A Geographical Study of General spatial-temporal distribution land use pattern using GIS in Trimbakeshwar Tehsil

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Abstract

General land use could be a crucial indicator of associate acceptable use or misuse of land. the analysis of general land use denote the standing of farming in a very vicinity. land use pattern implies that proportion of area below varied crops at a degree of some time. General cropping pattern could also be a dynamic high-powered would love of soul. land use study carries a superb importance as a results of it'll provides relating to intensively used, below used and unused land in the state and Country. to avoid the negative impact of any natural issues like a cyclone, flood, drought, soil degradation etc. the farmers unit choosing the variability of crop mixtures in their fields. Fragmentation of the General land holding to boot affects on the land use pattern and crop production, quick increasing population touching agricultural studies considerably relevant to agricultural geographies. The growth of population facet modification in General land use pattern. This analysis research paper an attempt has been to clarify high-powered land use pattern in Trimbakeshwar Tehsil of Nashik District.

Keyword: Study of Geographical Condition of study area, General spatial-temporal distribution land use pattern using GIS in Trimbakeshwar Tehsil, classification of General Land use etc.

Introduction

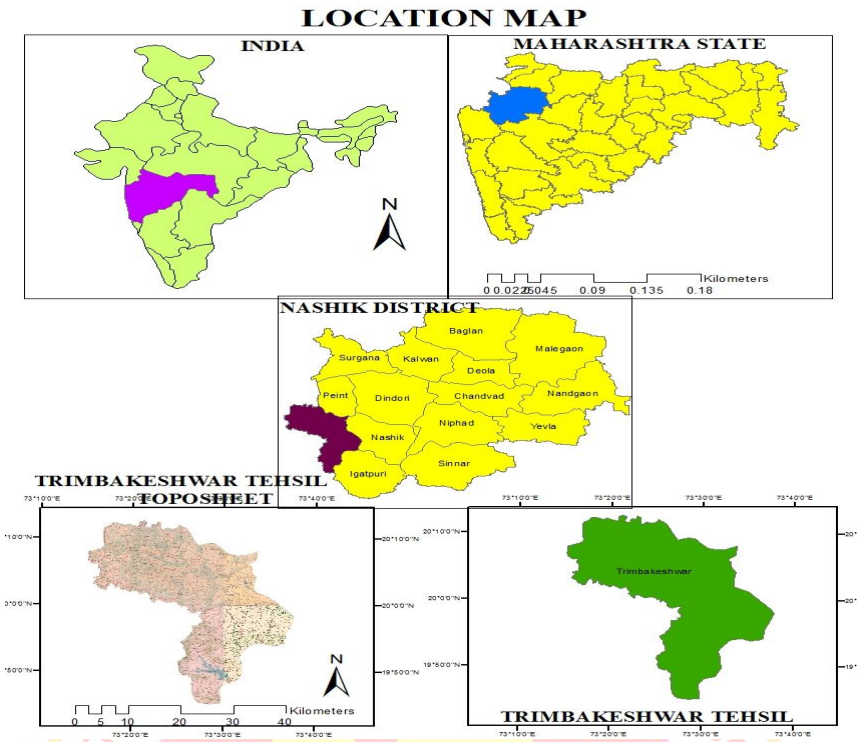
The present Research paper deals with General Introduction Land classification, Spatial Variations in Land use of this chapter**.** The utilization of land for different purposes indicates an intimate relationship between man and environment. The efficient use of land depends the capacity of man to utilize the land and manage it in proper perspective. In view of the predominantly agrarian nature of the study of region. Such studies are the subject of supreme importance. The land use pattern the spatial sequence of the under different land use.

Today, even in upland areas, the fallow cycle which is recreating plots before mature forest can be reestablished. It may be mentioned here that the conditions for intensive farming in a high elevation tropical environment are marginal and very different from those operating in temperature and latitudes. Soils are generally thin, nutrient rainfall and depleted of organic matter due to bacterial action and accompanying high temperature. The same high temperature and lack of cold spells encourage proliferation of the insects and diseases.

The study of classification of land use pattern in the Trimbakeshwar Tahsil would be of great help for preparation of the relative development plan for the region.

Study Area:

Trimbakeshwar Tehsil is situated partly in the Dhamanganga basin and partly in Middle Godavari Basin and Vaitarna Basin. It lines between 19°56'23.73"N to 19°55'41.43"N Latitudes and 73°32'18.34"E to 73°31'22.38"E longitude. Trimbakeshwar Tahsil has an area of 96523.00 sqkms and population 168423 as per the 2011 census. There are 122 villages and three revenue Villages namely Trimbakeshwar, Harsul, and Harsul-1 present in the Trimbakeshwar Tahsil. The main system of hill is the Sahyadris which run north south in the western portion of the district. The main from Sayadries range, two prominent spurs stretch out to the east of study area. In the extremes north are Damanganga hill, basin and which approximately forms and boundary between Peth and Trimbakeshwar Tahsil.



Aim and Objectives

This research paper has been undertaken to make an in-depth and comprehensive study of agriculture land use. Its planning and development using GIS in Trimbakeshwar is possible by evaluating following, A Geographical Study of General spatial-temporal distribution land use pattern using GIS in Trimbakeshwar Tehsil

Objectives:-

- ✓ To assess the physical background of study area.
- ✓ To assess the spatial as well as temporal land use in the study area.
- ✓ To suggest remedial measures for better agriculture planning and development using GIS.

Database and Methodology

The present study is based on primary and secondary sources. The published sources are revenue record, socio-economic abstract of Nasik district, census Handbook, Tahsil land record office and internet GIS software (Arc GIS 10.1) to obtain Village wise data for the various crop in Trimbakeshwar Tehsil.

Primary data have obtained for six sample villages through questionnaires. The questionnaires cover aspects like crop land use, farmer's education income from various sources and problems regarding agriculture and allied sectors. This information concerned Talathi and Sarpanch were contacted to get more information of sample villages.

The spatial and temporal aspects of general and agricultural land use were studies in-depth. The changes in various aspects have obtained and then mapped by using suitable method, suitable diagram and graphs have depicted for showing land use pattern.

Classification of General Landuse:

The land classification aims at dividing land into different categories according to factors as customary the total geographical area of the district is divided in to two major classes:

Arable Land:

The arable or cultivable land undergoes frequent charges as it is influenced by number of Geographical and socio-economic factor. The percentage of the arable land to the total geographical area is 34808.7 hectares. Shows the percentage arable land included for example net sown area (26.20 percentage), area sown more than once (2.23 percentage), current fallow (1.46 percentage), other fallow (1.26 percentage), cultivable waste (2.85 percentge) and pasture and grazing land (2.42 percentage).

Table No.1 General Land use pattern in Trimbakeshwar Tahsil (2001-2011)

Sr.No.	Land use Category	Total Geographical Area (in Hectares.)	Percentage		Changes
			2001	2011	
	Arable Land				
1	Net sown area	9119.87	15	26.2	11.2
2	Area sown more than once	776.23	0.51	2.23	1.72
3	Current fallow	508.2	0.75	1.46	0.71
4	Other fallow	438.58	2.56	1.26	10.3
5	Cultivable waste	992.1	2.7	2.85	0.15
6	Pasture and grazing	842.38	1.41	2.42	1.01
Total Arable Land		**34808.7**	**23.93**	**36.42**	**12.5**
	Non-Arable Land				
1	Forest	34789.2	69.55	57.25	12.3
2	Barren and uncultivable waste	1488.8	2.3	2.45	0.15
3	Land not available for agriculture	2145.1	4.25	3.53	0.72
Total Non-Arable Land		**60767.1**	**76.07**	**63.55**	**12.52**
Total Geographical Area		**96523**	**100**	**100**	

Source*: *Computed by Researcher

Non- Arable Land:

The proportion of non-arable land to total geographical area in 2001 to 2011 was 76.07 percentage and 63.55 percentage. Large portion of non-arable land is more than arable land in Trimbakeshwar because of the northern part of hilly and mountainous and south- east part is sub range of sahyadris. Therefore large portion of the non- arable area is more than arable land. Total portion of the non-arable land is largely covered by forest category i. e. 69.55 percentage and 57.25percentage .It is a parallel to arable land. The forest converts on an average about 69.55

percentage and 57.25 percentage to total geographical area. The total geographical area of remaining categories are barren and uncultivable waste that is (2.30 and, 2.45 percentage) and land not available for agriculture that is (2.45 and 3.53 percentage) in 2001 to 2011 years.

Spatial variations in land use:

The spatial pattern of land use in Trimbakeshwar Tehsil is the result of interaction between Geographical environment and socio economic environment. But the impact of regional and local factors is clearly evident from the land use patterns. Besides these factors, amount of rainfall exerts profound influence on the types of land use in the Tehsil. The overall land use has been categorized in different sub types on the recommendations made by food and agricultural Department, Government of India. These sub-types are as follows

Forest

Forest area represents an exclusive use of land, i.e. the growing of trees. Such an area is generally incompatible with other uses. Forest lands are an integral part of the natural environment of the Tehsil. It is not only essential for their products, but also for their role in maintaining the significant ecological equilibrium in the region. From the land use point of view, growing of forest on land otherwise no suitable for cultivation is its best use. Variations in area under forest have considerable importance in the study of agriculture in a region. The forests covers, on an average 69.55 percentage and 57.25 percentage per cent of the total geographical area in 2001-2011. Generally, deciduous and mixed forest is found in the Trimbakeshwar Tehsil. Extreme northern part of the Village like Harsul village, northern part of Harsul-1and Trimbakeshwar, north-western part of and south-western part of Vaitarna village show high proportion of area under forest. Besides, this part is occupied by Satapura Mountain and Sahyadris sub-ranges with 'Protected' and 'Reserved Forests'. In this area the amount of rainfall (875 mm) is more than other parts of the Tehsil in Nashik District. Sag, Teak and Tivas are the most valuable trees in this hilly region, but in present conditions tribal peoples have been burning and cutting trees in the forests discriminately.

forest, while Welunje (44.56percentage), Harsul (46.73percentage) moderate percentage of area under forests.

Land Not-Available For Cultivation

Land not available for cultivation is divided into following cultivation systems:

Land put to non-agricultural uses:

This type includes land occupied by settlements, roads, canals and rivers. Barren and uncultivable land.

Includes outcrops of hills and mountains:

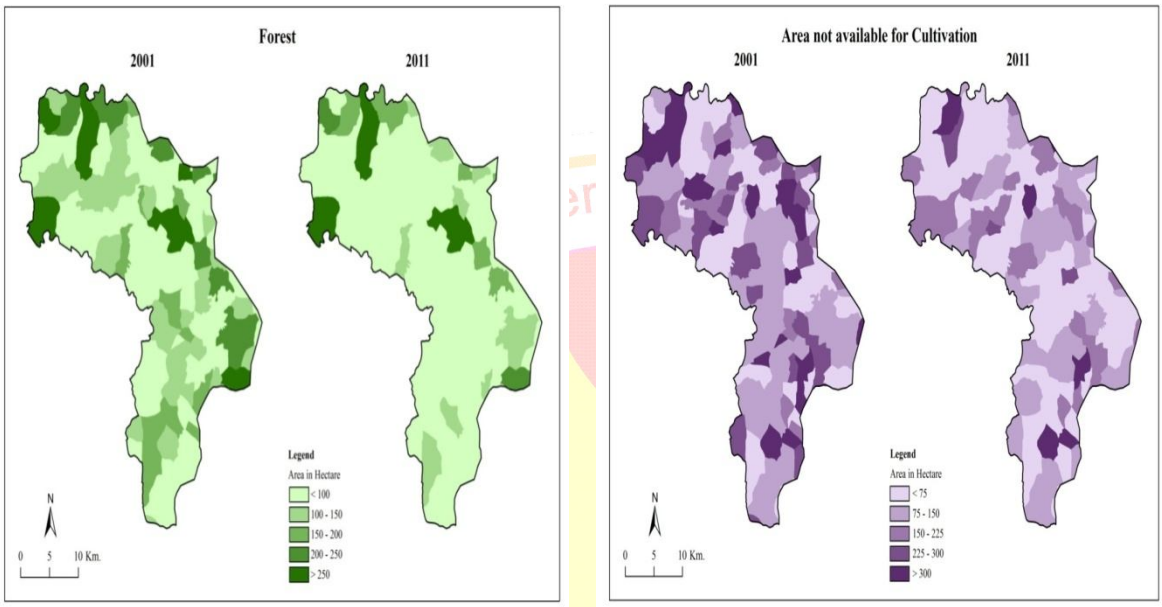
The small part of this land can be brought under cultivation of very high costs. Generally barren and uncultivated land is associated with poor soils, heavy rainfall and intense erosion.

The spatial distribution of land not available for cultivation is as below:

In the district, the land not available for cultivation accounts for 5.41 percent that is (389121 Hectares) out of total geographical area. Tahsil wise spatial distribution of land not available for cultivation, Harsul (8.16 percentage) and Trimbakeshwar (8.88 percentage) showed high percentage in the region and rank first and second in the district. Followed by Harsul (1.38 percentage) and Trimbakeshwar (2.73 percentage) showed lowest percentage of area under land not available for cultivation while Welunje (7.15 percentage) and Vaitarna (7.2 percentage) percentage are under land not available for cultivation (Table 3.2) 2.45 Percentage of land not available for cultivation is same as compared to the district to total area of district. High portion of land not available for cultivation in the Trimbakeshwar (26.37 percentage) and Harsul (25.77 percentage) villages, respectively rank first

and second in the district. Those villages which are town areas, transportation, rivers and settlement portion is high in that region. Vaitarna (18.15 percentage) and Trimbakeshwar (17.22 percentage) showed medium percentage of land not available for cultivation. In this region high rainfall, hilly and Mountainous region, steep slopes are the main reasons. Remaining Village like Harsul (3.09 percentage) and Welunje (9.40 percentage) has very low percentage of land not available for cultivation due to hilly northern part hilly and southern part is plain but piedmont.

Map-1 Land Not-Available For Cultivation and Forest Land in Trimbakeshwar Tehsil (2001 to 2011)



Other Uncultivated Lands Excluding Fallow Land

The cultivable waste land includes other uncultivated land excluding fallow land. This land use is divided into three types of permanent pastures and other grazing lands miscellaneous tree crops and graves and vegetation in the study area.

Cultivable waste

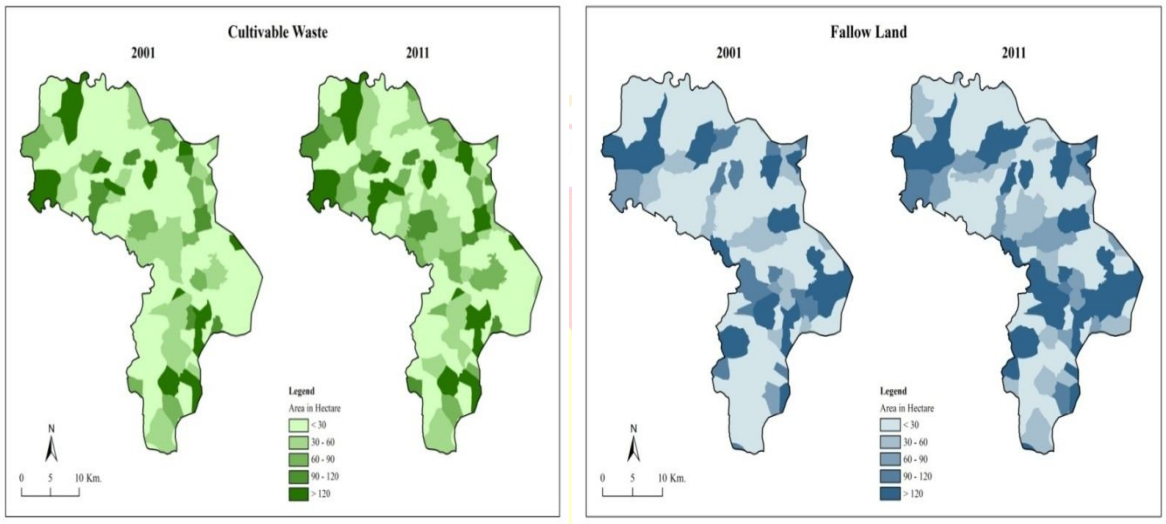
The permanent pastures and grazing lands include all lands under grass-cover, government and private land or permanent pastures which are kept reserved as a village common razing ground or vast tract of protected land, not open for free grazing and unreserved grass land. The miscellaneous tree crops and groves includes land under grasses, bamboo bushes, Nilgiries, Sal and Sag and other groves for fuels etc., and which are not included under orchards or forests. The land not cultivated during the preceding five years is called cultivable waste.

The Trimbakeshwar Tehsil has 3.67 per cent of total areal extent (25871 hectares) under other uncultivated land excluding fallow land. It can be seen from the (Table 3.2) that the Vaitarna village (18.82 percentage) showed high percentage of cultivable waste land. This Tehsil of the region is Sahyadris sub- hilly region, grazing and unreserved grass land and groves miscellaneous free crops. It ranked first in the district followed by Trimbakeshwar (3.06 percentage) and Welunje (2.34 percentage) and Trimbakeshwar village (0.08 percentage) indicated lowest percentage of other

uncultivated land excluding fallow land, in the district followed by Harsul (0.74 percentage) and Harsul (1.92 percentage) those Village normal percentage of cultivable waste land.

It can be seen from the Fig. 1 that Trimbakeshwar Tahsil occupied 3.67 percentage of other uncultivated lands excluding fallow land of the geographical area in the year 2001. This categories when comp aired to district Vaitarna Village (9.92 percentage) showed high percentage of other uncultivated lands excluding fallow land and it ranked first in the district followed by Trimbakeshwar (13.39 percentage) and Harsul (8.93 percentage)' indicating moderate difference. Trimbakeshwar (0.76 percentage) indicates lowest percentage of uncultivated lands excluding fallow land in the district followed by Harsul (2.46 percentage) and Welunje (4.54 percentage) Village

Map-3 Cultivable waste in Trimabkeshwar Tahsil (2001 to 2011)



Source*: *Computed by Researcher

Fallow Land

The term fallow is applied to land and not under cultivation at the reporting time but sown earlier in recent past. The duration for which a land remains fallow varies in places. Two types of fallows viz. current fallow and other fallow lands categories in census have been followed here also. The current fallow land includes the land which is not cultivated during the current year due to a variety of reasons i.e. as phase of rotation, for regaining fertility or due to some other constraints The land that current land includes arable area which is taken up for cultivation but has gone temporarily out of cultivation for a period of not more than five years.

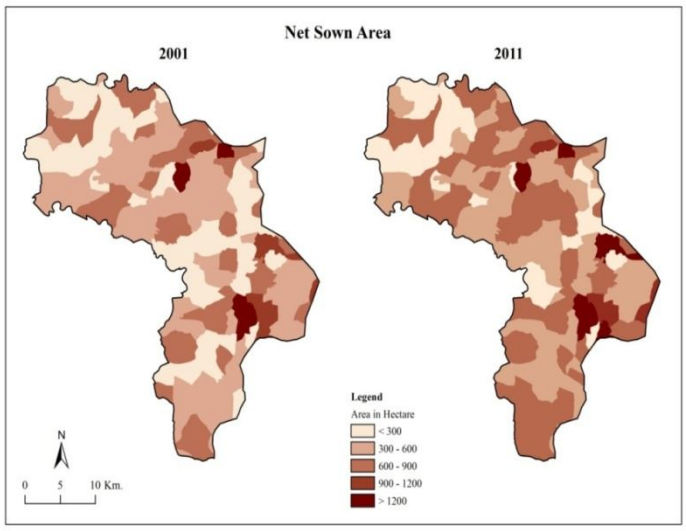
In the age-old agricultural systems, leaving field as fallow was a common practice which under present day circumstance is considered to be a luxury one cannot afforded with. Earlier, the fallows were left for natural irrigation along with population pressure and growing demand of more food-grains, it is not in vogue in general. It is clear from Table 3.3 and Fig. 3.2 that in Trimbakeshwar Tehsil the percentage of fallow land area occupied is 2.53 per cent of the total geographical area. Harsul(33.08 percentage) showed high percentage of fallow land and ranked first in the Tehsil followed by Vaitarna (25.19 percentage),Harsul (21.37 percentage), Trimbakeshwar (8.23 percentage) and Welunje (8.65 percentage). Trimbakeshwar (3.47 percentage) Village shows lowest percentage of area under fallow land. According to census 2001, it is clearly seen that fallow land in the district accounted for 2.53 per cent of the total geographical area (Table 3.2). The maximum fallow land is found at Harsul (4.91 percentage) and

minimum at Trimbakeshwar (0.54 percentage) and Trimbakeshwar (0.61 percentage). Southwestern part of the district shows Vaitarna (4.68 percentage) has high percentage of fallow lands, Welunje (3.08 percentage) and Harsul (4.47) percent shows proportion of fallow land.

Net Sown Area

The net sown area is the land which is being actually tilled for raising any type of crop like food, cash and fodder etc. The net sown area is area under actual cultivation whether, irrigated or non-irrigated. Net sown area is one of the most significant features of other categories of land use. In the district as a whole, net sown area covers an average about 39.61 per cent of the total geographical area. It ranked second in the district out of total geographical area in the district and ranked first. Covered by forest net sown area is a major category of land use, so it is very serious problem in agriculture at the Trimbakeshwar Tehsil. Western part of the Tehsil is covered by the Satpura Mountain and south-east is covered are by Sahyadri sub ranges, so cultivated area is decreasing in the whole district. Out of the total geographical area 39.61 percentage is under cultivation in the year 2001. This shows the dominance of agriculture in the economy of the region. The spatial distribution of net sown area indicates that the portion of net sown area has been remained less in the region.

Map-5 Net Sown Area in Trimabkeshwar Tahsil (2001 to 2011)



Source*: *Computed by Researcher

Spatial Analysis of Net Sown Area

In the district, net sown area influences few factors such as relief, slope, drainage climate, transportation and communication etc. During the period, 2001 it is clearly seen from Fig. 1 that, net sown area in the Tehsil is accounted as 39.61 percentage of the total geographical area. When the village spatial distribution of net sown area is compared to Tehsil net sown area it is found in Trimbakeshwar (30.97 percentage) and Harsul (28.10 percentage). These Tehsil have the high percentage of net sown area in both Villages. Southwestern part and northern part of Tehsil shows moderate percentage of new sown area (Vaitarna 13.36percentage and Harsul 13.79 percentage). Middle and north-eastern part of the district shows comparatively lower percentage of net sown area. Among this category Welunje and Trimbakeshwar(6.36 percentage) Tehsil show lowest portion of net sown area out of total geographical areas.

Trimbakeshwar (76.3 percentage) and Harsul (65.19 percentage) Village show very high percentage of net sown area in the Tehsil. Welunje (41.22 percentage), Harsul (45.12 percentage) and Vaitarna(38.82 percentage) have the medium percentage of net sown area in the

district. Trimbakeshwar Village (7.41percentage) shows very low percentage of net sown area in the district. Because, Trimbakeshwar Tehsil is covered by totally Sahyadris sub branches mountain, hilly region, steep slopes, lake of transportation facilities, tribal culture.

Plate No.1: Irrational felling of trees has decreased the forests cover in the western part of Trimbakeshwar Tehsil (Sahyadris Mountain). Terrain region, land not available for cultivation, lack of irrigation facilities, problem of water storage, proportion of high forest area and therefore, low proportion of net sown area is occurred in the Tehsil. In remaining Villages or parts of the Tehsil, the spatial distribution of net sown area is uneven. Due to above factors some are reasonable. Northern part of district is covered by Satpura mountain and so resulting in many problems of cultivation in crops, ultimately net sown area decreases. Presently tribal people are growing wheat, rice, Nachani, maize etc. In the of Harsul village few farmers also grow strawberry in farms that means some tribal are changing their traditional farming.

Gross Cropped Area

According to census 2011, it is clearly seen from Table 3.1 and Fig. 3.3 that, gross cropped area in the district account for 41.12 percentage of the total geographical area. The village spatial distribution of gross cropped area is compared to district gross cropped area. Trimbakeshwar (30.37 percentage) and Harsul (29.10 percentage) show high percentage of gross cropped area in the district. Southwestern and northern part of the district shows moderate percentage of gross cropped area (Vaitarna 13.12 percentage and Harsul 13.75 percentage). Central and north-eastern part of the Tehsil shows comparatively lower percentage of net sown area. Among this category, Welunje (7.45 percentage) and Trimbakeshwar(6.20 percentage) Village shows lowest portion of gross cropped area.

Central part of district, Godavari basin and piedmont plain are occupied by fertile soil, irrigation facilities, occurred in the surrounding area therefore high portion of net sown area. Harsul, Welunje, Harsul-1 and Trimbakeshwar area, Vaitarna surrounding areas have high portion of net sown area in the Tehsil.

Summery and Conclusion:

The discussion in above mentioned text indicates spatial-temporal distribution of general landuse for Trimbakeshwar Tehsil. The total area in study region has 68.56 percentage of net sown area. This net sown area is slightly exceeded than Nasik district and Maharashtra State. The net sown area has increased from east to west with increasing fertility and Irrigation only. South part has declined net Sown area rapidly due to undulating and region (2001-2011) from the total net sown area. In case of land not available for cultivation, is increased by 0.72 percentages during study period. Increase in land not available for cultivation, is found in central part. Cultivable waste in Trimbakeshwar Tehsil shows 0.04 percentage decline. Fallow land also indicates declining trend by 1.95 percentage in study area. Forest cover is decaling high (0.12 percentage). All the categories in the general landuse have direct impact on the area net sown and hence this distribution is of prime importance.

1) It will be seen from table 2.2 that the variability of rainfall in the Tahsil ranges between 29.5percentages to 43.75 percentages in central zone responsibility. Below 30 percentagerainfall variability was found in central zone. In the Trimbakeshwar Tahsil, the land is not available for cultivation accounts for 5.41 percentage (hectors) to total geographical area. In Trimbakeshwar Tahsil the proportion of area under cultivable waste land is about 3.67 percentage of the total geographical area. In the region under study in 2011 about 2.53 percentage land was under fallow.

2) The total area in study region has 68.56 percentage net sown area. This net sown area is slightly exceeded than Nasik district and Maharashtra State (Appendix III/1). The net sown area has

increased from east to west with increasing fertility and Irrigation only. South part has declined net Sown area rapidly due to undulating and region (fig.3.2). From 2001-2011 the total net sown area.

3) Cultivable waste in Trimbakeshwar Tahsil shows 0.04 percentage decline. Fallow land also indicates declining trend by 1.95 percentages in study area.

4) Forest cover is decaling high (0.12 percentage) All the categories in the general landuse have direct impact on the area net sown and hence this distribution is of prime importance.

5) The whole Tahsil is an essentially agricultural dominant region 29.45 percentage working force in Agricultural practice.

6) In Trimbakeshwar Tahsil more than 89.68 percentage area under plough in Kharif and less than 10.32 percentages is under Rabi season in the region

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