

Application of GIS and remote sensing to understanding demographic transformation of model watershed village sin south Ahmednagar District

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Abstract

Watershed is not simply the hydrological unit but also socio-political-ecological entities which play crucial role in determine food, social and ecological security and provide life supports services to rural people. Change in demographic characteristics with watershed development is the two important dimensions of benefits of watershed development programme. Watershed management means the process of creating and implementing plan, programs and projects to sustain and enhance watershed functions that affect the plant, animal and human communities within a watershed boundary. Watershed management is not so much about managing natural resources but about managing human activity as it affect these resources (Jankar and Kulkarni, 2013). In this way to access the impact of watershed development on demographic characteristics is important.

Keywords: watershed, hydrological, management, ecological, demographic

Introduction

If we want to solve the water problem in rural areas and stop the mass migration of the rural people to the urban centers, watershed development is the only solution. If we plan watershed development, works well, we can save the country from water crisis in the future. For that, a village should be considered as a unit and then composite thoughts need to be given to all the watershed areas in that unit. Watershed development is a miracle which transforms the society. Watershed developments not only increase water availability of the area but also change the society. It takes social and economical transformation through various activities. Watershed development is the foundation of economic and social transformation. Watersheds developments teach earn water through hard rock, and use it for welfare of village and downtrodden community of the village to raise their social transformation. The social transformation brings the economic transformation (Anna Hajare, 2011) [2]

Watershed management implies rational utilization of land and water resources for optimum and sustained production with the minimum of hazards to natural resources and environment. It requires collection and analysis of a great deal of information on physical relationship of vegetation-soil-water to land management which ensures economic and social progress of a region (Nagarajan. N. 2012) [4].

In India, most watershed projects are implemented with the twin objectives of soil and water conservation and enhancing the livelihood of the rural poor (Sharma and Scott, 2005) [5]. For this different types of treatment activities are carried out in watershed villages like Ralegan siddhi, Hivrebajar, Darewadi, Mudgal, Shirpur, Johad etc. These model watershed villages are the best examples, and they indicate that watershed is not only tool to increase availability of water, but also watershed is the best tool of socio economic transformation of the society. But today these villages are also facing problems of

scarcity of water, so there is a dire need to acquaint people with water management.

Study Area

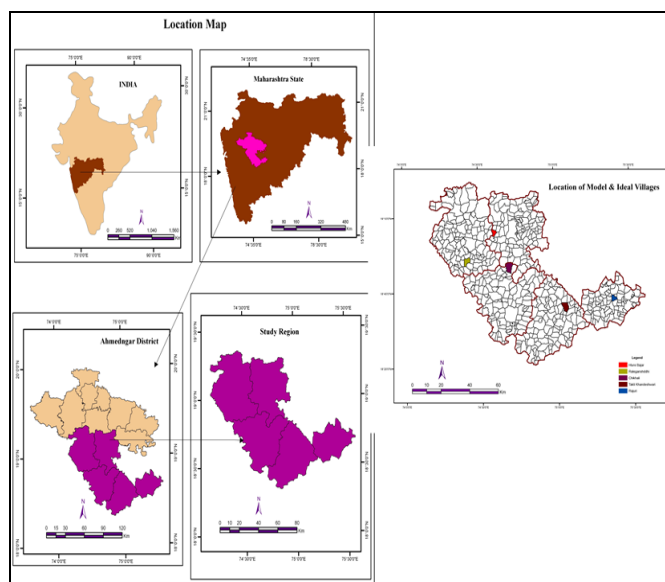


Fig 1

Aims and Objectives

1. To analysis selected demographic characteristics of the modal watershed villages.
2. To identify impact of watershed on demographic characteristics.

Data Source

Materials of the present study are collected through numerous sources.

Primary Data

Primary data is collected from the sample beneficiaries through personal interviews. For this purpose, questionnaire was prepared. For collection of data field work was done.

Secondary Data

The secondary data information is collected from record of Gram panchyat, Taluka Krushi Offices, Panchayat Semite and Self Help Groups (SHG). Some data is collected from several published research papers and Ph.D. Theses. For collection of data, topic related books and journals are referred. For the data related to various physical, socio-economic and demographic characteristics District Census Handbooks is referred (1981-2011). Toposheets are also used as a secondary data for study

Result and Discussion

Demographic Characteristics

Table 1: Distribution of total population in model watershed villages (Percentage).

Sr. No.	Name of Village	1991			2001			2011		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
1	Hivrebajar	11.14	12.12	11.62	11.48	11.84	11.65	11.35	11.65	11.49
2	Ralegansiddhi	22.90	21.92	22.42	24.96	22.24	23.66	21.72	22.40	22.05
3	Chikhli	24.17	24.39	24.28	23.47	24.90	24.15	22.76	22.01	22.40
4	Taklikhandeswari	25.01	23.53	24.29	23.88	23.51	23.71	25.88	26.25	26.06
5	Rajuri	16.79	18.05	17.40	16.20	17.50	16.82	18.29	17.68	18.00
6	Average	100	100	100	100	100	100	100	100	100

Source: Computed by researcher (Census 1991-2011) ^[9, 10].

The table no. 1 shows population distribution in the study region. Taklikhandeswari is the biggest village in study area accommodating around ¼ of population of study area and village Hivrebajar is the smallest village in which accommodate only around 11 percentage populations of all study villages, Ralegansiddhi and Chikhli also accommodate more than 20 percentage population of selected study area and Rajuri accommodates around 18 percentage population of

purpose. In addition the researcher discussed with state government departments like Soil Conservation offices, District Groundwater Department and officials of different NGOs, Social workers and Sarpanchs of villages.

Methodology and techniques

The present investigation aims at understanding the problems and prospective of the study area. For this purpose different aspect demographical is taken into consideration. Accordingly primary and secondary data is collected from different sources and on the same data different analytical methods are applied. In data analysis both empirical and theoretical approaches are used. Apart from this some Geographical Information System (GIS) techniques are also used for understanding ground truth.

study region. Taklikhandeswari is around double in population size as compared with Hivrebajar. It is also interesting to study how population size of village affects other population characteristics of the study area. In selected study area there are three big and two small populous villages.

According to the above table except Taklikhandeswari and Rajuri all model watershed villages shows declining trend of population.

Population Growth Rate

Table 2: Population growth rate of model watershed villages.

Sr. No.	Name of Village	Population Growth (Percentage)		
		1991	2001	2011
1	Hivrebajar	22.70	11.10	8.06
2	Ralegansiddhi	31.43	16.90	2.07
3	Chikhli	21.72	10.21	1.61
4	Taklikhandeswari	23.11	8.10	20.42
5	Rajuri	11.69	7.09	17.24
6	Ahmednagar District	24.35	19.80	12.44

Source: Computed by researcher (Census 1991-2011) ^[9, 10].

Table no 2 represents population growth rate of study area. Declining trend of population growth rate is important characteristics of Indian population. This was followed by Ahmednagar district average growth rate. Population growth rate of Ahmednagar district was decline continuously from 1991 to 2011.

Population growth rate of study area also declined continuously and rapidly in villages Hivrebajar, Ralegan siddhi and Chikhli from 1991 to 2001, but it declined very

rapidly from 2001 to 2011. However, in some study area opposite condition is observed in villages Taklikhandeswari and Rajuri where population growth rate declined from 1991 to 2001 but it suddenly increased from 2001 to 2011 in both villages.

Increasing population growth rate in villages Taklikhandeswari and Rajuri is a indicator of immigration due to improvement in agriculture land, living condition, development in educational and other facilities.

In general the three villages namely Hivrebajar, Ralegan siddhi and Chikhli show rapid declining trend of population growth rate and village Taklikhandeswari and Rajuri show sudden increasing trend of population growth from 2001 to 2011.

Population Density

Table 3: Population density distribution of model watershed villages.

Sr. No.	Name of Village	Population Density (Person /Sq. Km)		
		1991	2001	2011
1	Hivrebajar	105	117	126
2	Ralegansiddhi	202	236	241
3	Chikhli	96	106	107
4	Taklikhandeswari	110	119	143
5	Rajuri	113	121	141
6	Ahmednagar District	198	237	266

Source: Computed by researcher (Census 1991-2011)^[9, 10].

Table no. 3 represents population density that is land man ratio of study area. As per the data population density of all study villages increased rapidly in the last three decades, but if compared with district average density of villages, it is less except 1991 census year where only one village exceed density above district average and in 2001 and 2011 census all villages are showing population density below Ahmednagar district.

It is clear from the data that proportion of population to the land is high in Ralegansiddhi and the population density is increased in the village by 39 Persons / Sq. Km. in the last three decades. Chikhli and Hivrebajar show very less density of population. It is only 11 Person/ Sq.Km. 21 Person/ Sq.Km. in Hivrebajar in the last three decades. Decadal increase in population density is highest in village Taklikhandeswari where it increased from 110 to 143 Person/ Sq.Km. i.e. 33 Person/ Sq.Km.

It is found from the data that decadal increase in population density is high from 2001 to 2011 as compare with increase in density from 1991 to 2001.

Sex Ratio

Table 4: Sex ratio of model watershed villages.

Sr. No.	Name of Village	Sex Ratio (Female's /'000' Male)		
		1991	2001	2011
1	Hivrebajar	1026	937	939
2	Ralegansiddhi	903	810	943
3	Chikhli	951	964	885
4	Taklikhandeswari	887	895	928
5	Rajuri	1014	982	884
6	Ahmednagar District	949	940	939

Source: Computed by researcher (Census 1991-2011)^[9, 10].

Table no 4 represents sex ratio of study villages which is important indicator of socio-economic development in the region. From the data it is clear that in Ahmednagar district sex ratio is declined by 10 females/ 000' males. The same trend is also found in the study villages where it declined by considerable number of females. But in Taklikhandeswari it increased instead of decline. Hivrebajar and Rajuri shows

excess sex ratio that is female exceeds males (26 and 14 females/ 000' males). But Hivrebajar and Ralegan siddhi shows declines sex ratio from 1991 to 2001 and again it increased in 2011. Chikhli shows increase in sex ratio from 1991 to 2001 but again in 2011 census it declined very rapidly. Taklikhandeswari is only village which shows continuous improvement in sex ratio, but it is also not very good condition because still sex ratio of Taklikhandeswari is below the average sex ratio of the district. Worst condition about declining sex ratio is noted in Rajuri where it declined by 130 females / 000' males in last three decades, which declined from 1014 (1991) to 884 females / 000' (2011).

In general the rapidly declining sex ratio of the study area is an alarm to socio-economic health in the near future.

Conclusion

The model villages show before and after watershed development situation of following demographic characteristics. In 1991 to 2011 in the selected watershed villages general the three villages namely Hivrebajar (22.70 to 8.06), Ralegan siddhi (31.43 to 2.07) and Chikhli (21.72 to 1.62) show rapid declining trend of population growth rate whereas village Taklikhandeswari and Rajuri shows fluctuating trend of population growth rate. Village Taklikhandeswari and Rajuri show sudden increasing trend of population growth from last two decades. Compare with population density of Ahmednagar district density of all ideal and model villages has less density during study period. It is found that decadal increase in population density is high from 2001 to 2011 as compare with increase in density from 1991 to 2001. As per increasing census year density of population also increased in all model villages.

Declining sex ratio is serious problem in all model villages. In 1991 Hivrebajar (1026 Female's /'000' Male) and Rajuri (1014 Female's /'000' Male) shows excess sex ratio and remaining all villages has less than average district sex ratio (949 Female's /'000' Male). In general except Taklikhandeswari remaining model villages are showing depict and declining sex ratio from last three decades. Taklikhandeswari is only village which shows continuous improvement in sex ratio, but it is also not very good condition because still sex ratio of Taklikhandeswari (928 Female's /'000' Male) is below the average sex ratio of the district (939 Female's /'000' Male). All model villages are showing alarming situation of continuously declining sex ratio.

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