DEMOGRAPHIC STUDY AROUND PROPOSED JAITAPUR NUCLEAR POWER PLANT, MAHARASHTRA, INDIA : A CASE STUDY

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ABSTRACT

Jaitapur Nuclear Power Plant (JNPP) is an ambitious 9900 MW proposed power project of Nuclear Power Corporation of India (NPCIL) at Madban village of Rajapur tahshil, District Ratnagiri in Maharashtra. It will be the one of the largest nuclear power generation stations in the India once completed. Nuclear power is green and clean source of energy and very much necessary for India which is facing huge crunch of electricity. JNPP will be able to fill up the gap of increasing demand of energy for rapidly increasing economy of India. Before implementation of any developmental projects, it is necessary to generate the baseline information of the proposed area. The present study deals with demographic survey carried out around 5 km area from proposed nuclear power plant. The present study, focuses on the population characteristics and socioeconomic conditions of this region. Present study deals with the household survey around the proposed project site consisting of 16 villages. Results of study indicate that the region needs more improvement in education and economic condition of people. The results are discussed in the paper.

Key Words : Socio-economics, Demography, Jaitapur, Population, Demographic

INTRODUCTION

Demography, the science of population, is defined as the scientific study of human population or more specifically, the study of size, geographical distribution, age, sex structure and socio-economic composition of population and the factor that affect changes in these dimensions, namely, fertility, mortality and migration[1].

Demography is the statistical study of all population. It can be very general science that can be applied to any kind of dynamic population that changes over time or space. It encompasses the study of the size, structure and distribution of population and spatial and /or temporal change. Demography analysis can be applied to whole societies or groups defined by criteria such as education, nationality, religion and ethnicity. Formal demography limits its object of study to the measurement of population process, while the broader field of social demography population studies also analyzes the relationships between economics, social, cultural and biological process influencing a population. So it needs to study demography of surrounding area around proposed plant.

Developmental Projects needs information related to population dynamics e.g. population number, sex ratio, literacy etc. which will help to study the impacts and effects of economical, migratory sector. The study will provide information related to the region as well as factors impacting on population. Study demography of region will give multi-displinary results to understand biology, genetics, mathematics, statistics, economics, sociology, cultural

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anthropology, psychology, politics, geography, medicine, public health, ecology etc. which will help to study the impacts and effects of economical, migratory sector. The Jaitapur nuclear Power Plant soon will be build near Jaitapur village, Tahshil Rajapur, District Ratnagiri of Maharashtra state. Thirty km radius around from proposed Nuclear Power Plant was carried out. The present study was carried out as per the protocol given by Board for Research in Nuclear Sciences (BRNS), Department of Atomic Energy, Mumbai. The study includes 14 villages and about 1702 households' Present study may be used as main data base for JNPP and will be useful as reference data for future research related to developmental, industrial, conservational activates. For survey of villages Questioner method is used. These surveys were supposed to give detailed information on the related issues.

The availability of reliable datasets relating to key social, economic, demographic indicators is crucial for planning and monitoring of area specific developmental goals, policies of any government. Furthermore, availability of social statistics at sub-national levels, such as district and block from gender perspective is important not only for government and non-governmental agencies, but also for those who are working in the field of women empowerment, academician etc.[2]

AIMS AND OBJECTIVES

The main objectives of the study were

1. To explore the demographic structure of JNPP around area in different factors like socioeconomic structure, age , sex education etc.
2. To carry out comprehensive survey to collect information on various aspects related to demography.
3. To analyze data collected statistically to obtain the meaningful conclusion

METHODOLOGY

Basically study area selected is 30 km around proposed JNPP, in the present study deals with the 5 km area around JNPP, from 5 km zone 16 villages were selected. Information on uses of environment by public, available resources, census data, and food habits of the population.

For the study questionnaire method was used and data collected door to door data was collected using, paper and pencil (PAPI) questionnaire that was largely based on the traditional conceptual model of housing market behavior of individual households, Background characteristics such as type of household, socio-economic characteristics, and dwelling characteristics were thought to be relevant indicators of satisfaction with the dwelling as well as of housing need, both present and future[3]. Collection of various details on demography in prescribed questionnaire for obtaining the baseline population data regarding Family, Education, Employment, Economical status, Migration, Household facilities, Changes in the village, and dietary habits. Data analysis was carried out by using statistical tools like SPSS (Statistical Package for Social Science)

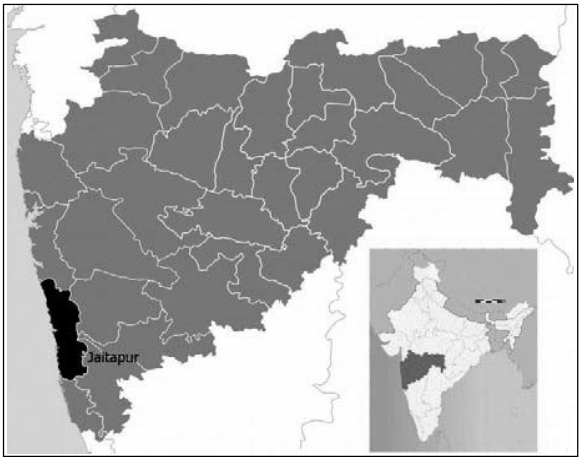
Study area

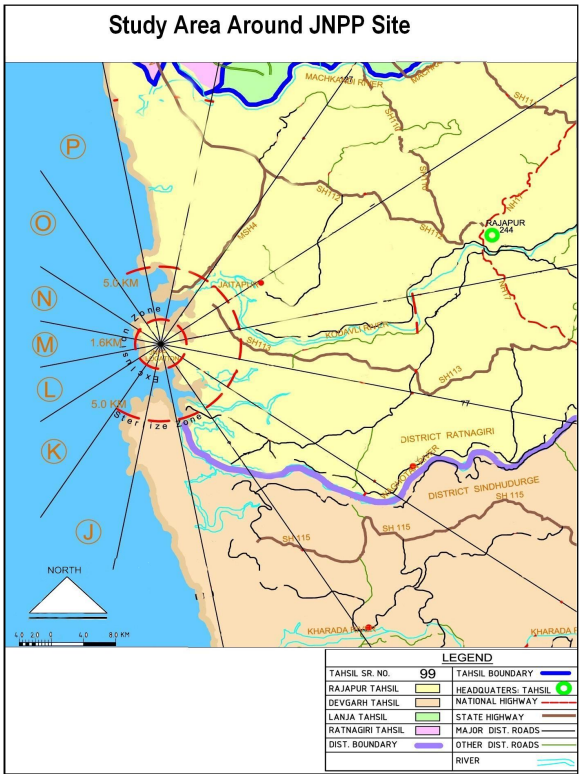
5 km around the Jaitapur Nuclear Power Plant (JNPP) site, Tahshil Rajapur, District Ratnagiri. 5km area is divided in to 2 annular sub areas (zones) **1)** 0 - 1.6: Exclusion zone, **2)** 1.6 - 5: Sterilization zone, As there is very less means only 3 to 4 house are present in 0 to 1.6 km area, for that by fusing both zone 0 to 1.6 and 1.6 to 5km zone only one zone make for study, called 0 to 5 km zone as cluster 1, Each annular area is sub divided in to 16 sectors direction wise. 1702 Households from Cluster1 was surveyed from 16 villages, total population is 6064. This report, discusses primary demographic information related to 0 to 5 km area (cluster 1) around JNPP site. Door to door interview by Questionnaire used for collection of information. **(Map No.1)**

RESULTS AND DISCUSSION

The present study deals with the 0 to 5 km zone covered 16 villages and 6064 population. Sex ratio, age structure, literacy, education, income, occupation and household facilities etc, demographic parameters are discussed in the results and discussion.

Sex Ratio : Age and gender are the important factors for the study of population structure, on the basis of which, other type of demographic data, such as population count, educational level, etc., are cross-classified and analyzed.[4] The area studied shows the female population is more as compared to male population However, this could be only an artificial tilt of the ratio towards females as the surrounding 5 km area doesn't have any employment sources and the males from this area are migrated to big cities like Mumbai for earning. The age wise analysis of the population for sex ratio clearly indicates the same. In pie chart **(Fig 1** and **Table 1)** it is clearly seen that there are 53% of population is females present whereas males are 47%.





Map No.1: Study area around JNPP site

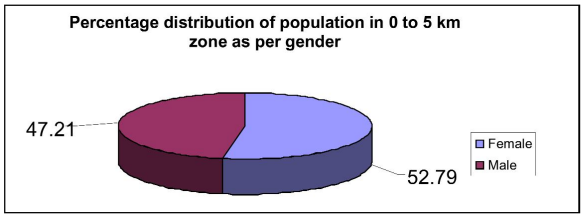


Fig 1: Percentage distribution of population in cluster 1 as per gender

Table 1 : Frequency distribution of age of the individuals in 0 to 5km zone with respective their gender

S/N	Age Groups	Number of Individuals	Total Percentage	No. of Fe males	No. of males	% of Fe males	% of males
1	0 - 10	604	9.43	286	318	4.46	4.96
2	10 - 20	1441	22.49	710	731	11.08	11.41
3	20 - 30	1185	18.50	572	613	8.93	9.57
4	30 - 40	1010	15.77	569	441	8.88	6.88
5	40 - 50	802	12.52	427	375	6.67	5.85
6	50 - 60	649	10.13	372	277	5.81	4.32
7	60 - 70	509	7.95	317	192	4.95	3
8	70 - 80	172	2.68	111	61	1.73	0.95
9	80 - 90	31	0.48	16	15	0.25	0.23
10	90-100	3	0.05	2	1	0.03	0.02
11	Above 100	0	0.00	0	0	0	0
	Total	**6406**	**100**	**3382**	**3024**	**52.79%**	**47.21%**

Age Structure : In cluster 1 **(Fig. 2)** population, most of the population is under age of 10 to 20 years about 22%. Followed by 20 to 30 years, it shows that the most of the population under this region is youth. Whereas 21% population is above 50 to 80 age. In gender wise distribution the female population is slightly more in 0 to 10, 10 to 20 and 20 to 30 age class than male population, where as above 30 year male population shows slight dominance otherwise in all age class male female population is same.

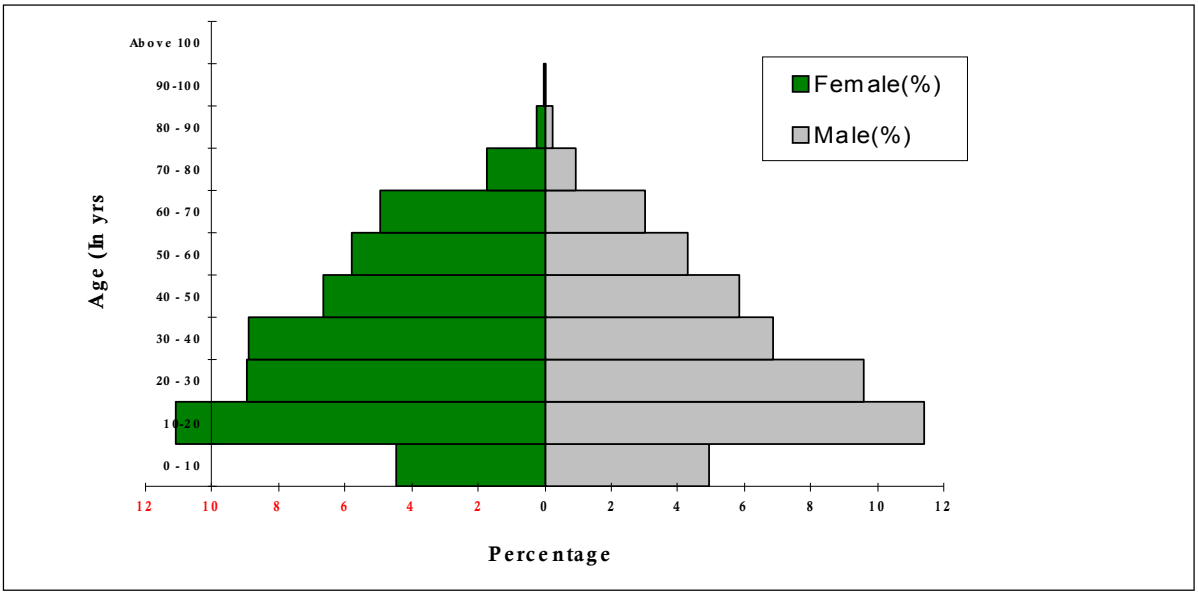


Fig 2 : Gender wise distribution of the age of the individuals in 0 to 5 km zone.

Literacy : The provisional population figure of the 2011 Census shows a marked improvement in the literacy rate.[5] In the first 5 km cluster, the percentage of literate person is 80% and 17 % illiterate persons. The pie chart (**Fig. 3)** shows the literacy percentage from 0 to 5 Km

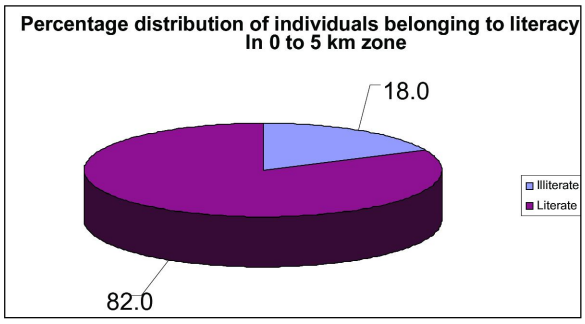


Fig 3: Percentage distribution of population belonging to literacy in 0 to 5 km zone

region so, it shows good literacy rate, but still 17% population is illiterate.

Educational Qualification: Education is an essential pre-requisite of all-round development of individuals towards better quality of life.[4] The educational qualification of population in cluster 1 **(Fig. 4)** showing variation, in that maximum number of population is having qualification is up to secondary medium level. Followed by education up to SSC and then up to primary school level. This result shows that though there is literate population is 80% but 35% having secondary level and 15 % having primary level education. The people having high education are very less in number

Monthly Income: Distribution of households, by income, is one of the bases of socio-economic status4. The monthly income of any region shows the standard of life of any population. In **(Fig 5** and **Table 2)** 0 to 5 km zone, 39% of the people's monthly income is bellow Rs. 2000 and 31% having income below Rs. 5000, On the other hand families having income more than 10,000 Rs are only 5% in percentage.

Occupation: The occupational structure of a community is an index of its economic profile[4]. The occupational status of people in cluster 1clearly revels that most of the people depend on farming and working on daily basis for their

Table 2. Percentage distribution of population in cluster 1 belonging to their monthly income

S/N	Total family income	Number	Percentage
1	Below 2000	663	38.95
2	2001-4000	535	31.43
3	4001-6000	132	7.76
4	6001-8000	80	4.70
5	8001-10000	44	2.59
6	Above 10000	91	5.35
7	Non response	157	9.22
8	**Total**	**1702**	**100**

income. Very less percentage of population is on governmental or private job. The most important thing here to mention is **(fig 6** and **Table 3)** 16.3% of population above 18 years has not any job.

Household Facilities: The residence characteristics of the population reflect its settlement nature4. According to survey about **(Table 4)** 46.18% of families living in semi pakka house, followed by27.14% of families living in pakka type means cement concrete house whereas till 26.50 % families living in Kachha house type.

More than **(Table 5)** 94% families having electricity as main source of light in their house,

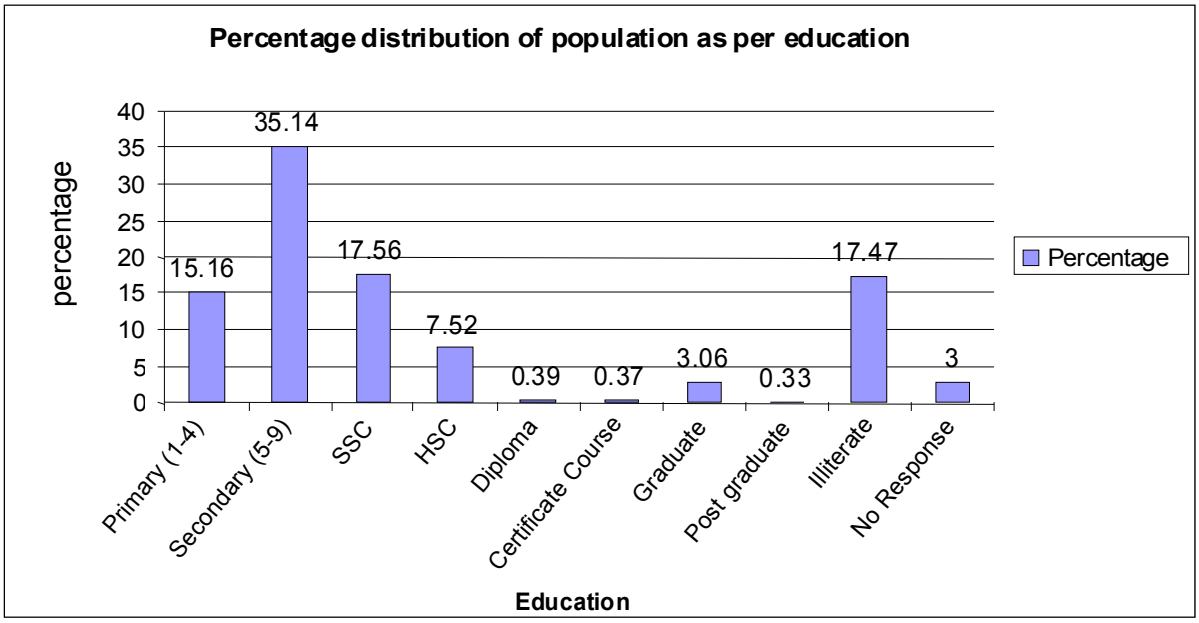


Fig 4 : Percentage distribution of the population 0 to 5 km zone with respect to their educational qualification

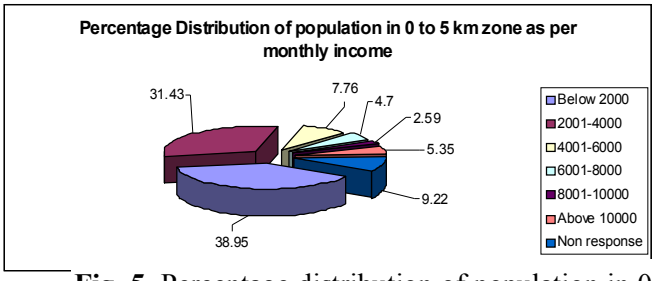


Fig 5. Percentage distribution of population in 0 to 5 km zone belonging to their monthly income

but still about 5% families don't have electricity, they use kerosene lamp for sources of light.

As per survey, about **(Table 6)** 60% of families in this study area use wood as a main source of fuel, mostly these families having old chulha (soil made) for cooking in which they use wood as fuel. About 23.56% of families use kerosene as a fuel in stove for cooking followed bt y only 15.28% of families use LPG as a cooking fuel.

The main drink source for drinking water in this region is well water. More than **(Table 7)** 83% of families use well water as main drinking water source.12.63% families depends on tap water system for main drinking water. About 2% of families depend on other sources like small streams

Table 3 : Percentage distribution of population in cluster 1 with respect to occupation

S/N.	Occupation	Number of individuals	Percentage
1	Farmer	538	8.40
2	Worker	871	13.60
3	Carpenter	13	0.20
4	Fisherman	223	3.48
5	Own Business	143	2.23
6	Govt. Job	82	1.28
7	Pvt. Job	334	5.21
8	House Wife	1391	21.71
9	Pension	52	0.81
10	Govt. helper	0	0.00
0	Other	130	2.03
11	Depend on children	73	1.14
12	No occupation (above 18)	1044	16.30
13	No occupation (below 18)	1512	23.60
	Total	**6406**	**100**

Table 4: Percentage distribution of population in 0 to 5 km zone as per the house structure.

S/ N	House construction structure	Frequency	Percentage
1	Kachha	451	26.50
2	Semi Pakka	786	46.18
3	Pakka	462	27.14
4	Non response	3	0.18
5	**Total**	**1702**	**100**

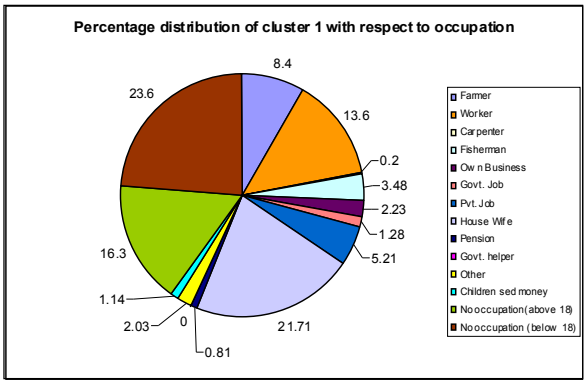


Fig 6 : Percentage distribution of population in 0 to 5 km with respect to occupation

Table 5: Percentage distribution of population in cluster 0 to5 km zone as per main source of light

S/N	Main source of light	Frequency	Percentage
1	Kerosene lamp	87	5.11
2	Electricity	1609	94.54
3	Biogas	1	0.06
4	Others	1	0.06
5	Non response	4	0.24
6	Total	1702	100

Table 6 : Percentage distribution of population in 0 to 5 km zone as per main fuel for cooking.

S/N	Main fuel for cooking	Frequency	Percentage
1	LPG	260	15.28
2	Bio/Gobar gas	19	1.12
3	Electricity	1	0.06
4	Kerosene	401	23.56
5	Coal	6	0.35
6	Wood	1010	59.34
7	Leaves	1	0.06
8	Other	0	0.00
9	Non response	4	0.24
10	**Total**	**1702**	**100**

CONCLUSION

All the above parameters of demography like age, literacy, gender, occupation and income give baseline information about the cluster 1. From the above analysis of survey it is seen that the male female ration is healthy although the, female number is more than male, the age and gender wise distribution also shows this result. The literacy rate is good but most of the population has knowledge up to secondary level, and there exists a need to increase education status in this zone. In this region mostly youth population is large, in the age 10 to 30 is population more in percentage but most of them don't have jobs (16.30%). The people here are mostly depending on agriculture, fishing and labour job. As these

Table 7 : Percentage distribution of population in 0 to 5km zone as per main source of water

S. N.	Sources for drinking water	Frequency	Percentage
1	Well	1427	83.84
2	Hand pump	5	0.29
3	River/Canal/Pond	14	0.82
4	Tap Water	215	12.63
5	Any other	36	2.12
6	Non response	5	0.29
7	**Total**	**1702**	**100**

regions have good working youth population which is literate, there can be a good human resource for new development and project like JNPP, can change the livelihood of the population residing in the region up to the basic standard level. Population also plays an important role in modern economic development. It is the most potent resource which can alter the entire face of the country, if utilized prudently. Not only it provides trained and skilled man-power for economic reconstruction but like other natural resources it can be exported to earn regular income and meet financial crisis[6].

As per survey, the household facilities show that most of people live in semi pakka house about 46%, which is made from locally found stone "chira" but still 26.50% people live in kaccha house which is basically made by mud and grass. These people are mostly daily wages labors, 27% of families living in pakka house most of them are big village. The survey also indicates that most of the families have electricity supply (about 94%), which means there is good supply of electricity. As this region shows most of the families use wood as their main fuel for energy source (59.34%) it shows that these families still depend on surrounding forest for fuel. These people tend to use traditional old method of 'chulha' on the other hand kerosene stove users are 23.56 %, and LPG user is 15.28%.only 1% of population using biogas like fuel. The rivers and streams in these region are seasonal and most of the households depend on well water for drinking water source **(Table 7)** about 84% of families are depend on wells. In some big village about 12% of households depend on Tap water system. This survey shows that the region has well man power and literacy but don't have good earning sources and standard life style.. As with any major infrastructure development in the region, it is expected that JNPP and its ancillary sector will generate ample opportunities for employment, self employment and the economical status is expected to improve.

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REFERENCE

1. Siegel J.S., Applied Demography: Applications to Business, *Government, law and Public Policy*. Academic Press, San Diego **(2002)**.
2. Development of Demographic Database for Micro (District) Level Planning In India: Exploration Of Alternative Data Sources, *Institute for Research in Medical Statistics Indian Council of Medical Research,* Bangkok, Thailand **(2003)**
3. Neth J., Housing and *the Built Environment* **12** (3) 325 **(1997)**
4. Dabral Shweta and Malik S.L. , Demographic Study of Gujjars of Delhi :Population Structure and Socio-cultural Profile, *J. Hum. Ecol.*, **16** (1): 17-24, **(2004)**
5. Navaneetham K, Dharmalingam A, Demography and Development:Preliminary Interpretationsof the 2011 Census, Econ. & Pol. Weekly EPW,vol xlvI no **16**, **(April 16, 2011)**
6. Shinde K. H., Study Of Population And Some Resources , In The Drought Prone Region Of Maharashtra, *Ind. Streams Res. J.*, **1**, (II), 145-150 **(March 2011)**.