CHAPTER III

GROWTH OF GOBAR GAS PLANTS

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3.1 INTRODUCTION

The substitution of mechanical sources of energy particularly the renewable sources of energy to conventional methods has been gathering momentum in the recent past almost all over the World. In the developing countries, even though the process of shifting to new methods of energy acquisition is slow, on account of institutional and non institutional factors, it has been recently realised that unless an impetus to the process of adoptation is given, the intensity of the energy problem which these countries are facing today can not be mitigated. I therefore, intend to make a critical appraisal of the quantitative growth of biogas plants in India, Maharashtra State, and Kolhapur District which is the specific geographical area of the present study.

3.2 QUANTITATIVE REVIEW

3.2.1 ALL INDIA LEVEL

Since 1981-82 the number of gobar gas plants installed has been increasing rapidly . For a instance in the year 1981-82 with the number of just 21888 Plants on record, it went to 1,98,000 by 1985-86 . Upto 1985-86 the grand total of biogas plants installed amounts to 5,41,930 all over the Country. The actuals have in facts exceeded

the targets because of certain voluntary and non-voluntary agencies such as Khadi and Village Industries Commission (KVIC), National Dairy Development Board (NDDB) and Action for Food Production (AFPRO) etc.

For instance, for the year 1989-90 the target fixed was 64,000 but it was exceeded by a margin of 15% and the actual plants installed during that period (April/December 1989) worked out to be 73,806. The statewise position of the biogas development of the year 1989-90 (April/December) against 1988-89(April/December) is shown in the Table No.3.1

TABLE NO.3.1

THE STATEWISE POSITION OF THE BIOGAS DEVELOPMENT TARGET AND ACHIEVEMENT FOR 1989-90 (APRIL-DECEMBER) VIS-A VIS 1988-89(APRIL-DECEMBER)

Sr.No.	States/Union Territories/ Agencies	Period			
		April-Dec.88-89		April Dec.1989-90	
		Target	Achievement	Target	Achievement
1	2	3	4	5	6
1.	Andhra Pradesh	6000	3666	5600	1511
2.	Arunachal Pradesh	4	-	4	-
3.	Assam	1200	262	800	307
4.	Bihar	2000	2404	2000	1207
5.	Goa	400	71	100	110
6.	Gujarat	4000	5849	4560	6286

1	2	3	4	5	6
7.	Haryana	800	643	800	1018
8.	Himachal Pradesh	1200	2891	1200	2652
9.	Jammu and Kashmir	80	23	80	39
10.	Karnataka	2800	2592	2800	1705
11.	Kerala	800	1519	1000	765
12.	Madhya Pradesh	1200	191	1200	446
13.	Maharashtra	12000	21323	13800	21916
14.	Manipur	20	10	80	42
15.	Meghalaya	20	-	24	-
16.	Mizoram	40	53	40	67
17.	Nagaland	16	-	4	-
18.	Orissa	1600	4426	1200	6706
19.	Punjab	1000	741	800	1421
20.	Rajasthan	1200	1527	1200	1738
21.	Sikkim	20	54	20	82
22.	Tamilnadu	5600	7583	4960	4362
23.	Tripura	20	-	30	31
24.	Uttar Pradesh	7200	7368	4800	4359
25.	West Bengal	2720	4201	3600	5097
26.	Andaman and Nicobar Islands.	4	8	18	11
27.	Chandigarh	4	-	2	-
28.	Dadra and Nagar Haveli	4	1	2	-
29.	Daman and Diu	4	-	2	-
30.	Delhi	28	23	14	13
31.	Pondicherry	16	7	20	10
	Sub Total (a)	52000	67436	50760	61901

1	2	3	4	5	6
	Sub-Total (a) B.F.	52000	67436	50760	61901
32.	KVIC	8000	3125	7200	5431
33.	NDDB	-	-	40	-
34.	APPRO	-	-	6000	6474
	SUB-TOTAL (b)	8000	3125	13240	11905
	GRAND TOTAL (a)+(b)	60000	70561	64000	73806

SOURCE : Annual Report 1989-90, Department of Non-Conventional Energy sources,Ministry of Energy,Government of India Page 9.

3.2.2 MAHARASHTRA LEVEL :

According to the latest figures available,the State of Maharashtra ranks first in respect of total number of gobar gas plants installed. For example by the end of 1985-86 the number of biogas plants installed amounted to 98273/- Even though,in the initial years of the decade1974-75 to 1984-85 it was lagging far behind the other States. But, later on it out-numbered the other States ,see table No.3.2.

TABLE NO.3.2

THE QUANTITATIVE GROWTH OF BIOGAS PLANTS INSTALLED IN MAHARASHTRA 1974-75 to 1988-89

Sr.No.	Year	No.of plants installed
1.	1974-75	538
2.	1975-76	1,190
3.	1976-77	1,508
4.	1977-78	1,662
5.	1978-79	1,800
6.	1979-80	2,529
7.	1980-81	2,706
8.	1981-82	2,883
9.	1982-83	8,029
10.	1983-84	22,882
11.	1984-85	52,546
12.	1985-86	N.A.
13.	1986-87	N.A.
14.	1987-88	N.A.
15.	1988-89 *	21,323
16.	1989-90 *	21,916

NOTE : * 1) From April to December only.

2) N.A. Not available.

SOURCE

1) K.C.Khandelwal and S.S.Mahdi, 'Biogas Technology' A Practical Hand Book,Volume I,Tata Mcgraw- Hill Publishing Company Limited,New Delhi Third Reprint page 65.

2. Annual Report 1989-90, Department of Non-Conventional Energy Sources, Ministry of Energy, Government of India, page 9.

During the first four years of the Seventh Five Year Plan (1985-86 to 1988-89) the State of Maharashtra completed the biogas plants construction which exceeded the target by 156 %. During the period of 1985-89, the grand total of the plants installed amounted to 2,73,337[1]. At all India level the State of Maharashtra topped the list of and bagged the prizes for its excellent achievement during the short period of four years. But, one should not be complacent about the quantitative growth of biogas plants in Maharashtra. It has been recently observed that a large number of plants installed are out of use. And hence, at the level of actual operation, a larger part of total capacity installed must be under-utilised either on technical ground or shortage of cow dung. From the technical point of view some biogas plants have gone out of operation because of the large size which can not suit the small farmers and marginal farmers whose number of livestock population is inadequate to maintain the regular supply of dung. The quantitative growth of plants in Maharashtra could be attributed to liberal grants of subsidies. It is found that many of the small and marginal farmers have installed the plants under the

lure of nominal subsidy without estimating of the regular and sufficient supply of raw material i.e.cow dung which depends upon the number of animal population. Roughly it can be said that,larger the number of livestock population the greater would be the supply of energy source for use of biogas plants.

3.2.3 KOLHAPUR DISTRICT :

The Kolhapur District of Maharashtra State has a geographical area of 8047 Sq.Kilometres . It's area roughly measures to 2.64% of the total geographical area of the Maharashtra State. The location of the District shown in the map of Maharashtra is appended with this chapter. The whole District of Kolhapur has been divided into three relief divisions namely hilly regions (above 600 metres), Foothill regions (450 to 600 metres) and plains of lowlands (below 450 metres) . For the talukawise details of the relief divisions refer to Table No.3.3.

TABLE NO.3.3

TALUKAWISE RELIEF DIVISIONS OF KOLHAPUR DISTRICT

Sr.No.	Taluka	Hilly Region	Foot Hill	Plains and low lands
1.	Ajara	66.54	28.38	5.08
2.	Bhudargad	49.70	45.72	4.58
3.	Chandgad	45.63	39.86	14.51
4.	Gaganbawada	65.63	34.37	Nil
5.	Gadhinglaj	31.46	44.76	23.78
6.	Hatkanangale	13.11	37.71	49.18
7.	Kagal	18.58	32.24	49.18
8.	Karveer	32.06	22.36	45.58
9.	Panhala	68.32	18.41	13.37
10.	Radhanagari	72.75	24.00	3.57
11.	Shahuwadi	58.39	40.47	1.14
12.	Shirol	1.33	22.35	76.12

SOURCE: Director,GroundWater Survey,Govt.of Maharashtra.

46% of the total area of the District has been classified as hilly regions,33.10% as foot hill region and 20% as low lands or plains. The taluka of Kagal has 18.58% hilly regions,32.24 % of foot hills and 49.18% plains and low lands.

3.2.3 a) POPULATION

According to the Census of 1981 the District had 25,06,339 population. According to 1991 Census, the population of the District has increased by 4 Lakhs and the estimated figure comes to 29 lakhs.

According to the District credit plan prepared by the Bank of India (Lead Bank of the District) 1982, bearly 80% of land holders of the District belong to small and marginal farmers category. Upto 1 hectare the percentage works out to be 48.39% and between 1 to3 hectares, the percentage works out to be 32.41 %.

3.2.3 b) LAND USE :

According to recent data,published by the District Social and Economic and Statistical Year Book 1988-89, the total geographical area of Kolhapur district measures 7,75,000 hectares. Out of this total geographical area, 1,45,000 hectares have been covered by Forest forming 18.73% . Again the land which could not be brought under cultivation measures to 69,000 hectares. The area of the grazing land in the district and area

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under bush measures to 4900 Hecs. Then, again area under current fallow and other fallow lands works out to be 47,000 Hect. Thus the area which is not under cultivation adds up to 3,10,000 hect. of the land. This land is properly maintained and looked after will be helpful for maintaining the quality and also increasing the number of a cattle population in the district. The rest of the land is under cultivation and nearly 11.3% has been irrigated by a lift well, lake etc.[2]

3.2.4 GROWTH OF BIOGAS PLANTS IN KOLHAPUR DISTRICT

TABLE 3.4

DEVELOPMENT OF BIOGAS PLANTS IN KOLHAPUR DISTRICT

(1982-83 to 1990-91)

Sr.No.	Year	No.of plant installed by Zilla Parishad	No.of plants installed by K.V.I.C.	Total (3+4)
1.	1982-83	129	503	632
2.	1983-84	581	829	1410
3.	1984-85	2152	697	2849
4.	1985-86	4081	664	4745
5.	1986-87	3157	525	3682
6.	1987-88	4193	574	4767
7.	1988-89	6378	997	7375
8.	1989-90	4636	2391	7075
9.	1990-91	4493	4648	9141
10	TOTAL	29800	11828	41628

SOURCE :1)Zilla Parishad Kolhapur Office record book
2) KVIC Centre, Kolhapur Office record book.

An overlook on Table 3.4 reveals a quantitative growth of biogas plants during a short span of 1982-83 to 1990-91. In Kolhapur District, two agencies KVIC and Zilla Parishad,Kolhapur have taken the initiative in encouraging the rural households to install the gobar gas plant at subsidised cost. As a result the total number of gobar gas plants increased from Just 632 to 41,628. In this increase the lion's share goes to Zilla Parishad,Kolhapur. The major reason for an impressive share of Zilla Parishad might have been due to close contact of Zilla Parishad members, because of their close contact with rural households. Considering the total household the number of rural households having the gobar gas plants seems to be considerably low, forming a very in-significant proportion. More than this,the households having gobar gas plants have been induced by the subsidies causing considerable reduction in the cost, funded by the State Government.

3.2.5 BLOCKWISE BREAKUP OF THE NUMBER OF GOBAR GAS PLANTS IN KOLHAPUR DISTRICT

TABLE 3.5

BLOCKWISE BREAKUP OF THE NUMBER OF GOBAR GAS PLANTS IN KOLHAPUR DISTRICT(1982-83 to 1989-90)

Sr.No.	Name ofthe Block	No.of plants installed by Z.P.	No.of plants install-ed by K.V.I.C.	Total 3+4	Blockwise distribu tion in percentage
1	2	3	4	5	6
1.	Ajara	1221	47	1268	4.98%
2.	Bhudargad	1973	119	2092	8.20%
3.	Chandgad	1378	90	1468	5.75%

1	2	3	4	5	6
4.	Gāgānbawada	273	26	299	1.18%
5.	Gadhinglaj	1797	225	2022	7.92%
6.	Hatkanangale	1340	581	1921	7.53%
7.	Kagal	1884	341	2225	8.72%
8.	Karveer	3503	1525	5028	19.71%
9.	Panhala	2039	654	2693	10.55%
10.	Radhanagari	2494	603	3097	12.15%
11.	Shahuwadi	1144	17	1161	4.55%
12.	Shirol	1625	607	2232	8.76%
	TOTAL	20671	4835	25506	100.00%

SOURCE : 1) Zilla Parishad, Kolhapur Office Record Book.
2) K.V.I.C.Centre, Kolhapur Office Record Book.
3) Panchayat Samitee, Kagal Office record book.

SINCE our case study of economic benefits of gobar gas plants is being restricted to the Kagal Taluka and particularly the Murgud Town of the Kagal Taluka, It is worth noting the blockwise distribution by biogas plants over the period of 1982-83 to 1988-89. As stated earlier the two agencies (Zilla Parishad and K.V.I.C.) seem to have been very active in inducing the rural household in different blocks of the district to have their own biogas plants for cooking purposes. Among the

various blocks the Karveer block tops the list having the targets of biogas plants (5028). Radhanagari block ranks second having 3097 biogas plants. And Panhala and Kagal Talukas rank respectively third and fourth. In terms of percentage to the total number of biogas plants in Kolhapur District, the Karveer block has got the highest percentage i.e.19.71% . Radhanagari and Panhala have the percentages respectively 12.50% shares and 10.55% . And the Kagal block just 8.72%. The variations inthe percentages could be attributed to the variations in the cattle population of the blocks. Though this criterion may not necessarily be sufficient to explain the variations in percentages of blockwise distribution of biogas plants. There are other factors such as easy access to financial agencies and also the agencies which have taken lead in the installation of biogas plants in the District. For the details of the percentage distribution refer to the table No.3.5

3.2.6 THE KAGAL TALUKA AND MURGUD TOWN

TABLE 3.6

GROWTH OF GOBAR GAS PLANTS IN THE KAGAL BLOCK AND THE MURGUD TOWN (1982-83 to 1990-91)

Sr. No.	Year	Plants in Kolhapur District	Plants in the Kagal block	Number of plants inthe Murgud town
1	2	3	4	5
1.	1982-83	632	15(2.37%)	Nil
2.	1983-84	1410	110 (7.90%)	02 (01.81%)

1	2	3	4	5
3.	1984-85	2849	323 (11.33%)	44 (13.62%)
4.	1985-86	4745	473 (9.96%)	14 (2.95%)
5.	1986-87	3682	230 (6.24%)	04 (1.74%)
6.	1987-88	4767	349 (7.33%)	05 (1.43%)
7.	1988-89	7375	735 (9.96%)	25 (3.40%)
8.	1989-90	7027	587 (8.35%)	52 (8.85%)
9.	1990-91	9141	460 (5.03%)	22 (4.78%)
10.	TOTAL	41628	3282 (7.88%)	176 (5.36%)

(N.B.: Figures in the brackets shown percentage to the total biogas plants of District and Block).

SOURCE : 1) Agricultural Department,Zilla Parishad,Kolhapur Office record book.

2) K.V.I.C.Centre,Kolhapur Office record book.

3) Panchayat Samitee,Kagal Office record book.

According to table No.3.6, the Kagal Block had a relative share of 2.37% in the total of the Kolhapur district. The relative percentage share of the Kagal Block jumped up to 11.33% and there after it showed a consistant declining trend of its relative percentage share. For example,the relative percentage share changed from 9.96% in the year 1985-86 to just 4.42% in the year 1990-91. By the end of 1990-91,the Kagal block had just 7.65% share in the total of the district. Coming to the Muragud town proper,the

Murgud town had just two biogas plants in the year 1983-84 forming 1.81% to the total number of biogas plants inthe Kagal Block. During the suceeding year 1984-85 its relative share jumped to 13.62%. And thereafter there had been decline up to 1.43% by 1987-88. During the three years 1988-91, the relative share fluctuated between 3.40% and 8.85% . By the end of 1990-91 the relative share of the Murgud town in the total for the Kagal Block formed just 5.36%. In absolute terms during this short period of 1983-91, the number of installed biogas plants increased from just 2 to 176 (1990-91). The overall increase of the biogas plants installed inthe Murgud town seems tobe quite low. Hence,concentrated efforts will have to be directed towards increasing the number of households having biogas, plants for fuel purposes. The sluggish growth of the biogas plants to some extent could be assigned to certain constraints on the households imposed by the small size of their land holdings and consequent meagure cattle population inclusive of both Milch and draught animal.

3.2.7 PROFILE OF THE KAGAL TALUKA

A brief outline of the profile of Kagal Taluka: Geographical area of the kagal Taluka measures to 54,754 hectares. In the total geographical area ofthe Kagal taluka,the cultivable area is respectively from 86.94% and 7.04%. What is more relevent to study is the area under forest. The area under forest measures 1473 hectares

Again non-cultivable area amounts to 3260 hectares. Fallow and grazing land measures just 1184 hects. on which the number of cattle population depends. The area under bush and food crops amounts to 1311 hectares. According to 1981 Census,the total population of the taluka amounts to 1,88,028 which forms 7.30% to the total population of the Kolhapur District (25,06,330). Since 1991Census population figure talukawise were not available. We have estimated the population of Kagal taluka by 1991 to be 2.11,700 on assuming the percentage of the population in the taluka to the total population of the District to be constant at 7.3% . Therefore in view of the growth of population and the growth of fuel requirement it is quite necessary to provide to the increasing population with modern substitutes to traditional sources of fuel consumption for cooking purpose like firewood and dried cakes of cow dung. The problem of providing economically viable substitute to traditional sources assumes top most priority in view of the continuous deforestation during the last few years. Not only that the traditional source of fuel consumption will have to be used very economically and conserve them by finding out suitable devices reflecting an improvement over the traditional methods of consumption. Again, in view of growing shortage of fuel like Kerosene, natural gas for cooking purposes,the importance of using

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traditional sources of fuel like cow dung (biogas) and agricultural wastes through modern devices which are directed towards elimination of wastes increases. For example, in Maharashtra, there are 75 lakhs rural households and their minimum demand for fuel is 18,75,000 Cubic metres. The actual fuelwood in the state indicates that, the State produces only 2,53,750 Cubic metres firewood which satisfies only 13.5% of the total demand of the fuelwood. And for remaining requirement, they have to depend on other sources like coke, hardcoke, cowdung, agricultural wastes, Kerosene, biogas etc.[3] More or less similar conditions on rural energy front prevail almost all the District of the State. The same can be applied at the taluka level. Hence, the need for measures either to conserve the traditional sources or to increase their supplies and eliminate wastes through modern devices. The modern devices have certain advantages over the traditional ones. And hence to explore the thrust area of the present research, is feasibility of modern devices in the rural segment of the population. Hence, the present case study is being undertaken, the scope of which is restricted to the Murgud town of Kagal Taluka of the Kolhapur District. The relevant statistical particulars of the district, taluka and Murgud are given below.

3.2.8 PROFILE OF MURGUD TOWN

(A) GEOGRAPHICAL LOCATION

The Murgud town is situated at the distance of above of 43 Kilometres to the South of Kolhapur city. The Tahsil headquarter Kagal is about 42 Kilometres to the north east from the town. The river Vedganga blows to the West of the town. The land of the town is made up of black cotton soil and is generally plain. Dudhganga-Vedganga Sahakari Sakhar Karkhana Ltd.,which is situated in Bidri is about 8 Kilometres from the town. The Mouni Vidyapeeth at Gargoti is also about 13 Kilometres from this town. The famous trading and commercial centre of Nipani is about 21 Kilometres..to the East from this town. The geographical location of town is : Latitude 16^{0} 20' N and longitude 74^{0} 10' E. The area under the jurisdiction of Municipal Council admeasures 231 Ha. 22 R. Town's altitude is 548.6 metres above M.S.L. Average rainfall is 1163.4 millimetre. Average maximum temperature is 32.2^{0} Centi.and average minimum temperature is 29.4^{0} C. Generally the climate is temperate.

B) POPULATION

According to 1981 Census ,the total population of Murgud town amounted to 8613. During the last decade of 1980 its population has not increasedmuch. On the contrary according to unauthorised

estimate,the population has decreased. However, we take for granted that,the population has remained constant by the end of 1990. The totalpopulation has been classified into various occupational distributions. The town itself has been situated in the Mofussil area i.e.having surrounded by rural villages, and the economy of the town itself has rural orientation The number of agricultural holding and agricultural labourers dominate the occupational distribution of the population. The households other than the agricultural households forma very small proportion of the total number of households which according to recent estimates amounts to 1920. Still it is a practice in rural India,that,the agricultural household combined their agricultural operations with animal husbondary either with a view to supporting their family incomes or to facilitate their agricultural operations with the assistance of draught animals like bullick and buffaloves.Along with the draught animals,the agricultural families undertake the activities of rearing the shed-animals like shee buffaloves,cows sheeps and goats,and even to some extent poultry birds. These animals constitute the real source of raw material that go into the output of biogas.

C) BOVINE POPULATION :

According to the recent Census of animal population conducted in May,1991 amounts to 2672. The distribution of bovine population runs as follow.

TABLE 3.7
DISTRIBUTION OF BOVINE POPULATION OF MURGUD

Sr.No.	Animal	Number	% of total Animal
1	2	3	4
1.	Cow	297	11.11%
2.	Bullock	204	7.63%
3.	Calf	52	1.95%
4.	Buffalow	894	33.45%
5.	Buffalow (Male)	2	0.07%
6.	Breed of Buffalow	137	5.12%
7.	Sheep	233	8.72%
8.	Goat	803	30.15%
9.	Horse	48	1.80%
10.	Total	2672	100.00 %
11.	Poultry	1077	-

SOURCE :-Classwise Census of the Animal : 15.4.91
Deputy Director,District Animal Husbandary Kolhapur Office.

Now a days in the total number of animal population,the proportion of draught animals per agricultural family seems to have been reduced due to

mechanisation of farming and also commercialisation of farming,but the loss in the draught animals has been made good by increase in the Milch animals due to dairy developmental activities sponsored by the State Government. Going by average number of per household,the installation of gobar gas plants may not be technically viable. Even though some families have large number of animals while some others have very small number of animals not sufficient to run a gobar gas plants. This is more or less a common phenomenon found to be universal as far as the agricultural households are concerned. In what way and how both factors namely number of animals of each families and biogas plant operation is being commented on in the relevent Chapter. and at appropriate place in the succeding Chapter IV.

***

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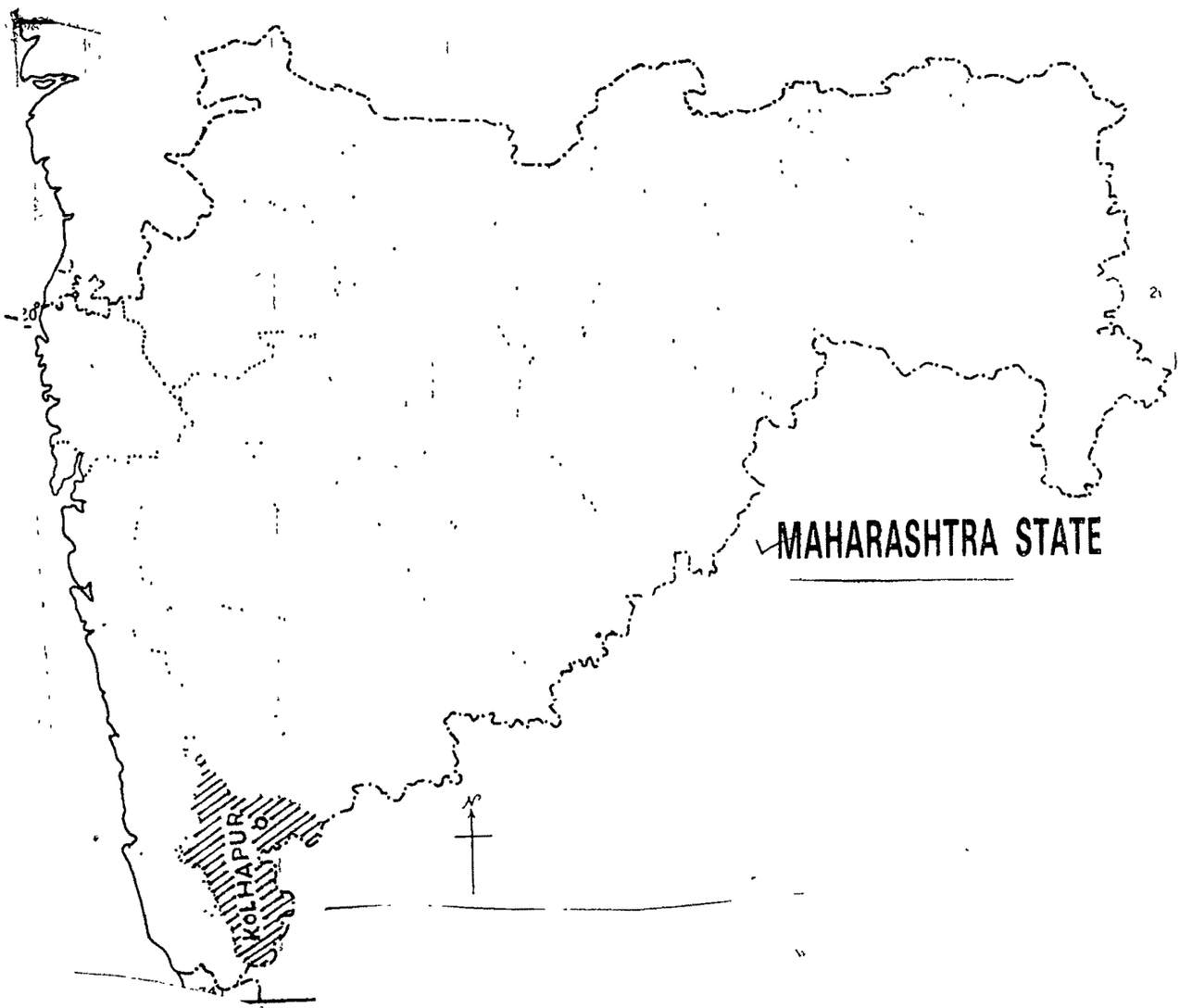
(The details of the proceedings were published in the Marathi News Fortnightly"Lokrajya" 16th June,1990,page 31)

2) District Statistical Abstract of Kolhapur District 1988-89.

3) P.W.Deshmukh: Chapter II " Afforestry As A Solution To The Environment And Energy Problem: A Case Study of Rural Maharashtra" Ecology of Rural India : Volume I, Edition, Editor Pramod Singh, Ashish Publishing House, 8181, Punjabi Bagh,New Delhi 110026,page 103 to108.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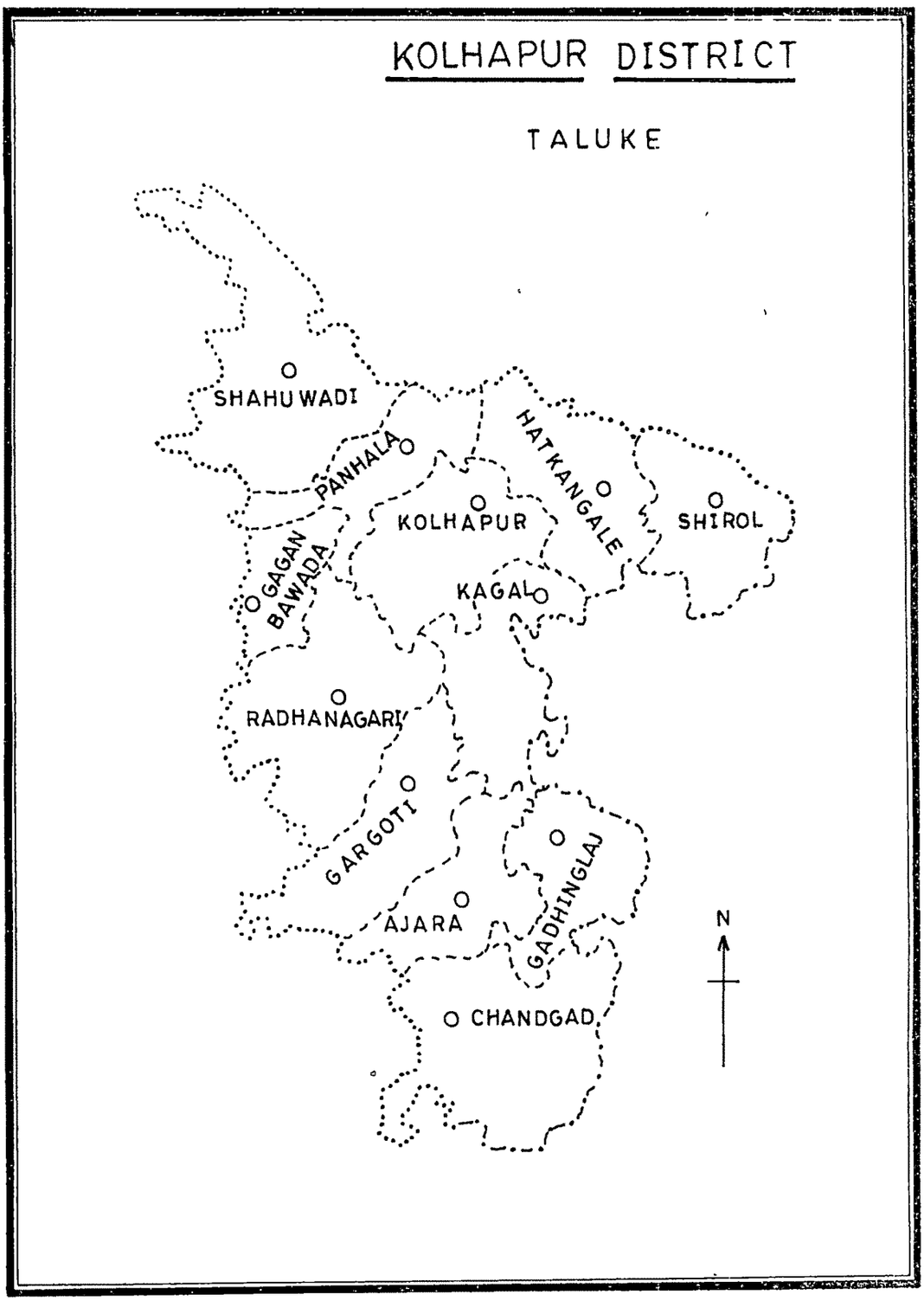
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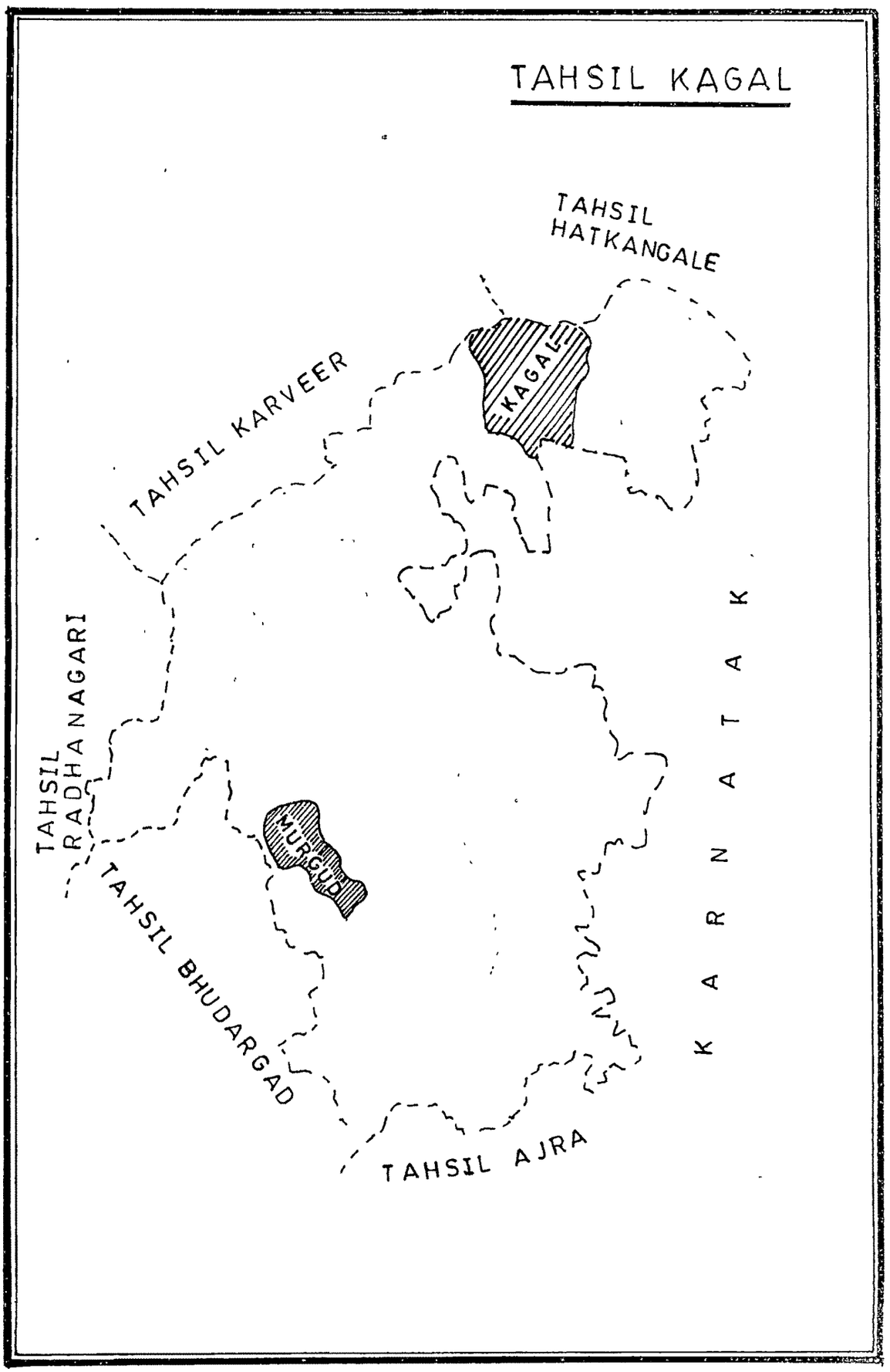
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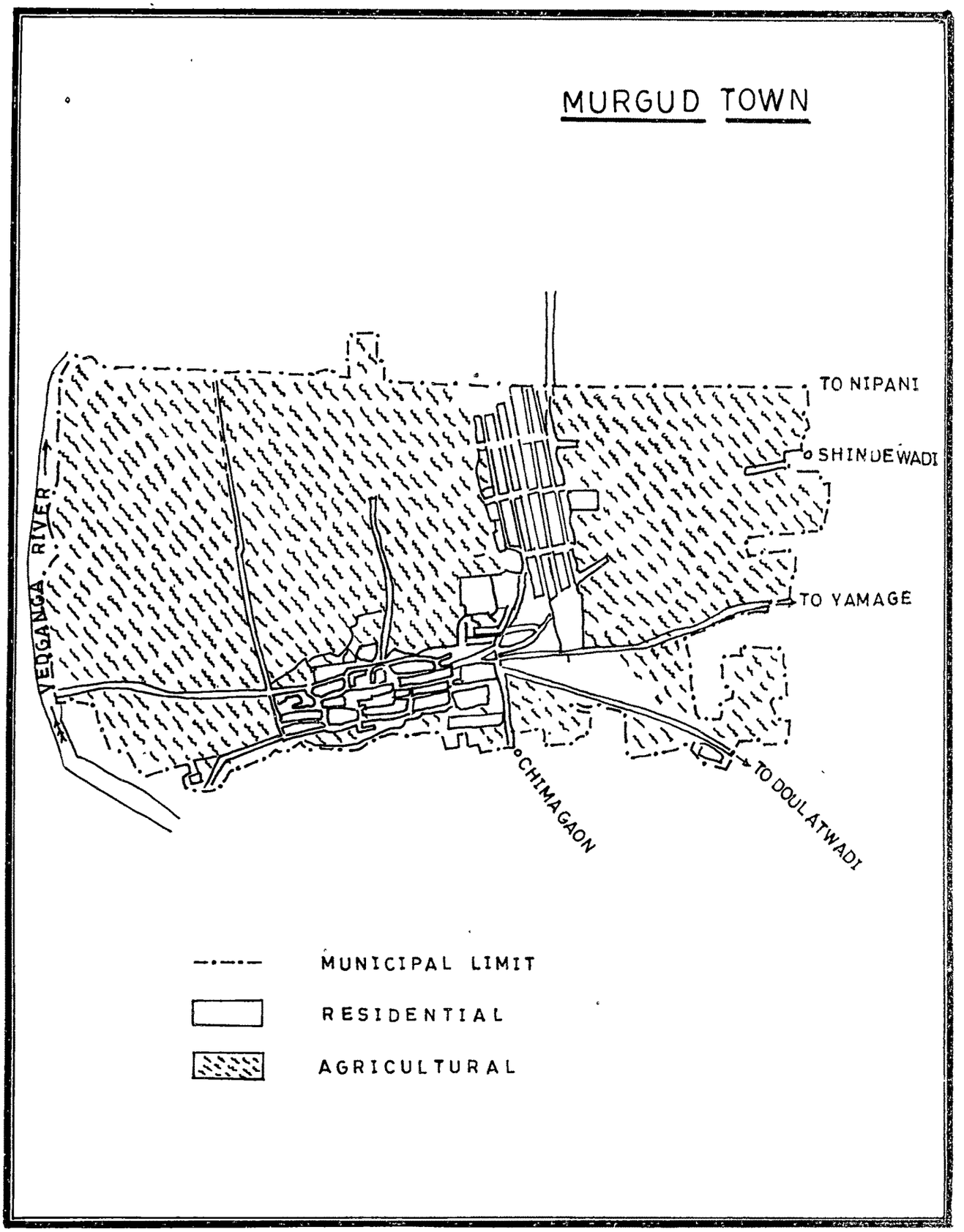
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