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Tq: Gajendragada

Re-Accrediated "B" Grade by NAAC

Dist: Gadag(KA)

Reg No :

Name :

FIELD WORK REPORT
"GENERATION OF WIND POWER IN GADAG DISTRICT"
- A GEOGRAPHICAL STUDY

SUBMITTED TO
BA VIth SEMESTER GEOGRAPHY PRACTICAL
EXAMINATION AUGUST / SEPTEMBER 2021

HEAD OF THE DEPARTMENT AND RESEARCH GUIDE

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Date : _____

*This is to certify that Shri/Smt. _____
has satisfactorily completed the course of experimensts in practical
GEOGRAPHY prescribed by the Karnataka University,
Dharwad for B. A.Semister in the laboratory of
this College during the year 201 -201*

Examiners :

1) _____

2) _____

Staff member in charge the Batch

Head of the Department

DECLARATION

I hereby declare that this field work report entitled "GENERATION OF WIND POWER IN GADAG DISTRICT" – A GEOGRAPHICAL STUDY research work carried out by me under the guidance of supervision of Dr M.R.Shivaram Head of the Department and Assistant Professor, Department of Geography Shri Annadaneshwar Arts, Science and Commerce College Naregal to the fulfillment of geography practical exam BA VI th Semester conducted by Karnataka University Dharwad for the academic year August / September 2021

Place : S.A.College Naregal

Signature

Date :

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INTRODUCTION

Wind power is the conversion of wind energy into useful form of energy such as using wind turbines to make electric power, wind mills for mechanical power, wind pumps, for water pumping, or drainage or sails to propel ships.

Wind power, as an alternative to fossil fuels, is plentiful, renewable, widely distributed, clean, produces no greenhouse gas emissions during operation and uses little land. The effects on the environment are generally less problematic than those from other power sources. As of 2011 Denmark is generating more than a quarter of its electricity from wind and 83 countries around the world are using wind power to supply the electricity grid. In 2011 wind energy production was over 2.5% of total world wind electricity usage, and growing rapidly at more than 2.5% per annum.

ORIGIN

Humans have been using wind power for at least 5500 years to propel sailboats and sailing ships. Windmills have been used for

irrigation pumping and for milling grain since the 7th century AD in what is now Afghanistan, India, Iran and Pakistan. In July 1887, a Scottish academic Professor James Blyth undertook wind power experiments that culminated in a UK patent in 1891. In the US Charles F Brush produced electricity using a wind powered machine starting in the winter of 1887, which powered his home and laboratory until about 1900. In the 1890s the Danish scientist and inventor Poul la Cour constructed wind turbines to generate electricity. Which was then used to produce hydrogen. These were the first of which was to become the modern form of wind turbine.

INTERNATIONAL STATUS

In 2010, Spain became Europe's leading producer of wind energy achieving 42976 GWh. However, Germany holds the first place in Europe in terms of installed capacity with a total of 27215 MW at December 31, 2010. Wind power accounts for approximately 21% in Spain, 14% in the Republic of Ireland and 9% in Germany.

Top 10 wind power countries - China - 75324 (MW) United States - 60007 (MW), Germany - 31308 (MW), Spain - 22796 (MW),

India - 18421 (MW), United Kingdom - 8845 (MW), Italy - 8144 (MW), France - 7564 (MW) Canada - 6200 (MW), Portugal - 4525 (MW), Rest of World - 39853 (MW) Total Wind Power capacity of the world is 282587 (MW)

Top 10 countries by Wind Power Electricity Production

Sl No	Country	Wind Power Production (TWN)	% World
1.	United States	120.5	26.2
2.	China	88.6	19.3
3.	Germany	48.9	10.6
4.	Spain	42.4	9.2
5.	India	24.9	5.2
6.	Canada	19.7	4.3
7.	UK	15.5	3.4
8.	France	12.2	2.7
9.	Italy	9.9	2.1
10.	Denmark	9.8	2.1
11.	Rest of the World	7.7	14.7
12.	World Total	4599.9 TWH	100%

NATIONAL STATUS

India has the fifth largest installed wind power capacity in the world. In 2009-10 India's growth rate is highest among the other top four countries. As of 31st Jun 2013 the installed capacity of wind power in India was 19661.15 MW mainly spread across Tamil Nadu (7154 MW), Gujarat (3093MW) Maharashtra (2976MW) Karnataka (2113 MW) Rajasthan (2355MW) Madhya Pradesh (396 MW), Andhra Pradesh (435 MW) Kerala (35.1 MW) Orissa (2MW) West Bengal (1.1 MW) and other state (3.20 MW). It is estimated that 6000 MW of additional wind power capacity will be installed in India by 2014. Wind power accounts of 6% of India's total installed power capacity and it generated 1.6% of the country's power.

There are many small wind farms in Karnataka, making it one of the states in India which has a high number of wind mill farms. Chitradurga, Gadag are some of the districts where there are a large number of windmills. Chitradurga alone has over 2000 wind turbines. The 13.2 MW Arasingundi (ARA) and 16.5 MW Anaburu (ANA) wind farms are ACCIONA's first in India.

Located in the Davanagere district. (Karnataka State), they have a total installed capacity of 29.7 MW and comprise total 18 Vestas 1.65 MW wind turbines supplied by Vestas wind Technology India Pvt Ltd. The ARA wind farm was commissioned in June 2008 and the ANA wind farm, in September 2008. Each facility has signed a 20 years Power Purchase Agreement (PPA) with 100% of the output. ARA and ANA are Acciona's first wind farm eligible for CER credits under Clean Development Mechanism (CDM).

SIGNIFICANCE OF STUDY

In Gadag district there are 605 number of wind electric converter are installed to produce capacity 482.175 MW of power.

Large number (421) of Wind Electric Converter are found in Kappattagudda spot and as surrounding villages. 62 Wind Electric Converter at Gajendragad. 9 Wind Electric Converter at Nargmd, 20 Wind Electric Converter in Shirundm 58 Wind Electric Converter at Bannikoppa 1 Wind Electric Converter are found in Naregal (Ron Tq).

OBJECTIVES

- 1) To know the Growth and Production of Generation of Wind power in Gadag District.
- 2) To know the problem and prospects of Generation of Wind Power in Gadag District.
- 3) To know the Talukawise case studies of Generation of Wind Power in Gadag District.
- 4) To know the environmental effects on Generation of Wind Power in Gadag District.

METHODOLOGY

- 1) Secondary data has been used which is collected from various Agencies, Central Renewable Resource Board, Hubli and Gadag Bureau of Economics and Statistics etc.
- 2) A study has been made by primary survey of Taluka Wind Power installed unit. Authentic published and unpublished data and information has been utilized to supplement and enrich findings.

LOCATION

Gadag District is located in the central part of Karnataka State and has a geographical area of 4657 Sq km. Gadag District is bounded by Bagalakot district in the north, Dharwad district in the west, Haveri and Ballary districts in the south and Koppal district in the east. It lies between $75^{\circ} 16'$ to $76^{\circ} 03'$ E longitude $14^{\circ} 56'$ to $15^{\circ} 53'$ N latitude. Gadag district is part of the erstwhile Dharwad District.

CLIMATE, DRAINAGE & SOIL

Gadag district situated in the northern maidan region with elevation ranging between 450 to 550 m. it is characterized by hills, rest of the area is characterized by plain lands with few isolated boulder exposures of gneisses and lenticular patches of flat topped hills as seen near Gajendragad, Malaprabha river borders Gadag district in the northern part of Tungabhadra river borders the southeastern part. The seasonal drains like Hirehalla, Bennihalla,

Sasvehalla etc drain the district. The climate is usually arid to very

1.1 warm with an average annual rainfall in the range of 500-650 mm spread over 35 to 40 rainy days. Most of the rain is received during

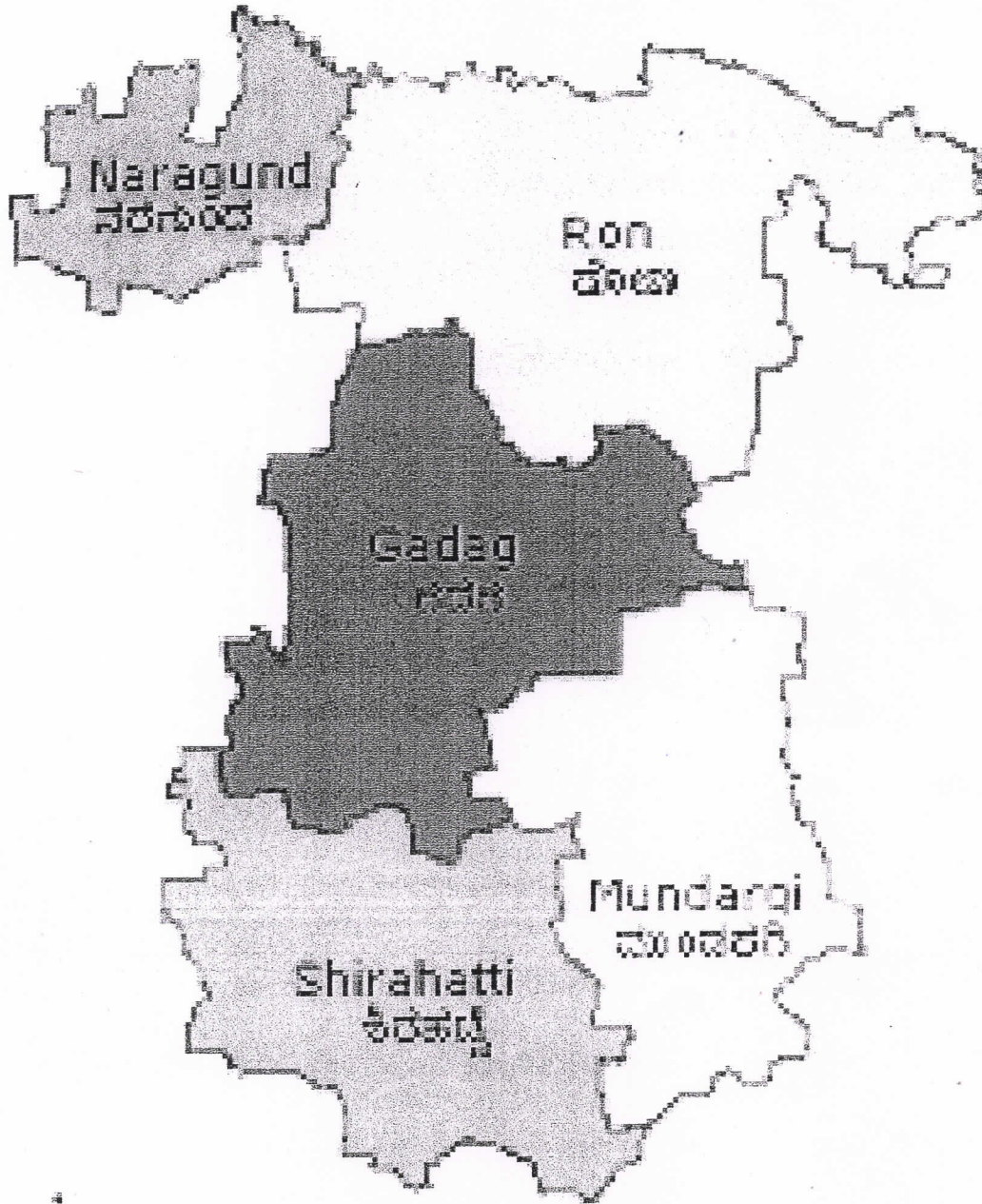
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GADAG DISTRICT



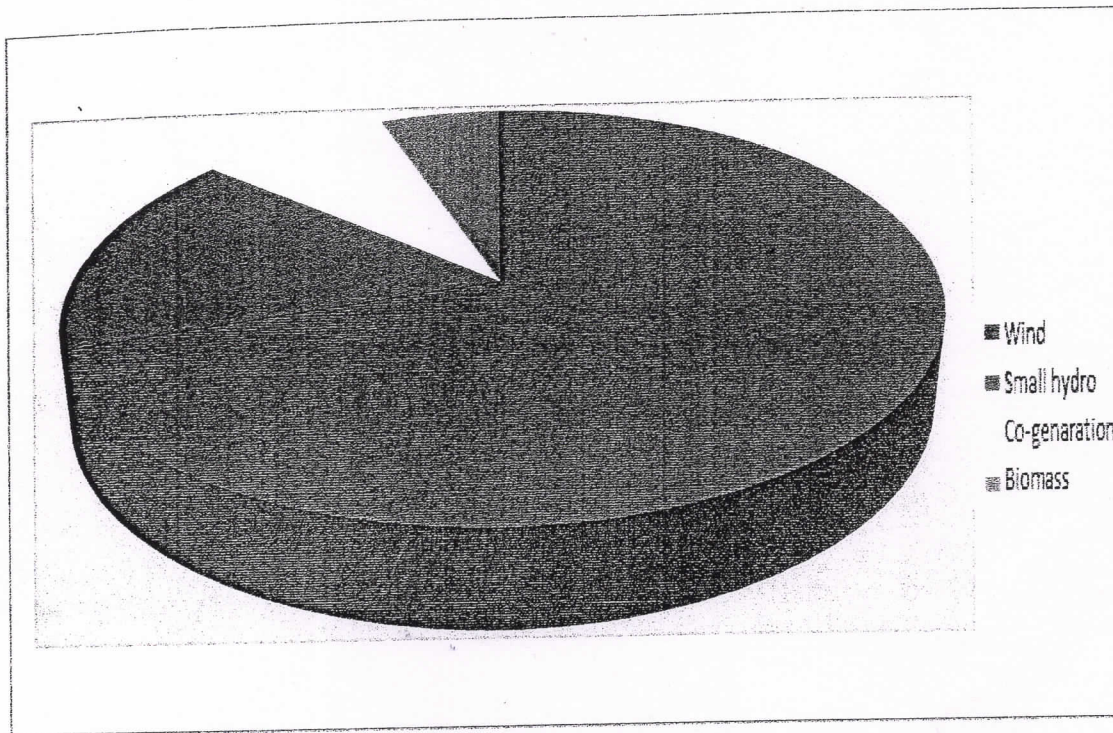
The achievement of Karnataka in the renewable energy sector by September 2008 is as below :

SL. No	R.E. Source	Potential MW	Achievement MW
1	Wind	13230	1120.685
2	Small Hydro	3000	416.096
3	Co Generation	1500	339.900
4	Biomass	950	81.000
	Total	18680	1987.675

The year wise target for different Renewable Energy Sources and the investment necessary during the policy period is given below :

R.E Source	Target MW	Year Wise Proposed Capacity Addition					Total investment (crores)
		09-10	10-11	11-12	12-13	13-14	
Wind Power	2969	630	680	530	530	599	15680
Mini & Small Hydro	600	100	100	150	100	100	2700
Co generation in sugar industry	281	56	56	56	57	57	1120
Bio mass / Bio gas	300	60	60	60	60	60	2100
Waste energy	50	10	10	10	10	10	400
Total	4200	856	906	806	806	826	22000

Renewable Energy source in Potential MW (2008):



A. Wind power :

There is potential of about 13000 MW for the development of wind power plants in the state. Wind potential areas in the state are Chitradurga, Gadag, Chikkamagalur, Bellary, Davanagere, Koppal, Bagalkot, Belgaum etc districts.

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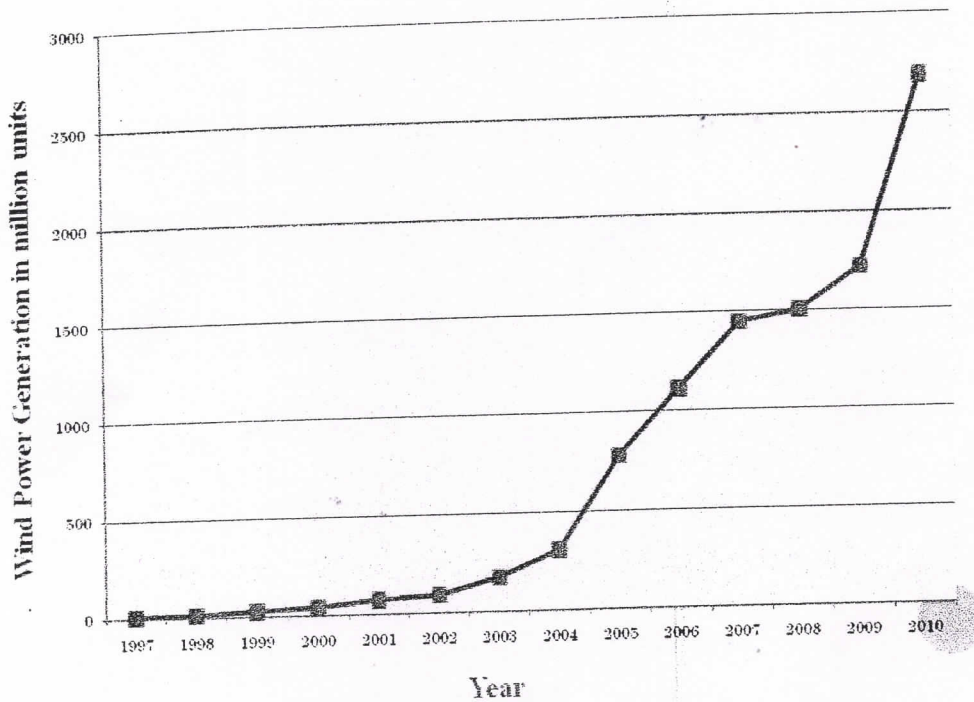
converter at Gajendragada, 9 wind electric converter at Bannikoppa, 1 Wind electric converter at Naregal, Ron Tq.

YEAR WISE GROWTH OF WIND POWER IN KARNATAKA

STATE	KARNATAKA GENERATION (MU)
1997	7.25
1998	11.72
1999	26.62
2000	39.47
2001	72.26
2002	92.86
2003	175.11
2004	308.16
2005	778.60
2006	1,113.82
2007	1,449.05
2008	1,505.78
2009	1,723.00
2010	2,687.00

Year wise growth of wind power in karnataka :

Year wise growth of wind power in karnataka :



- B. **Small Hydro** : There is potential of about 3000 MW for the development of hydel plants in the state. It is specific site could be river or stream based or canal based, reserves based etc.
- C. **Co-generation** : Karnataka has 53 sugar factories generations about 2 lakh tons of bagasse per day. This bagasse is sufficient to generate about 1500 MW power by using medium/High pressure boiler.

Gadag district in the second in the state of total wind power potential in produces 11.02.28 MW chitradurga district in first in the state wind power potential it produces 1300 MW.

There are 8 companies situated the different projects in the different that regions in the districts.

Company	Region
1) Enercon India Ltd	Kurthakoti, Kanvi, Mulagund, Adnur Hallikeri, Sasvihalli, Artur
2) Bhoraka	Yalisur, Attikatti, Sortur, Enam, Venkatapur, Hosur, Shirahatti, Doni, Mundaragi Tanda
3) Tejswini Developers Pvt Ltd	Beladadi Thanda, Nagapur Tanda,
4) Suzen Energy Ltd	Kappatagudda, Dambal, Doni, Vaddatti
5) KPCL	Kappatagudda
6) Mytrach Energy India Ltd	Hosahalli, Itagi, Mugli, Kalakapur Sankapur
7) Shriram Ltd	Bevinakatti, Bandihal, Tondihal
8) Chitradurga Wind Power Ltd	Kappatagudda

The total installed capacity of all the projects are 1110.775 MW the actual capacity produce 531.905 MW.

There are 605 wind electric converters installed capacity of 482.175MW in reftentct bulk meeting points.



Kappatagudda Region.

Kappatagudda region larges producer of wind power capacity in the Gadag District. Wind mast of 80 mtrs height has been installed 234. Wind electric converter installed to produce wind power for different companies viz enercon & KPTC etc total installed capacity 185 MW of power comes fra different places at altitudes.

Suglan infrastructure services wind form at Bagewadi

In the region 20 wind electric converter installed to produce 4.6 MW of power.

Mishi Jayanagar Sugar Ganagapur Gadag

01 wind electric converter produce 30.00 MW of power.

There are after same other companies. Wik a Indofarm (19) contry power ltd (8) at Gajendragad to produce 6.7 MW of power at Gajendragad

**DISTRICT-WISE POTENTIAL FOR WIND POWER PROJECT IN
KARNATAKA**

S.NO.	Name of the Districts	Total Wind Power Potential in MW
1	Chitradurga	1300
2	Gadag	1102.28
3	Davanagere	544.4
4	Belgavi	1413.94
5	Bellary	700.85
6	Haveri	685.27
7	Hassan	650.53
8	Shimoga	700.36
9	Tumkur	500.47
10	Dharwad	450.7
11	Raichur	408.36
12	Koppal	474.72
13	Madikere	100.95
14	Bagalkot	643.78
15	Bangalore (Rural)	205.35
16	Bidar	80.85
17	Bijapur	794.97
18	Chamrajanagar	67.58
19	Chikmagalur	702.35
20	Dakshina Kannada	221.1
21	Gulbarga	400.2
22	Kolar	300.56
23	Mandya	70.6
24	Mysore	300.65
25	Udupi	47.38
26	Karwar	367.8
27	Chikkabalapur	
	TOTAL	13236
As on 13.08.2013		

HUBLI ELECTRICITY SUPPLY COMPANY LIMITED

ABSTRACT

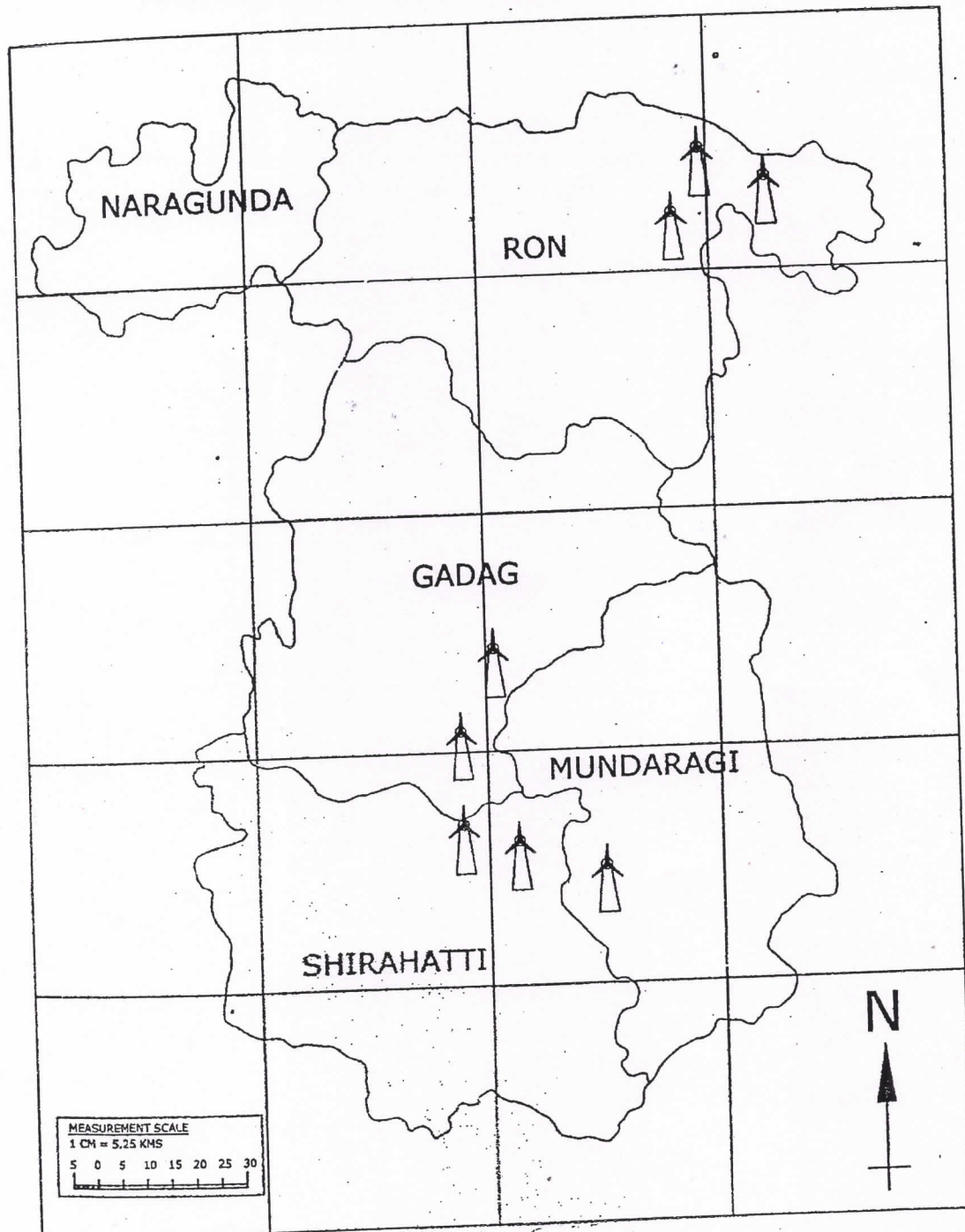
Sl No	Name of the IPP	No of wind electrical converters		Installed Capacity	No of Bulk metering points
1)	Indo Wind	19	4x0.400MW 14x0.225MW	4.975	
2)	Country Power Ltd	8	8x0.225MW	1.8	
3)	M/s RRB Energy Ltd Gajendragad	62	56x0.6 MW	31.8	4
4)	M/s Tejsri Developers Ltd Beladadi	44	44x0.225MW	9.9	1
5)	Suzlon Infrastructure Services Ltd Kappatagudda	61	18x1.5MW 43x1.25MW	80.8	2
6)	Suzlon Wind Farms, Hirewaddatti	68	68x0.85 MW	85.0	2
7)	Enercon wind farms Krishna Ltd Hirewaddatti	33	29x0.6MW 4x0.8MW	20.6	1
8)	Enercon wind farms Bannikoppa	58	38x0.6MW 20x0.8MW	38.8	2
9)	Enercon wind farms Krishna Ltd Kappatagudda	201	188x0.8MW	160.8	3
10)	Bhoruka Power Corporation Naragund	9	9x0.8MW	7.2	
11)	Pioner Wincon Pvt Ltd Shirund	20	18x0.225MW 2x0.25MW	5.0	1
12)	Karnataka Power Corporation Kappatagudda	20	9x0.225MW 11x0.23MW	4.6	

13)	SB Odugoudar Naregal RRNo 130/13.01.10	1	1x1000KW	1.00	
14)	Vijaya Nagar Sugar Gadag	1		30.00	
	GRAND TOTAL	605		482.175	

	Company	Grouped	GO	GO Date	Capacity all	Capacity in	Capacity Cancelled	Capacity facilitate	Location	District
1	Enercon India Ltd.	Enercon	EN 146 NCE 2007	17/05/2007	142.4	120.8	0	0	Kurtkoti, Horti, Kanavi, Mulgund-40 +142.4=182.4	Gadag
2	Enercon India Ltd.	Enercon	EN 398 NCE 2005	20/04/2006	108.81	40	0	0	Boganur, Shelvadi, Adnur, Hallikeri, Sasvihalli -26.4 Antur	Gadag
3	Bhoruka Power Corpn. Ltd.	Bhoruka	EN 341 NCE 2011	12/9/2011	78.3	25.5	0	0	Yelisirur, Shirunij, Attikatti, Soratur, Enam Venkatapura, Hosur, Shiratti	Gadag
4	JNI Investments & Trading Co-Operative Pvt. Ltd.	Enercon	EN 41 NCE 2006	20/04/2006	55.14	6.93	8.58	0	Chikka Handigola, Hulkoti, 4.95 Hirekoppa, Chikkop	Gadag
5	Tejasri Developers Pvt. Ltd.	Tejasri	EN 117 NCE 2008	28/03/2008	55	17.5	0	0	Beladadi tanda, Nabhapura tanda - 5+55=60MW	Gadag
6	JNI Investments & Trading Co-Operative Pvt. Ltd.	Enercon	EN 333 NCE 2012	12/2/2013	50.4	50.4	0	0	Kalasapura	Gadag
7	Suzlon Energy Ltd.	Suzlon	EN 80 NCE 2005	18/03/2005	50	50	0	0	Kappatagudda 30MW+45=75+25=100	Gadag
8	Suzlon Energy Ltd.	Suzlon	DE 325 NCE 2002	21/12/2002	45	45	0	0	Kappatagudda-30MW+45=75	Gadag
9	KPCL	KPCL	EN 569 NCE 2009	26/11/2009	39.75	0	0	0	Kappatgudda	Gadag
10	Suzlon Energy Ltd.	Suzlon	DE 137 NCE 2001	19/09/2001	30	30	0	0	Kappatagudda - 30MW	Gadag

11	Enercon India Ltd.	Enercon	EN 209 NCE 2006	26/05/2006	24.8	0	4.8	0	Adrahalli, Devih al, Nadigatti, Hosur, Narayanpur, Suganhalli-1	Gadag
12	Chitradurga Wind Power Pvt. Ltd.	Vestas	ME 124 NCE 2002	5/3/2003	24	0	20	0	Kappadagudda-24MW	Gadag
13	Bhoruka Power Corpn. Ltd.	Bhoruka	Enhancement EN 217 NCE 2009	21/05/2009	17	0	0	0	Doni Tanda, Mundargi taluk	Gadag
14	Suzlon Energy Ltd.	Suzlon	EN 92 NCE 2005	13/04/2005	16.25	16.25	0	0	Horogeri village, Chukkavadathi-5MW, Kappatagudda Kelur-10+1	Gadag
15	Suzlon Energy Ltd.	Suzlon	enhancement EN 61 NCE 2005 dtd 13.4.2005	13/04/2005	16.25	0	0	0	Kappatagudda-15+1.25=16.25	Gadag
16	Mytrah Energy India Ltd.	Mytrah	EN 116 NCE 2011	5/3/2011	15	0	0	0	Hosahalli, Itagi, Mugli	Gadag
17	Shriram Leitwind Ltd.	Shriram	EN 87 NCE 2009	8/2/2010	15	0	0	0	Sudi, Kalkapur, Sankapur, Itagi, Bevinakatti	Gadag
18	Shriram Leitwind Ltd.	Shriram	EN 87 NCE 2009	8/2/2010	15	0	0	0	bandehal, Thondehal	Gadag
19	Enercon India Ltd.	Enercon	DE 241 NCE 2001 dtd 19.6.2002	19/06/2002	15	15	0	0	Kappatagudda (15MW+8.2=23.2 MW)	Gadag
20	Suzlon Infrastructure Ltd.	Suzlon	EN 99 NCE 2006	20/04/2006	13.75	0	0	0	Dambal, Hire Vaddatti, Gauligeri Math, Doni,	Gadag
21	Suzlon Energy Ltd.	Suzlon	ME 61 NCE 2005	22/03/2005	13.5	13.5	0	0	Kappatagudda-15	Gadag
22	Enercon India Ltd.	Enercon	EN 319 NCE 2005	25/10/2005	13	13	0	0	Machinnalli (3+13=16)	Gadag
				Grand Total:	1110.8	568.51	38.13	49		

STUDY AREA IN GADAG DISTRICT WIND POWER LOCATIONS



There are many small wind farms in Karnataka, making it one of the states in India which has a high number of wind mill farms. Chitradurga, Gadag are some of the districts where there are a large number of windmills. Chitradurga alone has over 2000 wind turbines. The 13.2 MW Arasingundi (ARA) and 16.5 MW Anaburu (ANA) wind farms are ACCIONA's first in India. Located in the Davanagere district. (Karnataka State), they have a total installed capacity of 29.7 MW and comprise total 18 Vestas 1.65 MW wind turbines supplied by Vestas wind Technology India Pvt Ltd. The ARA wind farm was commissioned in June 2008 and the ANA wind farm, in September 2008. Each facility has signed a 20 years Power Purchase Agreement (PPA) with 100% of the output. ARA and ANA are Acciona's first wind farm eligible for CER credits under Clean Development Mechanism (CDM).

CONCLUSION

Gadag District is located in the central part of Karnataka State and has a geographical area of 4657 Sq km. Gadag District is bounded by Bagalakot district in the north, Dharwad district in the west, Haveri and Ballary districts in the south and Koppal district in the east. It lies between 75° 16 to 76° 03 E longitude 14° 56 to 15°

53 N latitude. Gadag district is part of the erstwhile Dharwad District.

According to the Population of India in the Census in the year 2011, Gadag District had population of 1,065,235 of which male and female were 538,477 and 526,758 respectively. In 2001 census, this figure for Gadag District was at 1.84 percent of Maharashtra population.

The average literacy rate of Gadag in 2011 was 75.18 compared to 66.11 of 2001. If things are looked out at gender wise, male and female literacy were 84.89 and 65.29 respectively

Gadag District is predominantly an agriculture-based district and cultivable land is the backbone of its economy. Agriculture contributes to about 65.5 percent of the income of the district. The main food crops are jowar, wheat, maize and pulses while the important commercial crops are groundnut, chillies, onion and cotton. The major horticultural crops grown in the district are pomegranate, chickoo and flower. Sericulture activity, though made a beginning, is yet to pick up in the district.

REVIEW OF LITERATURE

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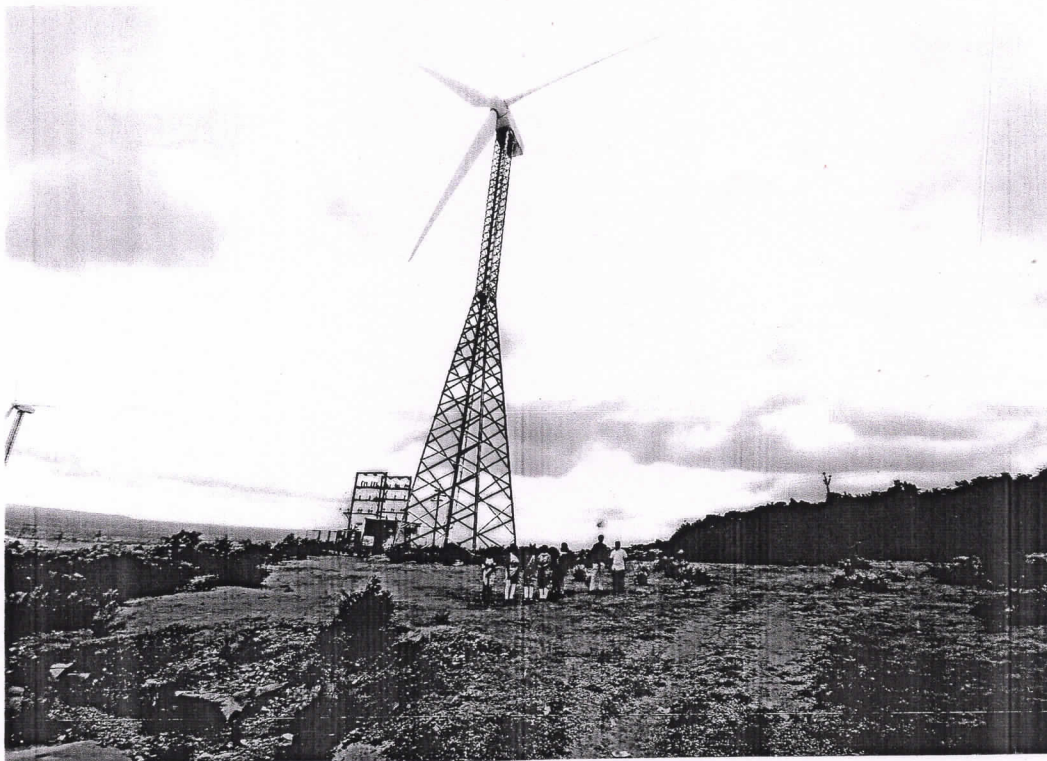
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- 3) "National Thermal Power Corporation to Develop Renewable Energy Projects in Orissa, India
- 4) "Indian Wind Turbine - Installed Wind Capacity"
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- 6) "Snzion parteners with Maharastra in record year for wind power"
- 7) "ONGC start maiden wind farm Project"
- 8) Dr Ranganath - Industrial Resources.

FIELD WORK PHOTOS



GENERATION OF WIND POWER
AT KALAKALESHWARA HILL
GAJENDRAGADA



FIELD WORK STUDENTS IN FRONT
OF ELECTRIC CONVERTOR



VIEW OF ELECTRIC CONVER
TOR.



TOP HILL VIEW OF KALAKALE
SUWARA.



FIELD WORK STUDENTS ALONG WITH
PROFESSOR IN FRONT OF ELECT
CONVERTOR^{RIS}_{TOR}



FIELD WORK STUDENTS



FIELD WORK STUDENTS' ALONG G.
WITH STAR COMPANY TECHNIANS



TOP HILL VIEW OF KAPPATAGUDDA



FIELD WORK STUDENTS, TEACHER
AT HIGHER ALTITUDE OF
KAPPATAGUDDA



VIEW OF ELECTRIC CONVERTER
AT RAPPATA GUDDA.



FIELD WORK STUDENTS VISITED
BASAVANNA STATUE AT GADAG.