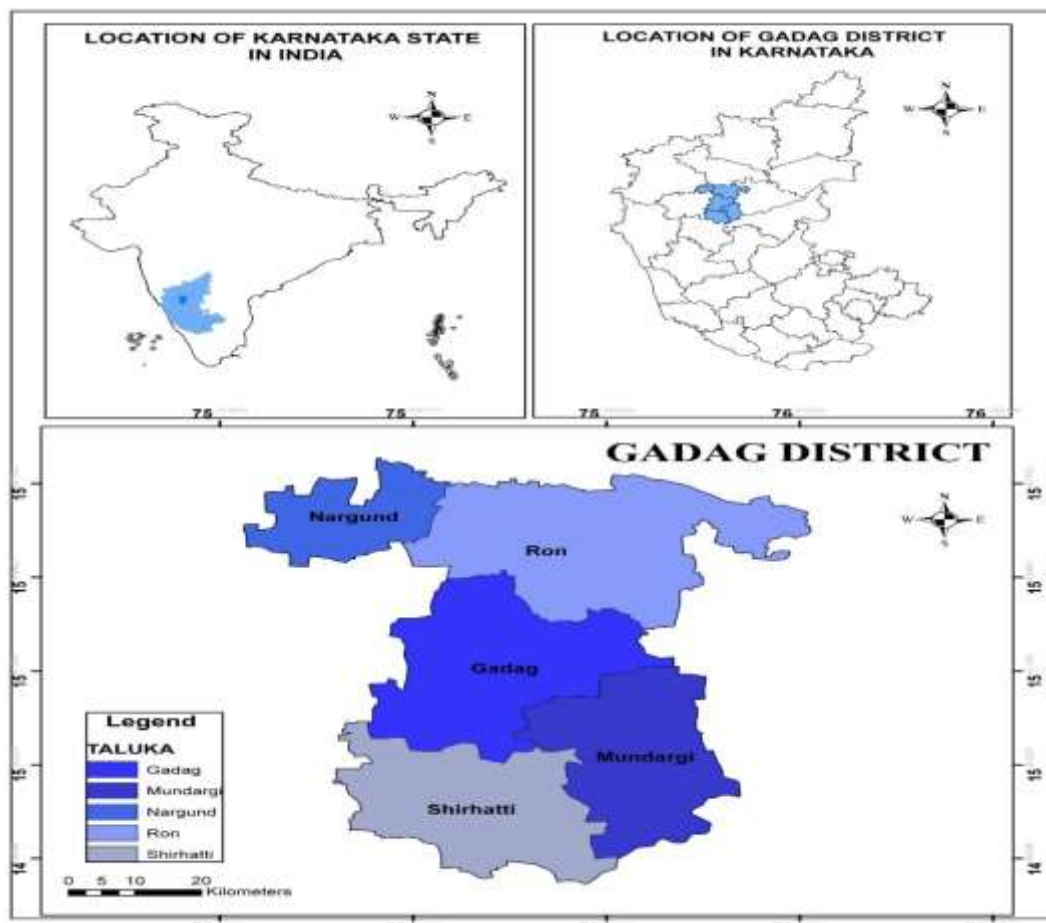


fig no: 1

III) OBJECTIVES:

The study has following objectives and are as follows:

1. to study the locational characteristics of wind turbines.
2. to study the different types of land are used for installation of wind turbines.

IV) DATA BASE AND METHODOLOGY:

The present study is based both primary as well as secondary source of information. The basic information related to the installation of wind turbines has been collected from the Karnataka Renewable

Energy Development Limited (KREDL). The land owners who have provided the land for the installation of wind turbines have been interviewed and collected the information. The analytical method has been employed and accordingly analyze through the map and tables based on the available evidence.

V) ANALYSIS:

Wind turbines are requires limited space and can be installed where the lands are not suitable for cultivation such as, hills and forest areas, plateaus, desert lands, Barren land, etc. in the some places wind turbines have been installed in agricultural land. The wind turbines have been located in such areas where minimum wind speed available for wind power generation. Generally, such places are mostly located on plateau, forest and hilly areas. The harness of wind power can be possible in barren land, uncultivable land due to rigid topography. The wind turbines are generally located away from the settlement area. Every wind turbine is having approach road for its maintenance and electricity recording purposes. Meter room constructed near the tower. In short, wind farm at a site may have a number of wind turbines with uniform or non-uniforms designs as well as same capacities or varies in capacities.

Gadag district is being the second highest installation of wind turbines followed by Chitradurga in the Karnataka State. There are 750 wind turbines have been installed in 4656 Square Kilometers of area by the 20 companies in all five talukas and have been functioning since, 1996. Among the five talukas, Gadag taluka is leading and rank first in installation of 413 wind turbines in 21 villages which is having half of the entire district followed by Mundaragi taluka, 11 villages involved in the wind generation with 214 wind turbines with 28.53 percentage of the wind turbines. In Ron has 11.47 percentage of wind turbines (86) in six villages. The Shirahatti taluka has 28 wind turbines installed in five villages and just having 3.73 percentage of wind turbines. Nargund taluka (1.20%) is the least taluka and has nine wind turbines installed only one place at Nargund (Table No: 1 and Fig No: 2 and 3).

Table No: 1 Wind Turbine Installations in Gadag District, 2016.

Sl no	Name of the Taluka	Geographical area (Square Kilo Meters)	Number of Settlements of Wind Turbine Installed	Number of Wind Turbines	Percentage Share of Wind Turbines
01	Gadag	1097	21	413	55.07
02	Mundaragi	884	11	214	28.53
03	Nargund	435	01	09	1.20
04	Ron	1291	06	86	11.47
05	Shirahatti	949	05	28	3.73
	Total	4656	44	750	100.00

Source: Compiled from the Karnataka Renewable Energy Development Limited, 2016-17.

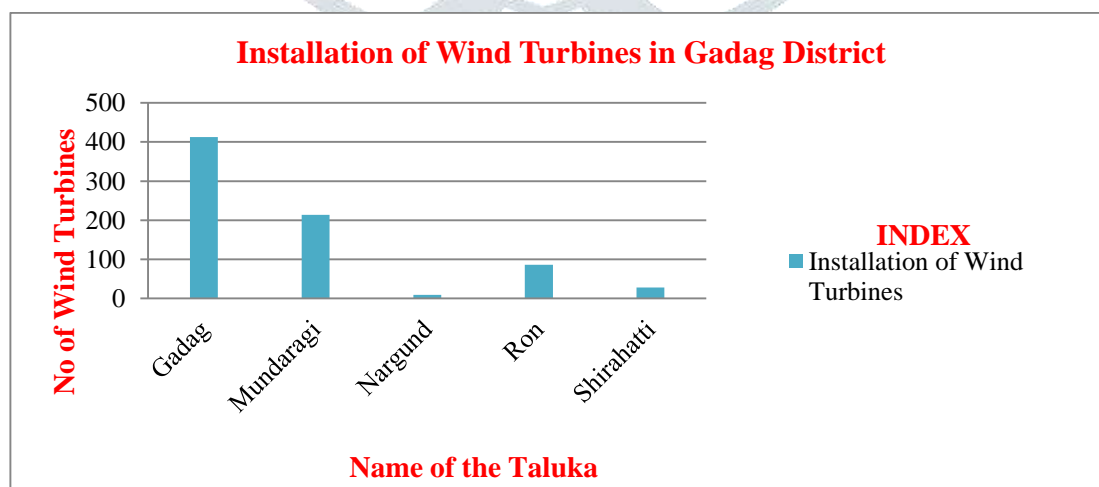


fig no : 2

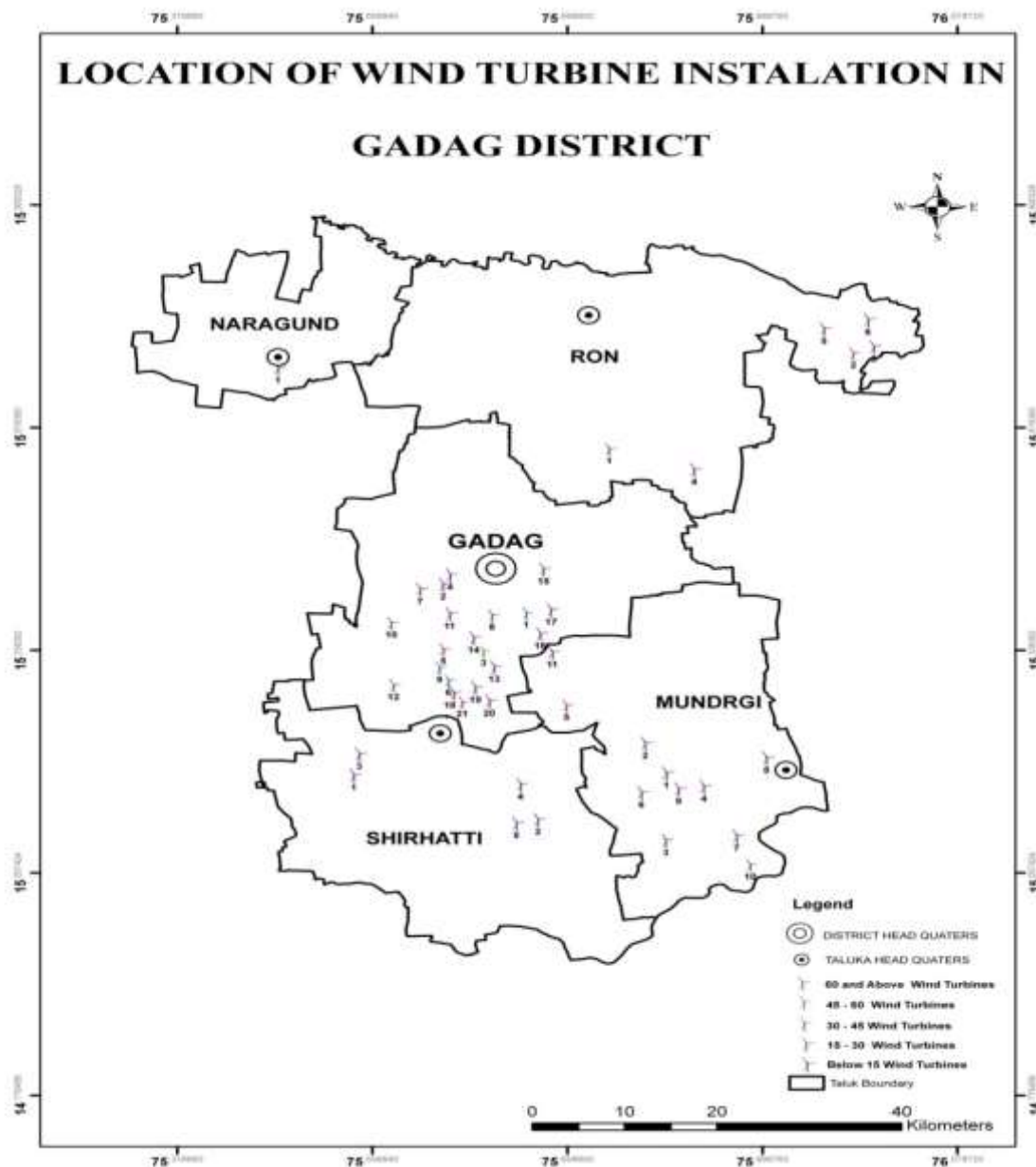


fig no: 3

Different Types of Land under Wind Turbines:

In the study region, there are 750 wind turbines has been installed in 375.00 acre of an area in different type of land such as, agriculture land (197.00 acre), barren land (05.00 acre), hilly area (66.00 acre) and forest area (107.00 acre) (Fig No : 4) in various settlements in the district.

Table No 2 : Taluka wise Area under Wind Turbines in Gadag District.

Sl No	Name of the Settlement	Total No of Wind Turbines	Area under Wind Turbine (In Acre)								
			Agriculture		Barren		Hilly		Forest		Total
			No of Wind Turbines	Area	No of Wind Turbines	Area	No of Wind Turbines	Area	No of Wind Turbines	Area	
01	GADAG TALUK										
01	Advisomapur	22	22	11.00	--	--	--	--	--	11.00	
02	Asundi	06	06	03.00	--	--	--	--	--	03.00	
03	Beladhadi	56	21	10.50	--	35	17.50	--	--	28.00	
04	Binkadakatti	07	07	03.50	--	--	--	--	--	03.50	
05	Harti	83	83	41.50	--	--	--	--	--	41.50	
06	Hosur	18	18	09.00	--	--	--	--	--	09.00	
07	Hulakoti	11	11	05.50	--	--	--	--	--	05.50	

08	Kalasapur	65	65	32.50		--		--		--	32.50
09	Kanavi	17	17	08.50		--		--		--	08.50
10	Kurtakoti	27	27	13.50		--		--		--	13.50
11	Malasamudra	09	--	--	09	04.50		--		--	04.50
12	Mulagund	23	23	11.50		--		--		--	11.50
13	Nabhapur	01	01	00.50		--		--		--	00.50
14	Nagavi	02	02	01.00		--		--		--	01.00
15	Narsapur	04	04	02.00		--		--		--	02.00
16	Papanasi	05	05	02.50		--		--		--	02.50
17	Sambhapur	03	03	01.50		--		--		--	01.50
18	Shirol	02	02	01.00		--		--		--	01.00
19	Sirunji(Sirund)	10	05	02.50		--	05	02.50		--	05.00
20	Venkatapur(Inam)	09	04	02.00		--	05	02.50		--	04.50
21	Yelishirur	33	33	16.50		--		--		--	16.50
	Total	413	359	179.50	09	04.50	45	22.50		--	206.50
02	MUNDARAGI TALUK										
01	Harogeri	01		--		--		--	01	00.50	00.50
02	Hirewaddatti	14		--		--		--	14	07.00	07.00
03	Jyalawadagi	01		--		--		--	01	00.50	00.50
04	Kalakari	09		--		--		--	09	04.50	04.50
05	Kappattagudda	146		--		--		--	146	73.00	73.00
06	Kelur	01		--		--		--	01	00.50	00.50
07	Korlhalli	09		--		--		--	09	04.50	04.50
08	Mundaragi (Rural)	10		--		--		--	10	05.00	05.00
09	Mustikoppa	03		--		--		--	03	01.50	01.50
10	Shingatalur	19		--		--		--	19	09.50	09.50
11	Shingatarayanakeri	01		--		--		--	01	00.50	00.50
	Total	214		--		--		--	214	107.00	107.00
03	NARGUND TALUK										
01	Nargund (TMC)	09		--		--	09	04.50		--	04.50
	Total	09		--		--	09	04.50		--	04.50
04	RON TALUK										
01	Abbigeri	30	30	15.00		--		--		--	15.00
02	Gajendragad (TMC)	45		--		--	45	22.50		--	22.50
03	Goudageri	02		--		--	02	01.00		--	01.00
04	Naregal (TP)	01		--	01	00.50		--		--	00.50
05	Rajur	06		--		--	06	03.00		--	03.00
06	Vadegol	02		--		--	02	01.00		--	01.00
	Total	86	30	15.00	01	00.50	55	27.50		--	43.00
05	SHIRAHATTI TALUK										
01	Gojanur	03		--		--	03	01.50		--	01.50
02	Machenahalli	08		--		--	08	04.00		--	04.00
03	Magadi	05	05	02.50		--		--		--	02.50
04	Majjur	07		--		--	07	03.50		--	03.50
05	Rantur	05		--		--	05	02.50		--	02.50
	Total	28	05	02.50		--	23	11.50		--	14.00
Total	44	750	394	197.00	10	05.00	132	66.00	214	107.00	375.00

Source: Compiled from field survey, 2016-17.

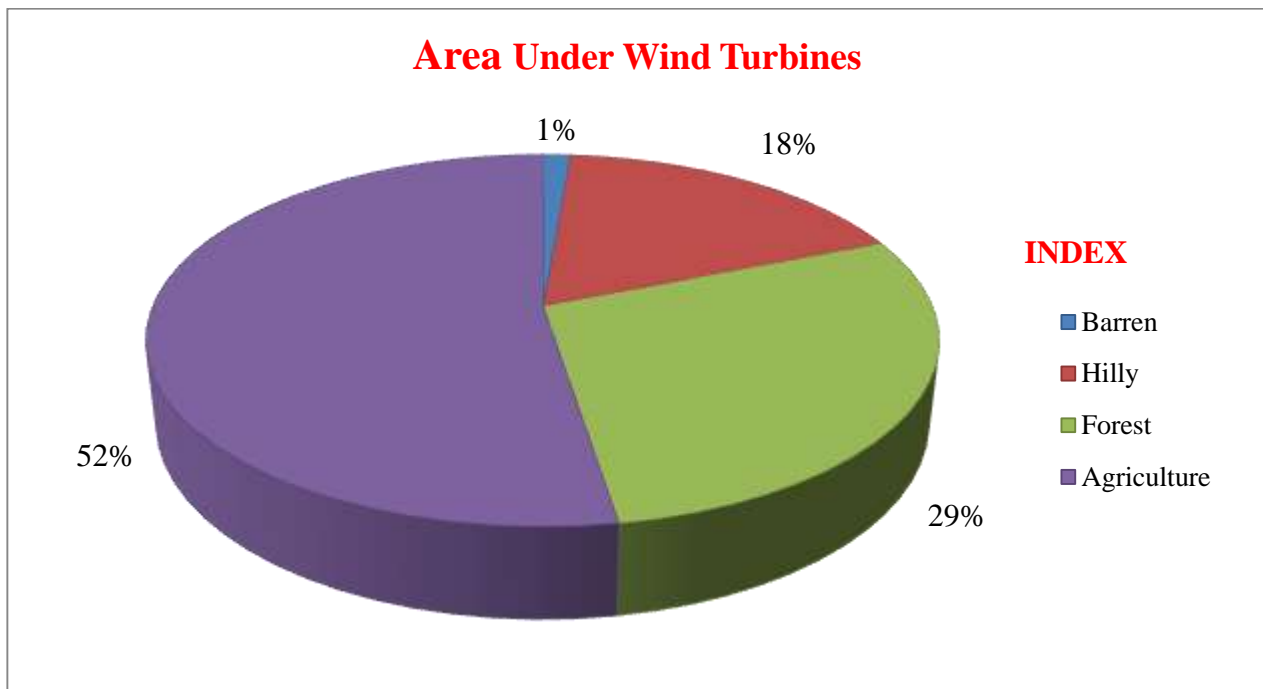


Fig No : 4

Taluka wise area under wind turbine is concerned, Gadag taluka is leading taluka in the installation of wind turbines as well as area under of installation. In this taluk, 413 wind turbines have been installed in the 206.50 acre of land in 21 settlements. Whereas, 359 wind turbines have installed in the 179.50 acre of agricultural land which is highest in the study area followed by hilly area 45 turbines have installed in 22.50 acre of land and nine turbines installed in 04.50 acre of barren land, no one wind turbine not installed in forest area. Harti is a leading village, there are 83 turbines have been installed in 41.50 acre of agricultural land, followed by Kalasapur 65 turbines installed in 32.50 agricultural land. Beladahadi 56 wind turbines have been installed in different land, 21 and 35 installed in Agricultural land (10.50 acre) and 35 in hilly area (17.50 acre) respectively. 33 turbines installed in 16.50 acre of agricultural land in Yelishiur. In the Mallasamudra nine turbines have been installed in 04.50 ace of barren land. In the Sirunji and Venkatapur 10 and 09 turbines have been installed in various lands, such as agricultural and hilly area. Nabhapur is the least of installation of turbine only one turbine installed in 00.50 acre of agricultural land (Table No : 2).

Mundaragi taluk has second rank in installation of turbines. 214 turbines have been installed in the of forest area 107.00 acre in 11 settlements. Whereas, Kappattagudda is leading for having 146 wind turbines installed in 73.00 acre. Followed by, Shingatalur 19 turbines have installed in 09.50 acre. Hirewaddatti 14 turbines in 07.00 acre. Harogeri, Jyalawadagi, Kelur and Shingatarayanakeri having only one turbine each in the 00.50 acre of each. These settlements least in the taluk.

Ron taluk has third place in installation of turbines. 86 wind turbines have been installed in six settlements in 43.00 acre of land. Whereas, 30 turbines in agriculture land (15.00 acre), 55 in hilly land (27.50 acre) and only one in barren land (00.50 acre). Gajendragad is leading and having 45 turbines in 22.50 acre of hilly land followed by Abbigeri 30 turbines have been installed in 15.00 acre of agriculture land. In the Rajur, Goudageri and Vadegol, 06, 02 and 02 turbines installed in the acre of 03.00, 01.00 and 01.00 of hilly area respectively. Only one wind turbine installed in the 00.50 of barren land in Naregal.

Shirahatti taluk is also contributes of installation of wind turbines. 28 turbines have been installed in five settlements in 14.00 acre. Whereas, 23 are in 11.50 acre of hilly area and five in 02.50 acre of agriculture land. In the Machenhalli, Majjur, Rantur and Gojar 08, 07,05 and 03 turbines have been installed in the acre of 04.00, 03.50, 02.00 and 01.50 in hilly area respectively. Five turbines have been installed in 02.50 acre of agriculture land in Magadi. Nargund taluka is the least taluka it has nine turbines have been installed in hilly area of 04.50 acre of land. Hence, the hypothesis that the wind turbines not only installed in the non-agricultural land but also in the agricultural land is confirmed (Table No : 2).

VI) CONCLUSION:

Wind is the safest and most abundant renewable source of energy in nature. Wind energy is a sustainable source of energy and is a dominant in all the activities of the human beings. The prosperity of the nation is definitely depends upon the energy for which India is also not an exception. The study area is

also leading district in Karnataka next to Chitradurga District. The study has observed that 179 acres of well fertilize potential agricultural land is under the installation of wind turbines, which is a serious and objectionable one. Once, the agriculture land is converted in to non-agriculture it is permanently ceased, certainly environmentally it is not acceptable and also it is a threat to the future generation. Further, the study is suggested that in future, the installation of wind turbine in the study area not in the agriculture land, defiantly the barren land is more suitable.

REFERENCES:

- [1] Kaul S N (2012) : Non- Conventional Energy Source. Published in EM International, Pune, Maharastra, India.
- [2] Rangarajan, S. (1995): Wind Energy Potential in India, Energy Environment Monitor, Vol. 11, No. 1 PP, 1,2,4.
- [3] Varadarajan, D.B. (1993): Energy Economics, Sterling Publishers Pvt. Ltd. New Delhi, pp. 2, 6,7
- [4] <http://www.kredl.kar.com>: Karnatak Renewable Energy Development Limited (KREDL).
- [5] District at a Glance, Gadag District, 2011.

