

**CHAPTER FOUR**  
**CASE STUDIES OF SAMPLED VILLAGES**

## CHAPTER FOUR

### CASE STUDIES OF SAMPLED VILLAGES

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## CHAPTER FOUR

### CASE STUDIES OF SAMPLED VILLAGES

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#### Introduction:

To make a detailed study of the villages situated in the catchment area of Warna dam, we divided all the twentyfive villages into three zones on the basis of distance from the dam, infrastructural facilities, economic linkages, area gone under submergence, socio-economic development and remoteness of the villages. We selected three villages (12 per cent) out of 25 villages in the catchment area for the detailed case study.

The three zones and villages falling in each of them and one sampled village selected from each zone are noted below in Table 12 (Map No. 4).

TABLE-12

Zonewise distribution of the villages in  
catchment area of Warna dam

Sr. No.	Zone	Villages	Sampled village
1	Zone-I Lower Zone ( 10 Km radius)	Khundlapur (Shendewadi, Dhangarwada) Chandoli(Bk)(Janaiwadi), Nandoli, (Gavalanwadi, Hadrewadi, Chendge- wadi), Amboli, Kulyachiwadi (Tambve), Nivale (Kop.),Tanali = 7	Kulyachiwadi (Tambve)
2	Zone-II Middle Zone (10 to 20 Kms radius)	Zolambi, Takale, Lond, Aoli, Vetti, Gothane, Dhakale, Sonarli (Dhangarwada) = 8	Zolambi
3	Zone-III ( 20 Kms radius) Interior Zone	Nivale (Sangli), Lotiv, Gave, Chandoli (Kd.), Rundiv, Javali, Chandel, Mala, Kolne, Patharpunj = 10	Rundiv

Source: Compiled by the author

(I) Case Study of Sampled Village - Kulyachiwadi  
(Tambve) - Zone-I:

(i) Introduction:

To make the detailed study of the villages in the catchment area of Warna dam we selected Kulyachiwadi, a wadi of Tambve village which has already shifted and resettled in the downstream command area of Warna Project. This village represents the villages in the first zone (lower zone) of catchment area within a radius of 10 Kms from the dam site. There are 10 Wadis of seven villages. Most of the villages are situated very near to the dam site and have lost maximum village area under submergence (Table No. 3/B). In this zone most of the villages (original Gaothan) are shifted and resettled in the downstream command area of Warna dam, because these villages were located below the line of submergence and very close to the dam site, but the Wadis of the original villages are located on the top of the spur or along the sloping side of the spur; slightly away and at higher elevations are not considered in the process of resettlement. Village Kulyachiwadi (Tambve) we selected for the case study because it typically represents the villages in this zone, which are partially uprooted.



(ii) Geographical Setting:

The village Kulyachiwadi has been located on the northward gentle sloping side of a spur of the Udgiri range, at an elevation of about 830 metres above MSL on the right bank of the Vasant Sagar of Warna dam. The distance between Kulyachiwadi and Warna dam is about 7 Kms in the southwest direction of the dam side. Administratively the village lies in Shahuwadi taluka of Kolhapur district. The distance between the village and the actual line of submergence is about 2 Kms. The village has covered an area of 694 hectares, i.e., 2.8 per cent of the total catchment area, of which 287 hectares of land has gone under submergence, i.e., 41 per cent of the total village area. The main 'Gaothan' Tambve has shifted because of the submergence and has resettled near Vadgaon in Hatkanangale taluka. The total population of the village as recorded in 1991 census is 206, i.e., 3.5 per cent of the total population of catchment area. There are 57 houses and 71 households according to 1991 census. We observed that the houses are constructed in two groups - one on the right bank of a stream and another on the other side of the stream. The stream is perennial and rises on the top of the Udgiri Sada, flows in south to north direction and joins the Tanali river, a main tributary

of the Warna river. The stream has developed a number of rapides and water-falls during its course of about 10 Kms. The structural terraces along the gentle to moderate sloping sides of the spurs, are cultivated by the villagers. The slopes are generally convex except at the foot hill of the Udgiri Sada where the slope is concave and the whole area has been covered under dense forest. The stony waste top of the Udgiri Sada is barren and has been situated at a distance of 500 metres away from the village to the south direction.

(iii) Climate:

The village experiences moderate summer, wet rainy season and moderate winter season. The Meteorological Observation Station is located at Warna dam site, which is just 4 Kms from the Kulyachiwadi village. The maximum temperature in this area was recorded in February 1993 upto 37°C, while minimum temperature was recorded in December and January 1993 ranging between 6°C and 9°C. The annual rainfall varied between 1,888 mm (in 1987) and 3,199 mm (in 1980). The area has received 3,094 mm total annual rainfall in the year 1993. Like the other villages in the catchment area this village, too, receives heavy downfall during the months of June, July, August and September. Also they experience dense fog in the months of November, December and January,

during the early mornings.

(iv) Soils:

The nature and the characteristics of soil at different locations and different situations are mostly developed as a result of interaction of soil genetic factors: climate, relief, vegetation, parental rock and time in addition to human influence.<sup>1</sup> The area under present study has been situated in the uplands of Warna valley, and it is entirely hilly terrain. There is less slope for the deposition of sediments except in the Warna valley along the banks; and at the foot hills of the spur but these alluvial structural terraces have gone under submergence of Warna dam. We observed that at present, the structural terraces along the convex slopes of the spur and on the top of the spurs the fields are under cultivation in the area. Thus, the parental materials are important to form patches of structural terraces in this lower zone of catchment area.

The natural vegetation plays a dominant role in form or pedo-chemical weathering. The relief directly has influenced soil formation through its effects on drainage and runoff in this area. The soil on the steeper side is thinner solum and less distinct horizons, while on the gentle sloping side we observed concave slope



at the foot hills of Udgiri Sada, have a thick solum and distinct horizons. We observed generally thick dense evergreen forest patches on the concave slopes i.e., 'Ambai Devarai' just 2 Kms from the Kulyachiwadi to the eastward sloping side or the Udagir Sada.

The soils of the area are divided into four different groups. The first group consists of alluvial black-brown soil, mainly noticed on the banks of the Warna river, but now this rich fertile alluvial structural fields are under submergence. The second group of soil is known as reddish brown soil which lies both above and below the village site. The land of the upper terraces is unirrigated (rainfed). The rock bench field terraces are in the valley on more convex slope, generally lie below the village site and are well ploughed and also some fields are irrigated with local canals (Paats). The deep red laterite soil is noticed in this part. The fourth group or soil is known as light brown soil which is very thin in cover, found on the eastern and southern parts of the spur. These soils have been used as grazing land by the villagers as they are less productive.

(V) Landuse Pattern and Agriculture System:

Landuse Pattern:

The existing landuse pattern of the lower zone

of the Warna dam catchment area follows the nature of climate and physiographic elements of relief, slope etc. aspects. The landuse pattern in Kulyachiwadi area has been dominated by the rugged hilly terrain. The detailed mapping of the landuse pattern of the village area has been conducted as noted below in Table-14.

TABLE-13

Landuse pattern - 1991-92 (Statistical profile of the villages located in the catchment area of Warna Dam)

Sr. No.	Name of the village	Total hectareage of the village		Forest		Cultivated		Culturable waste Fallow land		Not available for cultivation (grazing+barren)		Submerged area		
		Hect.	%	Hect.	%	Unirrigated Hect.	Irrigated %	Hect.	%	Hect.	%	Hect.	%	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Shendewadi (Kundalapur) Dhangarwada ,,	684	2.8	-	-	274	40.0	5	100	14.6	22	3.2	288	42.0
2	Janaiwadi (Chandoli Bk.)	384	1.6	-	-	170	44.3	2	7	1.8	10	2.6	197	51.3
3	Gavalanwadi (Nandoli) Hardewadi ,, Chendgewadi ,,	987	4.0	600	6.1	155	16	3	16	1.6	10	1.0	206	21.0
4	Aloli	324	1.3	141	43.5	20	6.1	2	9	2.8	15	4.6	139	43.0
5	Lond (Pethlond)	947	3.8	232	24.5	223	23.5	3	40	4.2	73	7.7	379	40.0
6	Gave	548	2.2	337	61.5	86	15.7	2	29	5.3	47	8.6	49	9.0
7	Rundiv	1812	7.4	1598	88.2	12	10.7	1	6	0.3	158	8.7	38	2.1
8	Chandoli (Kd.)	1161	4.7	884	76.1	188	16.2	5	18	1.5	70	6.0	1	0.1
9	Jawali	609	2.5	396	65.0	31	5.1	3	19	3.1	118	19.3	44	7.2
10	Lotiv	647	2.6	290	45.0	16	2.5	1	5	0.8	146	22.7	190	29.0
11	Vetti	898	3.6	613	68.3	210	23.4	4	60	6.7	15	1.6	-	-

TABLE 13 contd.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
12	Nivale	945	3.8	652	69.0	193	20.4	5	29	3.0	72	7.6	-	-
13	Takale	899	3.7	550	61.2	74	8.2	4	50	5.6	44	4.9	177	19.7
14	Zolambi	1800	7.3	1127	62.6	385	21.4	5	11	0.6	13	0.7	264	14.7
15	Dhakale	1505	6.2	1147	76.2	43	2.9	3	110	7.3	193	12.8	12	0.8
16	Tanali	820	3.3	617	75.2	39	4.8	4	26	3.2	138	16.8	-	-
17	Chandel	2322	9.4	2172	93.5	27	1.2	5	16	0.7	93	4.0	14	0.6
18	Sonarli (Dhangarwada)	996	4.0	110	11.0	21	2.2	1	206	20.7	319	32.0	340	34.1
19	Kulyachiwadi (Tambve)	694	2.8	317	45.7	34	4.9	3	3	0.4	53	7.6	287	41.4
20	Hivale	1410	5.7	644	45.6	104	7.4	18	32	2.3	630	44.7	-	-
21	AmboLi	282	1.1	37	13.1	11	4.0	3	10	3.5	136	48.2	88	31.2
22	Gothane	856	3.5	-	-	171	20.0	1	481	56.2	204	23.8	-	-
23	Patharpunj	963	3.9	680	70.6	38	4.0	1	216	22.4	29	3.0	-	-
24	KoIne	474	1.9	185	39.0	30	6.4	5	247	52.1	12	2.5	-	-
25	Malā	1690	4.0	1146	67.8	106	6.3	2	385	22.8	53	3.1	-	-
<b>TOTAL:</b>		24657	100.0	14475	59.0	2661	10.0	92	2146	9.0	2674	11.0	2713	11.0
								0.4						

Source: Tahsil office, Shirala, Shahuwadi.

TABLE-14  
Kulyachiwadi (Tambve) - Landuse pattern

Sr. No.	Major landuse categories	Landuse sub-categories	Area in Hect.	Percentage
1	Forest	-	317	46.0
2	Cultivated	1. Cropped 26(70%) 2. Irrigated 3(8%) 3. Grass land 3(8%) 4. Fallow land 5(14%)	37	5.0
3	Culturable waste	-	12	2.0
4	Unculturable waste	1. Grazing land 31(75.0) 2. Gaothan 10(25%)	41	6.0
5	Submerged area	1. Forest 10(3%) 2. Cultivated 277(97%)	287	41.0
	Total:		694	100.0

Source: District Census - 1991

(1) Forest Land:

The lower zone of the catchment area of Warna dam consists of hills, spurs, valleys of which major portion of the area is under forest cover. In Kulyachiwadi village area about 317 hectares of land, i.e., 46 per cent of the total area is under forest cover. The forest consists of dense evergreen forest grown at the foot hills of the Udgiri Sada. While in the deep valleys and along the streams semi-evergreen forest cover has grown. Open scrubs have occupied the top of Udgiri Sada. The important species like Hirda, Pisa, Jambhul, Mango, Kinjal etc. are found in this forest. Also a number of herbal medicinal plants and bushes are found in the forest. The area consists of dense forest patch called 'Ambai Devarai (Photograph No. ) one of the best examples of biodiversity conservation, with the help of local people in this area.

(2) Cultivated Land:

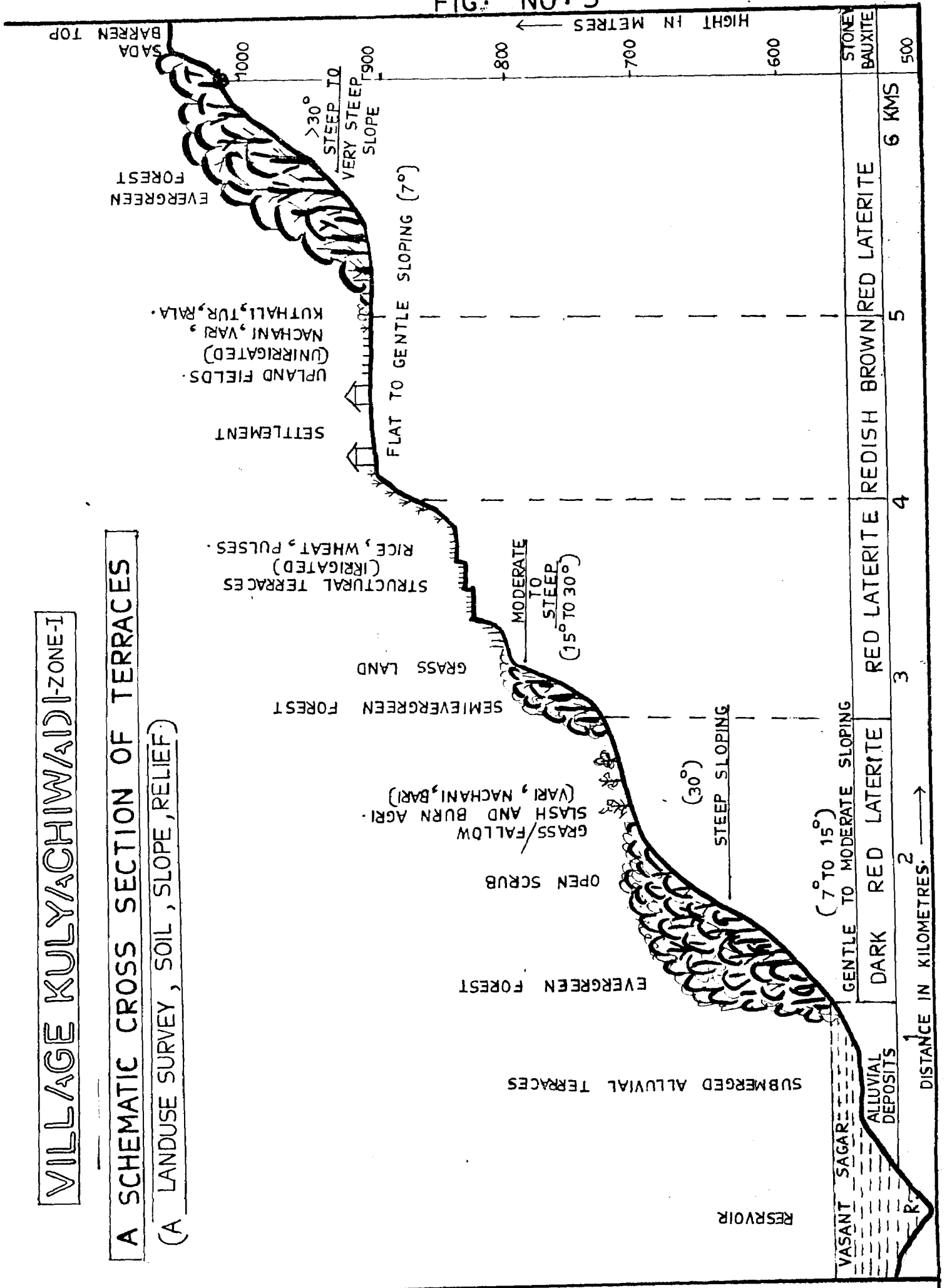
Like the other villages in the lower zone of the catchment area, Kulyachiwadi has only 37 hectares of land, i.e., 5 per cent of the total village area under cultivation. The cultivated lands are located on the top of the spur, along the convex slope of the valleys, in the form of structural terraces. Of the total cultivated land only 3 hectares of land, i.e.,

87.A  
FIG. NO. 3

VILLAGE KULYACHIWADI-ZONE-I

A SCHEMATIC CROSS SECTION OF TERRACES

(A LANDUSE SURVEY, SOIL, SLOPE, RELIEF)



8 per cent of the total cultivated land is under well and canal irrigation (Paat), 8 per cent private grass land, 19 per cent fallow land of the total cultivated area. Thus, the remaining 70 per cent land is under net cropping area. There is no lift irrigation facility.

(3) Culturable Waste:

The land under culturable waste consists of only 12 hectares, i.e., 12 per cent of the total area. It comprises scrubs, bushes and open forest on the fringe area of cultivated land. The villages are using the area as grazing land.

(4) Uncultivable Land:

Of the total geographical area of the village 41 hectares of land i.e., 6 per cent of the total area recorded as unculturable waste. It comprises stony waste land on the top of the Udgiri Sada, Gaothan etc.

(5) Submerged Land:

The village has lost 287 hectares of land, i.e., 41 per cent of the total area (10 per cent forest, 97 per cent cultivated land of Tambve village). We observed that the village has lost the most fertile land under submergence just as other villages in the lower zone, which are very close to the dam site.



Agricultural System:

The terrain and climate have evolved a specific agriculture system in this lower zone of the catchment area. We observed during our field studies that generally the farming techniques, crop relation, crop-association, field pattern and duration of crop sowing, growing and harvesting are the same throughout the catchment area of Warna dam. The ruggedness of the hilly terrain and heavy downfall during the rainy season have dominated the agricultural system in the area.

(A) Size, Shape and Slope of the Agriculture Fields:

Generally the size, shape and slope of the fields are influenced by the nature of physiography and drainage. Mostly the interlocking spurs are used for field terraces in this zone of the catchment area. These terraces are narrow, elongated and irregular in shape, but not as much irregular as we observed in the middle and interior zones of the catchment area. The average size of the field is from 7 to 10 metres long and 5 to 7 metres wide on the moderate or gentle slope; the length and width increase as slope decreases on the top of the spurs. In this area we found the angular, triangular, rectangular shaped terrace fields. Most of the terrace fields are unirrigated (rainfed) but on the lower terrace land few fields are irrigated

with traditional Paats (canals) with the help of perennial springs and streams in the area.

(B) Cropping Pattern:

Both the Kharif and Rabi crops are harvested in the lower catchment area of Warna dam. The cropping patterns in this area are strongly dominated by the physiography, climate and soils.

(C) Cropping Pattern in Kharif Season:

(Map No. 9)

Like other zones of the catchment area in lower zone also Kharif season continues mostly from May to July and harvesting period occurs in the months from August to October. Rice (wet paddy) and Nachani are the main Kharif crops. The lower terrace fields are used for rice cultivation, while Nachni, Vari, Barag, Rala are sown on the gentle to moderate sloping fields of medium to poor quality. Wet paddy is sown in the months of June and July and it is harvested in the months of September and October. The average yield of rice is very poor, i.e., 10 quintals per hectare.

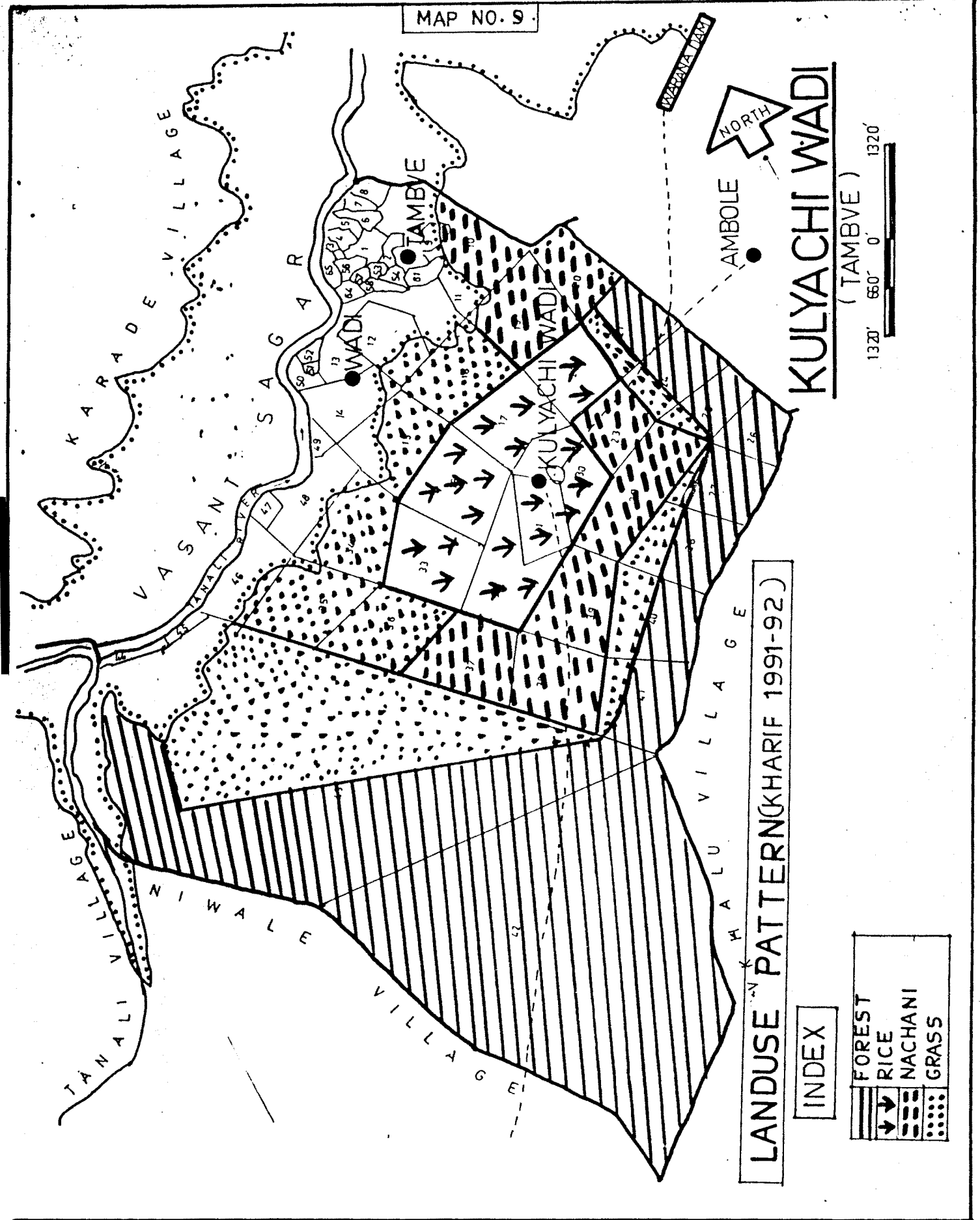
(D) Cropping Pattern in Rabi Season:

(Map No. 10)

The Rabi season generally continues from November and December to March, April and May. Wheat is the

90.A

MAP NO. 9



LANDUSE PATTERN (KHARIF 1991-92)

INDEX

	FOREST
	RICE
	NACHANI
	GRASS

1320' 660' 0' 1320'

(TAMBE)



AMBOLE

KAWANA DAM

KULYACHI WADI

KARADE VILLAGE

VASANTI SAGAR

TAMBE

WADI

KULYACHI WADI

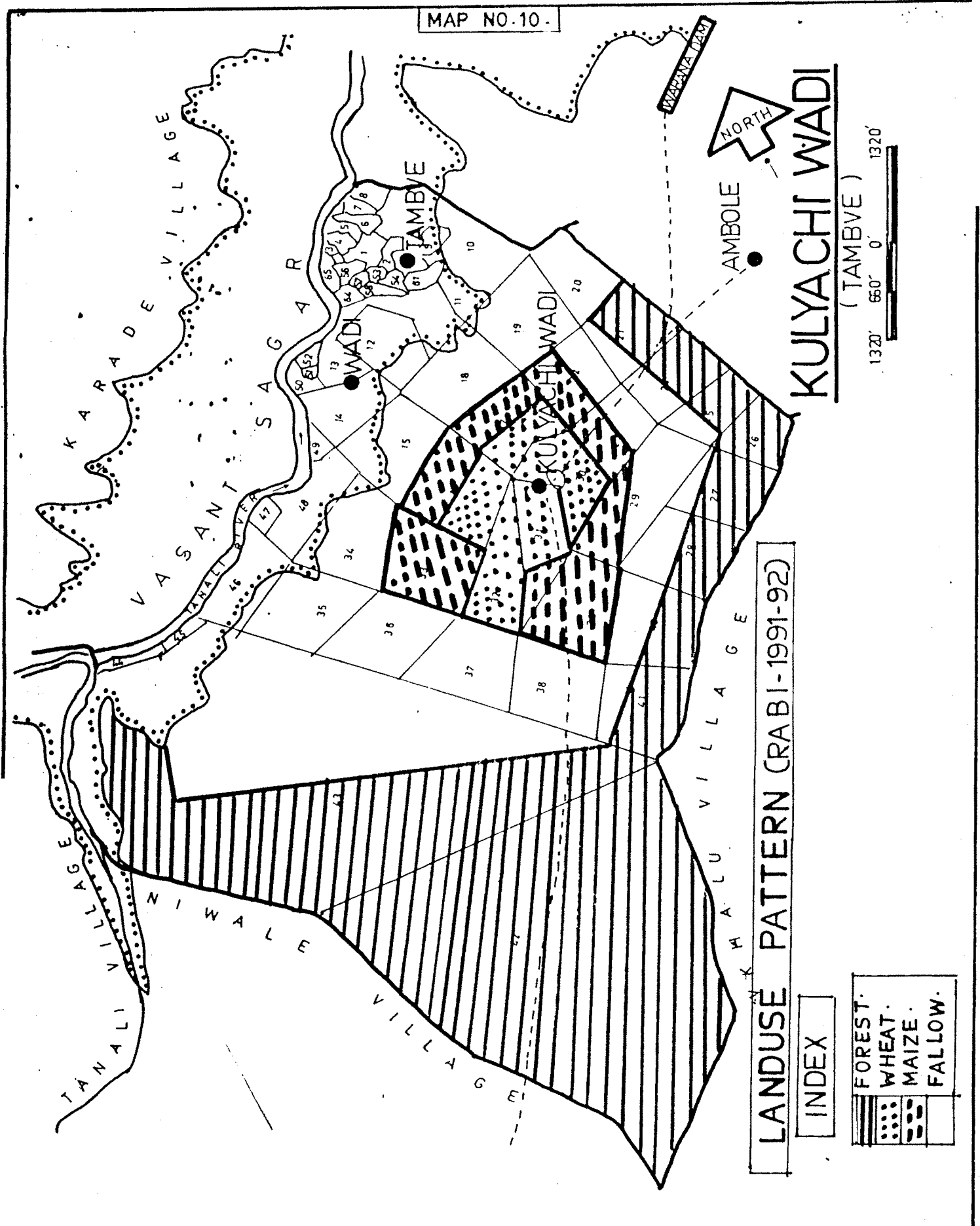
KAWANA DAM

TANALI VILLAGE

NIWALE

VILLAGE

YAWATA



# KULYACHI WADI

(TAMBVE)

## LANDUSE PATTERN (RABI-1991-92)

INDEX

	FOREST.
	WHEAT.
	MAIZE.
	FALLOW.

main crop in this season. Vegetables, pulses (Tur, Gram, etc.), maize, Salu, etc. are other crops harvested in Rabi season. But the irrigation facilities are very poor and limited. Thus, there is no insured Rabi season. Only a few pieces of fields are being irrigated by means of traditional Paats (canals) through spring and stream water. There is no lift irrigation facility in this area. The flowing water has been tapped and diverted towards the fields through Paats (canals). The same traditional method is being used throughout the catchment area of Warna dam for limited irrigation.

(E) Crop Rotation:

The existing crop rotation cycles have been evolved after a long experience in the catchment area. They are well suited for the hilly terrain. It has been observed in the Kulyachiwadi area that on irrigated structural terraces, two crops are harvested each year, without leaving land as fallow i.e., in Kharif season rice is sown and wheat or Gram in Rabi season. While in the unirrigated fields, rice, Nachni, Vari, Barag, Rala, Tur are harvested in alternate year. It has been observed that rice (Kharif) and pulses (Gram, Tur) in Rabi is the most suitable crop rotation in the lower zone of the catchment area.

(vi) Horticulture

According to climate, topography, soils and landform conditions, the lower zone of the catchment area is very much suitable for horticultural purposes, but no attempt has been made by the government agencies or by the villagers in the area to promote the development of fruit trees in this area. Mango, Phanas, Jambhul, Alu, Karvand etc. fruit trees are found in this region. The fruit tree plantation has not been done on the commercial basis in the area, except some mango tree-plantation.

(vii) Livestock:

The people living in the Kulyachiwadi are much interested in animal husbandry. According to 1990 livestock census there were 150 cattle, 21 buffaloes and 120 sheep. The domestic animal rearing is an important occupation which stands next to agriculture in this zone. The domestic animals are very useful for milk production, mainly for the domestic use and not for sale. The domestic animals are used for agricultural activities especially in the fields situated on the top of the spurs where the fields are larger and slope is gentle.

We observed that the performance of the milching animals is not good and it is because of the poor quality

of local breed, poor quality of fodder and hilly terrain. Similarly, there is no marketing facility in the area for such products.

Poultry breeding is another source of rural economy in the area. Almost each and every house is interested in poultry breeding. Local variety of hens and cocks are more suitable for rearing. The poultry products like birds, eggs have good demand in the downstream markets, but the lack of transportation has restricted the development of this occupation on a large scale in this area.

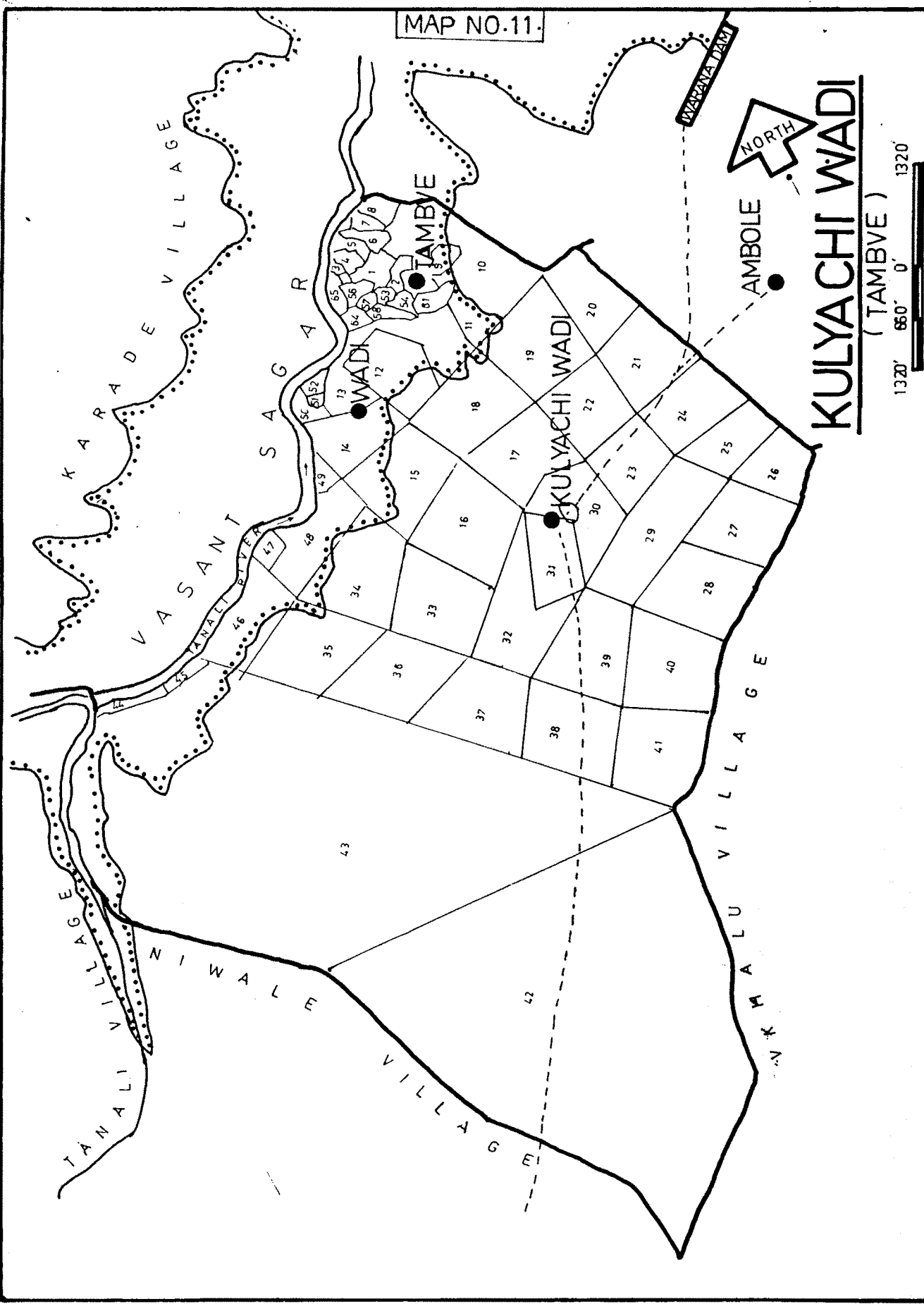
Bee-keeping was not observed in the area, even though the area is quite suitable for bee-keeping like the upper and middle zones of the catchment area of Warna dam.

(viii) Kulyachiwadi - Rural Settlement:

(A) Social Amenities:

The lower zone is most backward and isolated from the outside world like upper zone and middle zone. Except Nivale no other village has even Kachha road. A jeep can go up to Nivale, only in summer. During the monsoon seasons, villages become islanders almost for four months of a year in this area. Except Nivale, not a single village has been provided with the facility of bus service. The nearest bus stop is at Warnawati

MAP NO.11.



# KULYACHI WADI

( TAMBVE )

1320' 0" 1320'



at a distance of 15 Kms from Tanali, 10 Kms from Kulyachiwadi. Nivale serves as a bus stop for the rest of the villages, but not during monsoon. We observed that very few people take advantage of the bus service. The people simply believe in walking. The nearest market places are Mandur and Arale which are at a distance of about 15 Kms from Kulyachiwadi, while 20 Kms from Nivale and 25 Kms from Tanali in the area. Not a single village in this part is provided with electricity except Nivale on right bank and Kundalapur, Dhangarwadi on left bank. Not a single shop is there in the villages. For the purchase of kerosene villagers have to depend upon Ukhalu village situated downstream, at a distance of about 10 Kms from Kulyachiwadi. The village has a Zilla Parishad Primary School upto 4th standard. But there is only one teacher appointed and one classroom has been provided for the four classes. The villages have no Post Office facility in the zone but the whole area on the right bank comes under Ukhalu Sub-Post. And on the left bank villages come under Mandur Sub-Post Office.

The economy of the village is agro-based like other villages in this area. We observed that for years no modern technological changes have been made in the villages. There is no electricity and no lift irriga-

tion in the area. The small land-holdings, poor accessibility, poor quality seeds, limited use of fertilizers, and absence of plant protection measures are the major barriers in the diffusion of modern technological achievements in this area.

(B) Population Structure:

Total population of the village Kulyachiwadi was 206 as recorded in 1991 census. It was 377 in 1981. The population has declined because of the shifting of the original Gaothan Tambve in 1986 due to the submergence, of which Kulyachiwadi is a sub-Gaothan situated at higher elevation.

According to 1991 census there were 98 males, i.e., 48 per cent of the total population, while female population was 108, i.e., 52 per cent of the total population. This clearly indicates that similar to other villages in the catchment area the female population is dominant, which is because the males go out to places like Bombay in search of job.

(C) Occupational Structure:

From the table below it is clear that out of the total population, 92 i.e., 45 per cent, was working population, while non-working population was 114, i.e., 55 per cent of the total population.

TABLE-15

Kulyachiwadi(Tambve) occupational structure and literacy (1991)

Sr. No.	Occupation	M	%	F	%	Total	%
1	Cultivators	32	35.0	49	53.0	81	88.0
2	Agri. labourers	-	-	-	-	-	-
3	Forest/dam workers	8	9.0	3	3.0	11	12.0
4	Household industry	-	-	-	-	-	-
5	Marginal workers Cattle grazers	-	-	-	-	-	-
6	Others	-	-	-	-	-	-
7	Total workers	40	44.0	52	56.0	92	45.0
8	Non-workers	58	51.0	56	49.0	114	55.0
	Total population	98	48.0	108	52.0	206	100.0
9	Literate	50	83.0	10	17.0	60	29.0
		24.0		5.0			

Source: Compiled by the author

Of the total population 60, i.e., 29 per cent population was literate upto primary level. We observed that only 15 villages out of 25 villages have schooling facilities upto lower primary level, which has resulted in the poor development of literacy in the entire area.

(ix) Problems:

The villages in the lower zone of the catchment area of Warna dam are totally isolated. During monsoon season they become islanders. Even though the villages situated in this lower zone of the catchment area are very near to the dam site as, similar to the upper and middle zones, they are facing several socio-economic and physical problems. The high altitude, steep slopes, ruggedness of the hilly terrain, density of forest, poor accessibility, economic poverty, illiteracy, etc. have forced the villagers in this area to work hard and struggle for getting enough food for survival. The socio-economic problems of the entire area are discussed in detail in Chapter Four.

Ecological Problems:

During our studies we observed that in the entire catchment area of Warna dam similar ecological problems are created by the villagers as well as outsiders. First, the villages have attempted to cultivate the

lands which are not suited for cultivation. Thus, the problem of soil erosion is another cause for worry in the area. The overgrazing, overlopping, overploughing, deforestation etc. have neglected the basic conservation measures in the area. Thus, not only the villagers are getting poor return from the agriculture, but also they are creating basic ecological problems to the rich biodiversity conservation in the area. But who is responsible for this? A unique question is discussed in Chapter-V.

## CHAPTER FOUR

### CASE STUDIES OF SAMPLED VILLAGES ZONE-II ZOLAMBI

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## CASE STUDY OF SAMPLED VILLAGES

Zone-II: Zolambi Case Study1. Introduction:

To make detailed study of the villages situated in the catchment area of Warna dam, we selected Zolambi village which represents the villages in the second zone of the catchment area. Village Zolambi is situated at a distance of 21 Kms away from the dam site in the north-west direction on the left bank of the Warna reservoir. The village has converted area of about 1,800 hectares and is the third largest village in the area.

2. Geographical Setting:

The village Zolambi is located on the top of a spur of the Warna valley, at an altitude of about 930 metres above MSL on the left bank of the reservoir about 6 Kms away from the river-bed in the north. The distance from the dam site to Zolambi by road (Kachha road) is about 21 Kms. The village covers an area of 1,800 hectares, i.e., 7.3 per cent of the catchment area. The total population of the village as recorded in 1991 census is 275, i.e., 4.7 per cent of the total population of the catchment area. The village is divided into two major Gaothans, i.e., Zolambi Gaon and Dhangarwada, located at slightly higher elevation to the east

of main Gaothan.

### 3. Topography:

Zolambi is located on the southward sloping side of the Walmiki range, at an elevation of 930 metres above MSL. The general slope of the area is north to south. The village area is divided into several terraces at different elevations from Warna river to the top of the Walmiki range. There are a number of streams running down the Walmiki spurs, which generally rise on the top of the Walmiki Sada and flow towards the Warna valley along the sharp slopes. They have created several rapids and waterfalls even in their short course of about 10 to 15 Kms in length. The slopes are convex in nature which are covered with ever-green forest in the valley side and semi-evergreen forest on the top of the hills. At the foot hills of the edges of the Sada evergreen thick forest has grown. The structural terraces flat to gentle slope are developed on the top of the spurs, along the convex slopes, and along the small streams and are cultivated. The moderate to steep slopes are covered with grass, scrubs and bushes.

### 4. Climate:

The village Zolambi is located at a height of about 930 metres above MSL along the top of a spur,



experiences moderate summer and wet rainy season and chilly winter season. According to the Warna Dam Division report, the maximum temperature at Zolambi reaches 35°C in the months of March and April while minimum temperature of 4°C to 5°C in the months of December and January. The annual rainfall of the village is concentrated in four months of the late summer, i.e., June to September. The annual total rainfall varies between 4,180 mm and 6,437 mm. According to Dam Division records, Zolambi has received 5,700 mm rains during 1993. Like the whole catchment area, heavy downfall in the monsoon season is the characteristic feature of the Zolambi village.

#### 5. Soil:

The nature and the characteristics of the soil at different locations and different situations are mostly developed as a result of interaction of soil genetic factors:<sup>2</sup> Climate, relief, vegetation, parental rock and time in addition to human influence. The area under study is situated in the uplands of Warna valley and it is entirely hilly terrain. There is less scope for the deposition of sediments except in the downstream valley bottom area. Thus, the parental materials are important to form patches of structural terraces along the convex slopes of the spurs, on the top of the spurs.

The natural vegetation plays a dominant role in the form of pedo-chemical weathering. The relief directly has influenced soil formation through its effects on drainage and runoff in this region. The soil on the steeper side has thinner solum and less distinct horizons, on the other side (gentle slope), we observed on the concave slope a thick solum and distinct horizons (Fig. 2) where generally thick dense forest patches are found. The patches of thin soils which consist of structural terraces located on spur top and along gentle slopes are the result of rock which undergoes chemical and mechanical weathering. The alluvial soil deposited on the alluvial terraces in the downstream area near the bank of the Warna river was formed on the lower alluvial terraces, but this richly deposited thick solum soil has gone under Warna dam submergence. Thus, at present, the unirrigated, thin solum and poor quality soils are under cultivation in the area.

The soils of the area are divided into four different groups. In general the soils are red laterite. The first group consists of alluvial black brown soil mainly noticed on the banks of the Warna river but today it is rich fertile soil under submergence. The second group of soil is known as reddish brown soil

which lies both above and below the village. The land of the upper terrace is unirrigated (rainfed). The rock benche field terraces are in the valley on more convex slope, generally lying below the village site are well ploughed and also irrigated with small canals (Paat). The deep red soil is noticed in these parts. The fourth group of soil is known as light brown soil which is very thin in cover, found on the eastern top of the spurs. These soils have been used as grazing land as they are less productive.

#### 6. LANDUSE PATTERN AND AGRICULTURAL SYSTEM:

##### Landuse Pattern:

The existing landuse pattern of the upper Warna valley catchment area follows the nature of climate and physiographic elements of relief, slope etc. aspects. The landuse pattern in the Zolambi village is dominated by the hilly terrain. The detailed mapping of the landuse pattern of the Zolambi village has been conducted as noted below in Table-16.

TABLE-16

## Village Zolambi - Landuse pattern

Sr. No.	Major landuse categories	Landuse sub-categories	Hectarage	Percentage
1	Forest	-	1,127	62.7
2	Cultivated	1. Cropped - 369(96%) 2. Irrigated - 5(1.3%) 3. Fallow land - 11 (3.0%)	385	21.4
3	Culturable waste	-	11	0.6
4	Unculturable waste	-	13	0.7
5	Submerged area	1. Forest - 94(36%) 2. Cultivated fallow land - 170(64%)	264	14.7
Total:			1,800	100.00

Source: Compiled by the author

(1) Forest Land:

The Zolambi hilly area primarily consists of hills, spurs, stream valleys, of which major portion of land is under forest. Of the total area of the village about 1,127 hectares, i.e., 62.7 per cent of land is under forest cover. The heavy rainfall, high temperatures, red laterite soils have flourished the rich floral and faunal wealth in the area. The forest consists of dense evergreen forest available at the foot hills of the Walmiki Sada, down below in the Warna valley side and along the streams in the area; while the open scrub or semi-evergreen forest occupied the sharp sloping area. On the top of the Sada barren land has developed, consisting of stoney waste and a few patches of grassland. Since 1986 the whole upper catchment area of Warna dam is declared as "Chandoli Wild Life Sanctuary" by the State Government. The important species like Hirda, pisa, Jambhul, Bhom, Mango, Kinjal, Tamal-patri etc are found in the forest. Several herbal medicinal plants are found in the forest. Hunting and timber-cutting are prohibited since 1986 as it is declared as reserved forest.

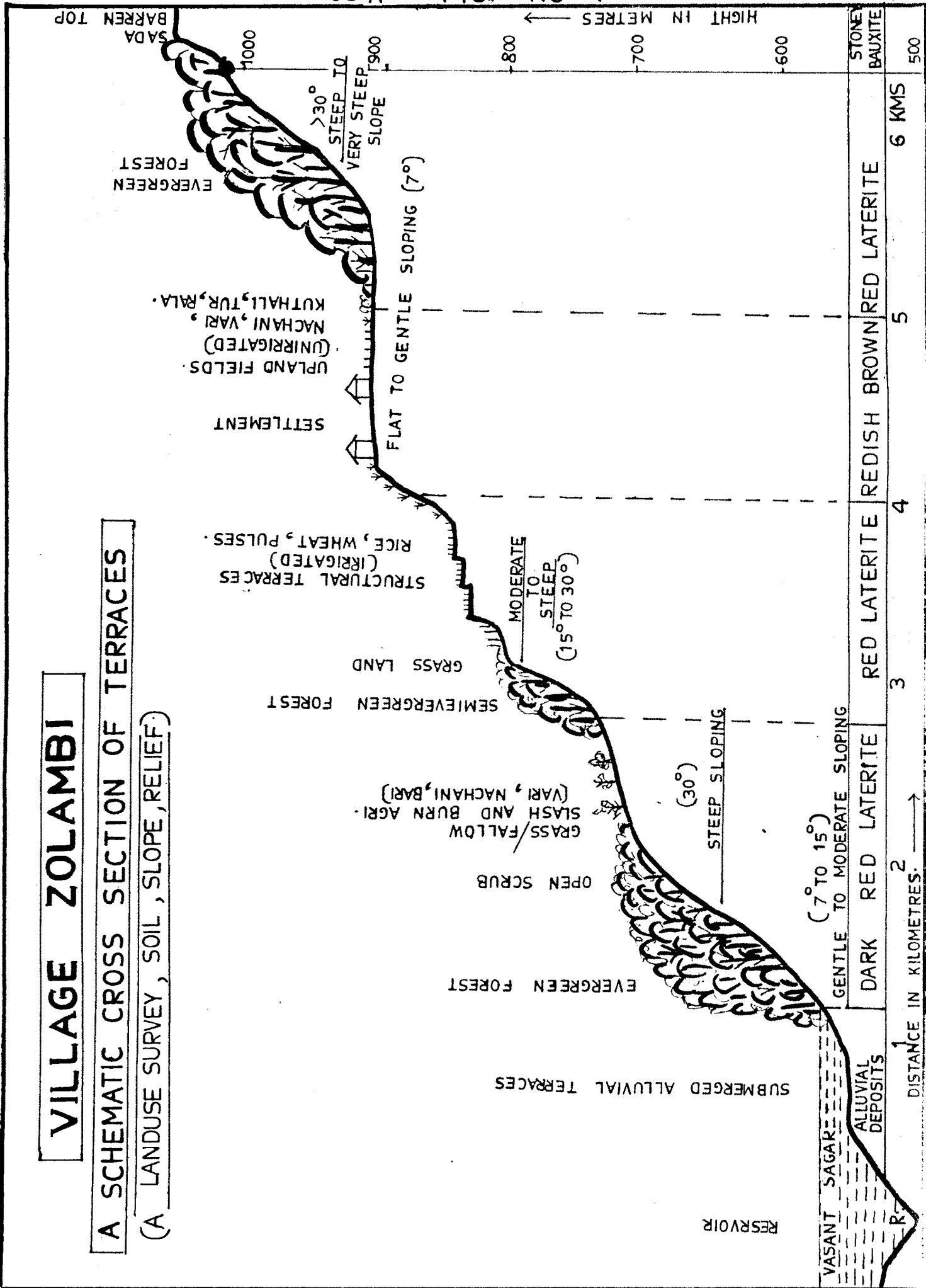
(2) Cultivated Land:

On the whole in the catchment area of Warna dam, very few patches suitable for cultivation, have

# VILLAGE ZOLAMBI

## A SCHEMATIC CROSS SECTION OF TERRACES

(A LANDUSE SURVEY, SOIL, SLOPE, RELIEF)



remained. The rich alluvial terraces along the bank of the Warna river are no more in existence because they are submerged. Like other villages in the catchment area, Zolambi village has only 385 hectares of land under cultivation, i.e., 21.4 per cent. The cultivated lands are located on the top of the spurs, along the valley side, on the flat to gentle sloping land in the form of structural terraces. Of the total cultivated land, only 1.3 per cent land is irrigated by means of spring and stream water (Paat). The remaining as much as 98 per cent of the land is rainfed, of which 3 per cent is fallow land.

(3) Culturable Waste:

The land under culturable waste consists of 11 hectares of the total area, i.e., 0.6 per cent. It comprises scrubs, bushes and open forest, occupying the fringe area of the cultivated land. The villagers are using this area as grazing land.

(4) Unculturable Waste:

About 13 hectares, i.e., 0.7 per cent of the total area, recorded as barren land. It includes rocky or stoney waste located on the top of the Walmiki Sada and deeply dissected hilly land on the steep convex slopes of the spurs.

(5) Submerged Area:

It consists of 264 hectares, i.e., 17.7 per cent of the total area. It comprises the lower alluvial terraces along the Warna river bank and dense forest cover in the valley has gone under submergence since 1986. Less than 1 per cent land is under miscellaneous use such as settlement, roads etc.

Agricultural System:

In the hilly terrain like Zolambi area, slope and rainfall are important to determine the agriculture system in the area. The sharp slopes of the interlocking spurs, the narrow, elongated and irregular field terraces, heavy rainfall during the monsoon, soil erosion due to the torrential rains are the typical characteristic features of this upper catchment area of Warna dam. Under such adverse conditions, the people living in the small villages like Zolambi have to face several problems. The present agricultural set-up has been evolved after a long experience. We observed during our field studies that generally the farming techniques, crop rotation, crop-association, field patterns and duration of crop sowing, growing and harvesting are the same in the villages located on the top of the spurs in the catchment area of Warna dam. The terrain



and climate have evolved a specific agricultural system in this hilly region. The ruggedness of the hilly terrain of the upper catchment area controls the agricultural systems of tilling, crop rotation, crop association etc.

(A) Size, Shape and Slopes of the Agricultural Fields:

Generally the size and morphology of the fields are coined primarily by the nature of physiography and drainage. In the upper Warna basin, mostly the interlocking spurs have been used for field terraces (Fig. No. 2) with great toil. These terraces are very narrow, elongated and irregular in shape on the moderate slope whereas angular, triangular, and rectangular shaped terrace fields are found on the top of the spur where slope is gentle to flat. The average size of the field may range from 5 to 10 metres long and 3 to 5 metres wide on the moderate slope (convex slope), while 5 to 15 metres wide and 10 to 15 metres long on the top of the spurs. The field terraces generally lie both above and below the village site, which is usually situated slightly upper side of the mid slope of a spur or on the flat top of the spur. The land of the upland terrace is usually found unirrigated (rainfed) in which Nachni, Vari, Rala, Burag are

harvested.

On the lower terrace land some fields are irrigated by means of spring, stream water (Paat). This land is suitable for rice in rainy season (Kharif) called wet paddy and wheat, maize, vegetables, Satu in Rabi season. On the mid slope of the high spurs, the terrace fields are so narrow that plough may not be used and fields are tilled with a hoe called 'Kudali Nangar'. On the steep slope, 'Slash-and-burn' cultivation is practised, but in a limited measure, where Nachani, Vari Barag are harvested in Kharif season.

(B) Cropping Pattern:

The cropping pattern of the upper catchment area of Warna dam follows the nature of physiography, climate, soil and aspects of land-forms. Both the Kharif and Rabi crops are harvested in the hilly area. Map No. 12 shows landuse pattern in Kharif season and Map No. 13 shows landuse pattern in Rabi season.

The cropping patterns of village Zolambi are studied in two different seasons, i.e., Kharif and Rabi. We visited the village in different seasons to get the necessary information about the whole agriculture system in the village. The field work, field mapping questionnaires, personal interviews, sketches, photographs etc. techniques were used to collect the information

and data.

(C) Cropping Pattern in Kharif Season:

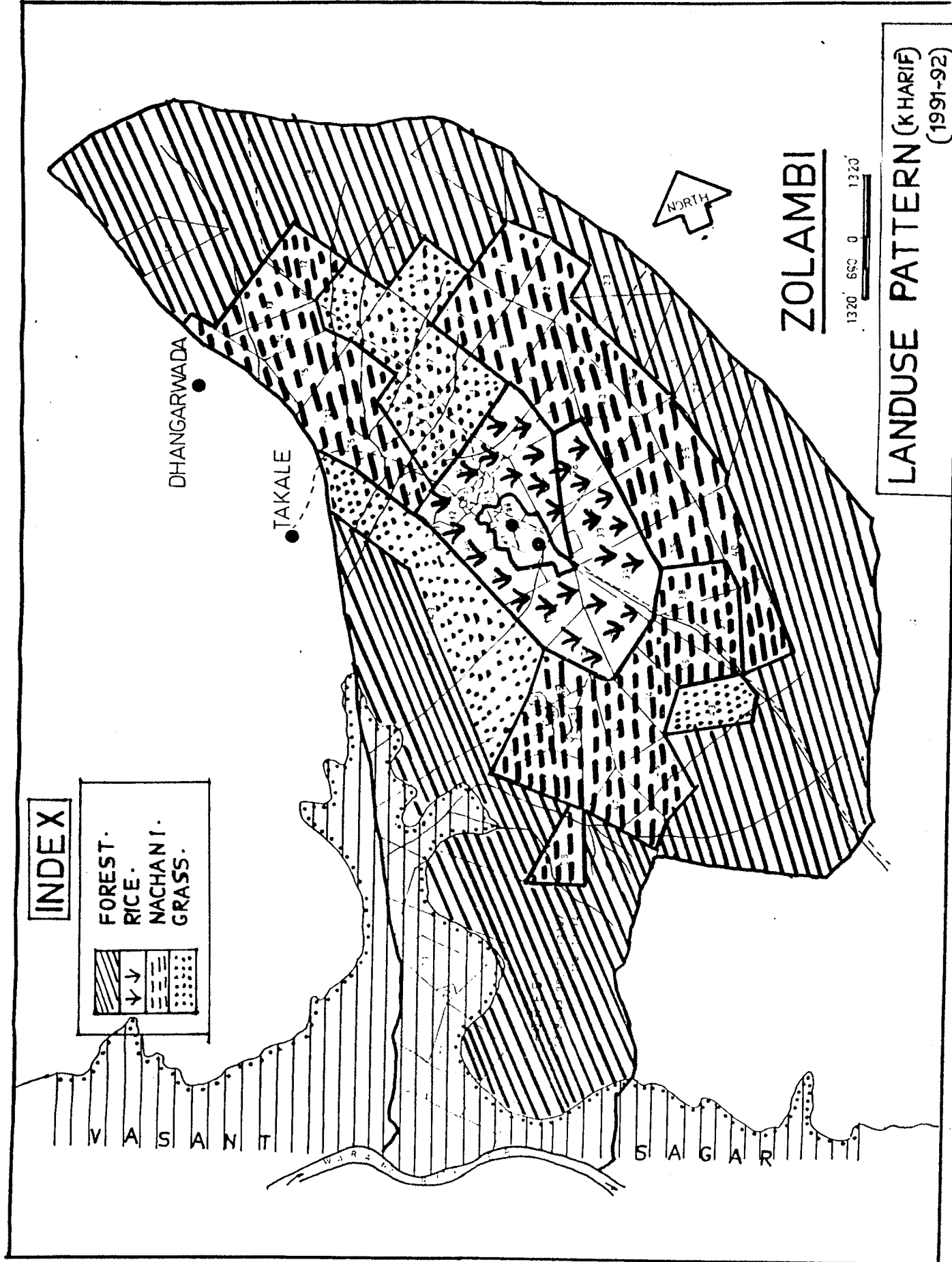
In the area Kharif season continues mostly from May, June and July and harvesting period occurs in the months of August, September and October. The main crops in Kharif season are rice (wet paddy) and Nachani.

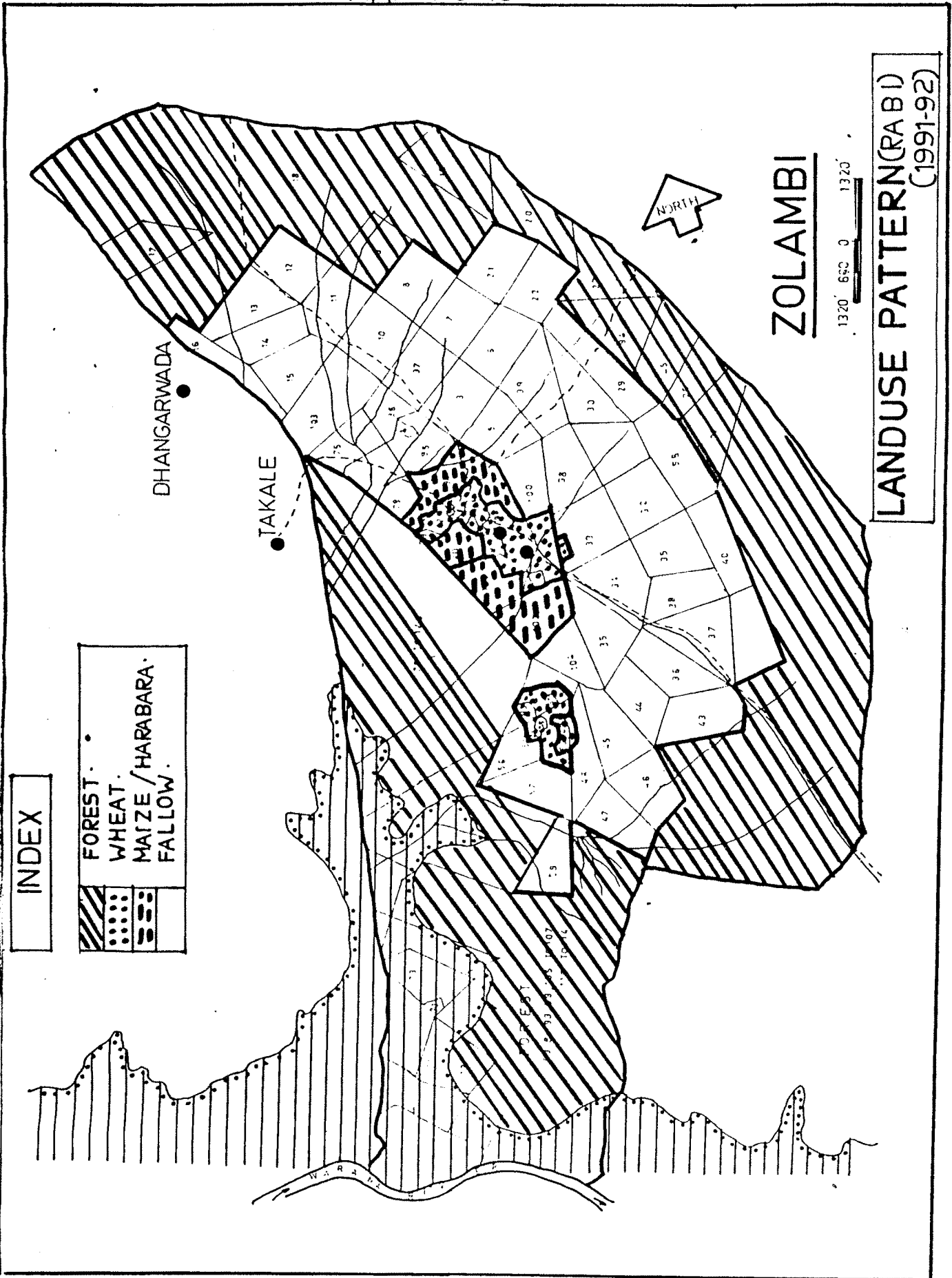
Rice is the important crop in the Kharif season (Map No. 12). The lower structural terraces on the spurs are used for rice (wet paddy) cultivation, while Nachani is generally sown on the steep sloping land of medium quality and on the top of the spurs where irrigation is not possible and soil is of poor quality. The Ropa system of wet paddy cultivation is practised in the area in which paddy is sown in the months of June and July and it is harvested in the months of September and October. The average yield of the rice in the area is 10 quintals per hectare.

(D) Cropping Pattern in Rabi Season:

(Map No. 13)

The Rabi season generally continues from November and December to March, April and May. Wheat is the main crop in this season. Vegetables, oil-seeds, maize, pulses and Shalu are other crops harvested in the Rabi season. In pulses Tur and Gram are mostly harvested





in all irrigated fields. The availability of spring, stream and well water supply determines the development of Rabi season. These sources are very limited and unsatisfactory which has resulted in only 1.3 per cent of the total land being irrigated. The traditional Paats (canals) are the prime sources of irrigation in the area, which gradually reduces in the late summer season.

It is observed that very low quality of seeds are used in the area; no chemical fertilizers are used, poor quality of crop protection measures are being adopted, which results in poor agricultural yields in the area.

(E) Crop Rotation:

The existing crop rotation cycles have been evolved after a long experience. They are well suited to such a hilly terrain, but now irregular and haphazard landuse and neglect of land resource conservation measures has reduced the crop yield in the upper hilly catchment area of Warna dam.

It has been observed that on irrigated terraces, two crops are harvested each year without leaving land as fallow, i.e., in Kharif season rice is sown and wheat or maize and Tur, Gram in Rabi season. Because of this rotation the land exhausts its carrying capacity

and fertility of the land is lessened. But it is observed that rice and Gram rotation is best suited in this region.

Where the fields are not adequately irrigated on the spur tops and along the moderate to gentle sloping fields rice, Nachani, Vari, Barag, Rala are harvested in alternate years.

(7) Horticulture:

According to climate and topographical conditions the upper catchment area is ideally suited for horticulture, but unfortunately adequate efforts have not been made to develop horticulture in the area except some fruit trees and bushes like mango, Phanas, Jambhul, Alu, Karvand etc.. The area is quite suitable for modern horticultural crops but we observed that generally people do not take much interest in this type of agriculture. The government agencies, too, have almost forgotten this remote catchment area of Warna dam.

(8) Livestock:

The people of Zolambi are much interested in animal husbandry, because it is second important aspect of their economy next to agriculture. The domestic animals of the area are cow, buffalo and sheep as milch livestock, while he-buffaloes and oxen are used for

farming activities, but they are very poor in number. Owing to the hilly terrain and steep slopes domestic animals are less suitable for farming activities. According to 1990 livestock census there are 301 cattle, 19 buffaloes and 119 sheep in the village under investigation.

(9) Poultry Breeding:

Almost each and every household is engaged in rearing poultry birds such as cocks and hens. The villagers get good prices for meat, eggs in downstream markets for their domestic birds. The distant markets and poor local demand are the main barriers in the development of poultry birds rearing and poultry breeding in this area.

The poor quality of breed, low quality of fodder, lack of hygienic conditions for the domestic animals are the prime barriers in the development of this occupation. The domestic animals of the region are generally looking good in appearance but their performances are poor. We observed that, the farmers neither care nor feed them properly. As a result, the condition of the livestock is deplorable in the upper catchment hilly area of Warna dam.

(10) Bee-keeping and Honey Production:

Just a few years ago this catchment area was



known for honey collection and bee-keeping. The physical conditions in this area are quite suitable and similar to Mahabaleshwar-Panchgani region, just 50 Kms north to this region for the bee-keeping. But since the submergence of Pethlond market place, people do not take much interest in honey collection and bee-keeping. Very few boxes of honeycomb were seen during our field studies. We noticed that bee-keeping occupation is on the decline in the upper catchment area.

(11) Zolambi - Rural Settlement

(A) Population Structure:

The total population of the village as recorded in 1991 was 275. The population was 368 in 1981. The population decline was found to be due to resettlement of a few families in the downstream command area because of the submergence. The village has been divided into two groups - Gaon and Dhanagarwada. The houses are in general dispersed in shape. Some are nucleated in the top of the spur usually of some community. The distant houses are connected with footpaths. The houses are constructed with the help of wood, mud, rocks, and mud-bricks (Bhenda) as building material. The wooden material is used on a large scale as it is easily available in the nearby forest.

Since September 1993 a series of earthquakes are shaking the whole catchment area and surrounding Patan taluka, Shahuwadi taluka and Sangameshwar taluka. We observed that almost all the houses are badly damaged. The tremor on 8 December 1993 caused severe damage in the whole area. The epicentre of the earthquakes is 10 Kms to the west from Zolambi, at Chandoli (Kd.). There are 73 occupied houses and an equal number of households. The population structure and occupational structure of the village in 1991 are presented in the following Table.

TABLE-17

## Village Zolambi - Occupational structure and literacy (1991)

Sr. No.	Occupation	M	%	F	%	Total	%
1	Cultivators	52	46.0	31	19.0	83	30.0
2	Agril. labourers	1	0.9	-	-	1	0.4
3	Dam/forest workers	-	-	-	-	-	-
4	Household industry	-	-	-	-	-	-
5	Marginal workers	-	-	-	-	-	-
	Cattle grazers	-	-	-	-	-	-
6	Others	2	1.8	-	-	2	0.8
7	Total workers	55	49.0	31	19.0	86	31.0
8	Non-workers	58	51.0	131	81.0	189	69.0
	Total population:	113	100.0	162	100.0	275	100.0
	Percentage:	41.0		69.0	-	-	100.0
9	Literate	32	28.0	25	15.0	58	21.0
	Percentage of the total:		12.0		9.0		

Source: Compiled by the author

The table clearly indicates that the female population in the village was dominant, i.e., 69 per cent. Out of the total population, 86, i.e., 31 per cent are workers, of which 64 per cent were male and 63 per cent were female. Of the total population, 69 per cent were non-working groups, i.e., children, aged persons etc.. Most of the working population was engaged in agriculture as cultivators.

Of the total population only 21 per cent (male 28 per cent, female 15 per cent) population is literate upto primary level only.

We observed that the dominance of female population was due to the migration of male population to Bombay in search of job. The detailed statistical information regarding the out-migration is not available.

(B) Social Amenities:

The village has a Z.P. primary school upto 4th standard. There are two teachers and one class-room. Total strength of the class was 41. The village has no Post Office. The Postal service is provided by the Warnavati Post Office once in a week through a runner.

The nearest bus stop is at Chandoli (Bk.) at a distance of about 21 Kms to the east in the downstream area. The villagers have to walk at least four hours to reach the bus stop at Chandoli dam. Most of the

villagers prefer to go to Jinti in Patan taluka for bus service, because it is at a shorter distance (10 Kms) and the steep is not that sharp to tread along, which is the case with Chandoli way. There is no other means of transportation and communication with the outside world.

(C) Market:

For the market facility villagers depend on Mandur (21 Kms)(Sunday) weekly market, Arale (25 Kms)(Saturday) and Dhebewadi (20 Kms)(Tuesday) market places.

The economy of the village is agro-based, though the agricultural system is traditional subsistence-type. It was observed that for years no modern technological changes have been made in the village. The landholdings are small, usually confined near the habitation, poor accessibility, poor quality of seeds, inadequate use of chemical fertilizers and absence of plant protection measures having badly affected the agricultural production and obviously their economy.

(12) Problems:

Like other villages in the upper catchment area of Warna dam, Zolambi is also facing many social, economic and physical problems. some problems are created by

nature and some are created by man, while some others are imposed on them by other people/agencies (government).

Primarily, the people are river-dam affected, but government agencies are not considering it so; secondly, they are sanctuary affected people and recently they are facing a series of earthquakes of moderate to low intensity almost every hour of the day since 30 September 1993. The economic, social as well as resettlement and rehabilitational problems are discussed in Chapter-V, as they are unique but common in the catchment area of Warna dam.

#### Ecological Problems:

The village Zolambi, like other villages in the area, consists of rugged hilly area. Throughout the area the farmers have attempted to use the lands available, though not suited for cultivation. This has not only created a problem of severe erosion but also sedimentation in the reservoir down below.

During our field studies we found out that the slash-and-burn agriculture is practised in the area upto limited extent, which has created a major problem of deforestation in the area. It was observed that the man-made burns are common in summer season along the sharp slopes of the spurs. The soil cover also

is weakened due to excessive erosion during heavy monsoonal downfall in some areas.

Overgrazing, overlopping, overfalling and overploughing, the environmental problems have been neglected by the dwellers and no conservation measures have been implemented in the area. Thus the land resources of the valley, such as forest, water, soils and physical land-forms have been deteriorated frequently due to excessive erosion in the upper part of the valley. To protect the upper part of the catchment area from the geographical hazards, long-term and short-term preventive measures are badly needed. These preventive measures are discussed thoroughly in Chapter-VI.

## CHAPTER FOUR

### CASE STUDIES OF SAMPLED VILLAGES ZONE-III- RUNDIV VILLAGE

- 1 INTRODUCTION
- 2 GEOGRAPHICAL SETTING
- 3 TOPOGRAPHY
- 4 CLIMATE
- 5 **SOILS**
- 6 LANDUSE PATTERN AND AGRICULTURAL SYSTEM
- 7 HORTICULTURE
- 8 LIVE STOCK
- 9 BEE-KEEPING AND HONEY COLLECTION
- 10 RUNDIV RURAL SETTLEMENT
  - a. POPULATION STRUCTURE
  - b. SOCIAL AMENITIES
- 11 PROBLEMS

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## CASE STUDY OF SAMPLED VILLAGES

Zone-III: Rundiv Case Study1. Introduction:

To make the detailed study of the villages situated in the catchment area of Warna dam, we selected Rundiv village for case study. It represents the villages in the third zone of the catchment area. In the third zone the villages lie far away from the dam site (more than 20 Kms). The villages are located in the extreme remote area apart from the rest of the world; especially Rundiv, Jawali have become islanders after the submergence. Rugged hilly terrain, steep slopes, dense forest on the one hand and mighty Vasant Sagar reservoir on the other, have isolated the villagers physically, socially, economically and even politically. Village Rundiv is a unique example of man-imposed isolation.

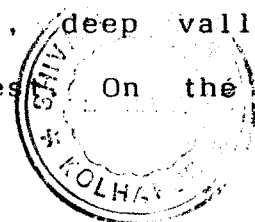
2. Geographical Setting:

The village Rundiv is located on the flat top of a spur of the main Sahyadri range which runs almost north to south direction at a height of about 950 metres above MSL on the eastward slope. It is situated on the right bank of the Warna river. Administratively Rundiv lies in the Shirala taluka of Sangli district. The distance from dam site to Rundiv village is about

50 Kms via Nivale-Vetti Kachha road. Rundiv is located at the western tail-end of the Warna dam reservoir at a distance of about 4 Kms from the tail-end of the reservoir. The village is covered by an area of 1,812 hectares, i.e., 7.3 per cent of the total catchment area of Warna dam. The total population of the village as recorded in 1991 census is 139 i.e., 2.4 per cent of the total population of the catchment area. The village is scattered on the eastern slope of the main Sahyadri range, which runs north to south direction in the area. There are 32 houses in the village located in a row south to north on a narrow spur top, just parallel to Sahyadri range.

### 3. Topography:

The village area is divided into several terraces at different elevations from Warna river to top (Sada) of the Sahyadri range. The number of streams generally rises on the top of the Rundiv Sada at a height of about 950 metres above the MSL and flows towards Warna river along the eastern slopes of the Sahyadri. They have created several rappidés and waterfalls during their short course. The structural terraces along the spur, valley are cultivated. The slopes are generally convex. The sharp to moderate slopes, deep valleys, are covered with dense evergreen forest. On the top



of the Sahyadri (Sada) open scrubs, bushes and patches of grass are covered. The stoney or rocky top of the Sada is totally barren and flat. To the north of the Rundiv village at a distance of about 4 Kms a beautiful waterfall is developed by the river Warna. The total height of the fall is about 45 metres from the bottom. The fall is called 'Kandhar Fall'.

#### 4. Climate:

The village experiences moderate summer, wet rainy season and chilly winter season, as the village is located 950 metres above MSL on the eastward facing slope of the main Sahyadri range. According to the Warna Dam Division records (An observation centre situated at Patharpunj just 10 Kms north of Rundiv), the maximum temperature in Rundiv area reaches 36°C in the months of March and April, while minimum temperature recorded in the area is 4°C to 6°C in the months of December and January. The annual rainfall varied between 5,790 mm (1987) and 8,804 mm (1983). The area received 7,982 mm rainfall during the year 1933.

#### 5. Soils:

The natural vegetation plays a dominant role in the formation of soil in the area. The relief has directly influenced soil formation through its effects on drainage and runoff in this area. We observed during

our field studies that the soil on the steeper side has thinner solum and less distinct horizons; on the other side on gentle sloping a thick solum and distinct horizons are found where generally thick and dense forest patches are found (Fig. 3). Mostly at the foot hill of the Sata we observed two types of field terraces, structural terraces and alluvial terraces. The alluvial terraces are found on the bank of the river, but most of these terraces stand submerged.

The soils of the area are divided into three different groups. But in general, the soils are red laterite. The first group consists of alluvial black-brown soil, mainly noticed on the bank of the Warna river, but these patches of fertile land are submerged under reservoir. The second group of soil is known as reddish soil which lies both above and below the village site. The land of the upper terrace is unirrigated (rainfed). Below the structural terraces in the valley on more convex slope soils are well ploughed and irrigated with small canals (Paats) to some extent. The third group of deep red laterite soil is noticed in these parts.

## 6. LANDUSE PATTERN AND AGRICULTURAL SYSTEM

### (A) Landuse Pattern:

The landuse pattern in the area is dominated

by the hilly terrain. The detailed mapping of the landuse pattern of Rundiv village has been conducted. Table-18 presented below gives the information about different landuse categories.

TABLE-18

## Village Rundiv - Landuse pattern (1991)

Sr. No.	Major landuse categories	Landuse sub-categories	Hectar-age	Percent-age
1	Forest	-	1,598	88.00
2	Cultivated land	-	12	0.7
		1. Cropped 5(42.0)	-	-
		2. Irrigated 1(8.0)	-	-
		3. Fallow land 6(50.0)	-	-
3	Culturable waste	-	6	0.3
4	Unculturable waste	-	158	9.0
5	Submerged area	-	38	2.0
		1. Forest 18(47.0)	-	-
		2. Cultivated fallow land 20(53.0)	-	-
	Total area:		1,812	100.0

Source: Compiled by the author

(1) Forest Land:

The hilly area of upper Warna basin is primarily consisting of hills, spurs, valleys, of which major portion of the land is under forest cover. In Rundiv, about 1,598 hectares of land, i.e., 88 per cent, is under forest cover. The forest consists of dense evergreen patches at the foot-hills of the Sahyadri Sada, in the deep valleys and along the stream banks. While the open scrubs have occupied the top of the Sahyadri range (Sada). The important species found in the forest are Hirda, Pisa, Jambhul, Mango, Kinjal, Tamalpatri, Makadi. Several herbal medicinal plants are found in the forest, too. The area under study consists the core part of the Chandoli Reserve Forest area.

(2) Cultivated Land:

As in the other villages in the upper catchment area, Rundiv has only 12 hectares, i.e., 0.8 per cent of the total area under cultivation. The cultivated lands are located on the top of the spurs, along the convex slope of the valley in the form of structural terraces. Of the total cultivated land only 1 hectare, i.e., 8 per cent of the total cultivated land is under canal (Paat) irrigation; the remaining 92 per cent land is rainfed, of which 50 per cent is fallow land used as grazing land. There is no lift irrigation

facility.

(3) Culturable Waste:

The land under culturable waste consists of only 6 hectares of the total area i.e., 0.3 per cent. It comprises scrubs, bushes and open forest on the fringe area of cultivated land. The villagers are using this area for cattle grazing.

(4) Unculturable Waste:

About 158 hectares of land are recorded as unculturable waste, i.e., 9 per cent of the total village area. It comprises stoney waste on the top of the Sahyadri Sada, and dissected hilly land, on the steep convex slopes of the spurs in the valley.

(5) Submerged Land:

The village has lost 38 hectares of land (both forested 18 hectares and cultivated 20 hectares), i.e., 2 per cent of the total area under Warna dam submergence. We observed that the village has lost most fertile alluvial terraces under submergence.

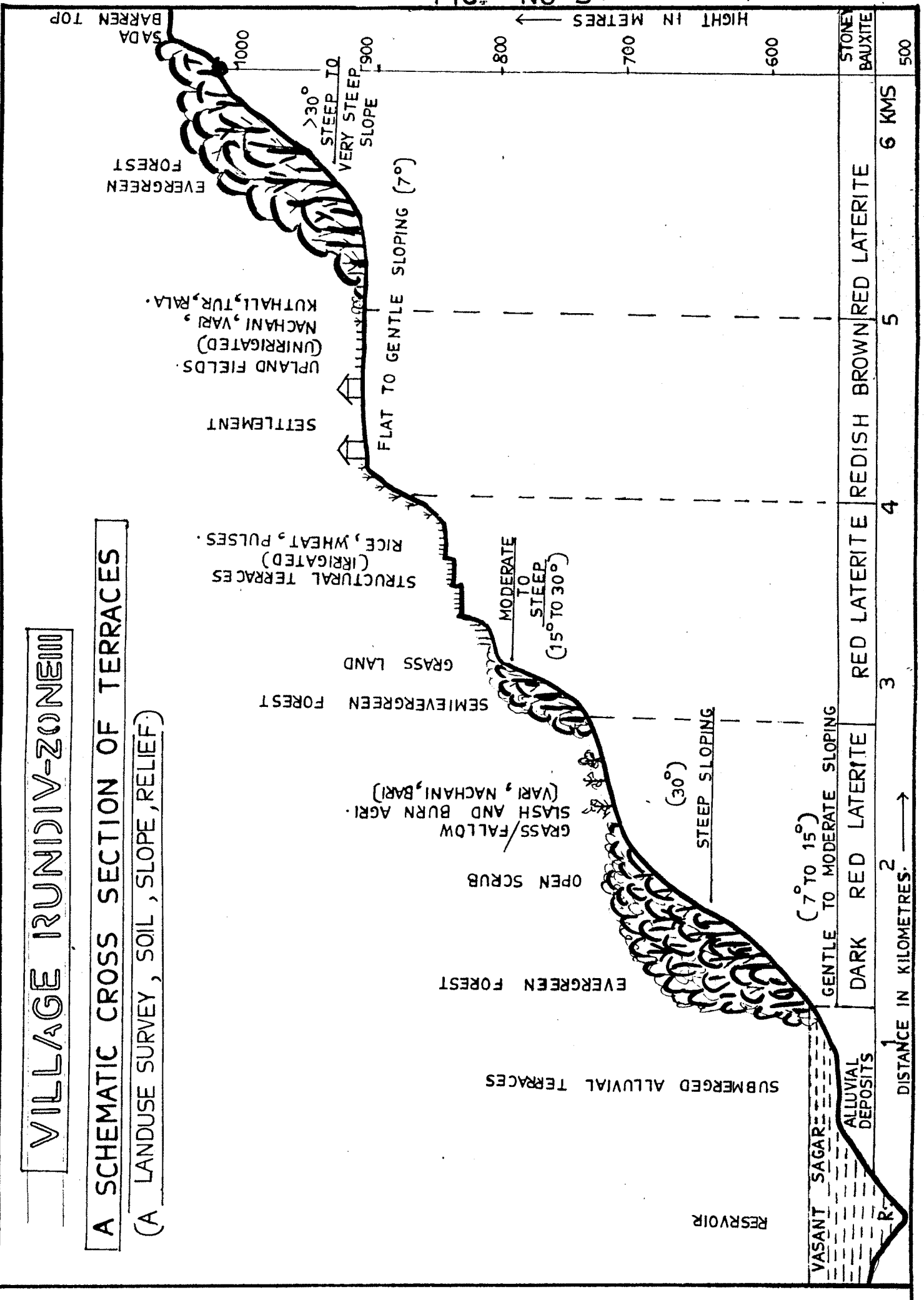
(B) Agricultural System:

The terrain and climate have evolved a specific agricultural system in this region. We observed during our field studies that generally, the farming techniques, crop rotation, crop-association, field pattern and



VILLAGE RUNDIV-ZONEIM

A SCHEMATIC CROSS SECTION OF TERRACES  
(A LANDUSE SURVEY, SOIL, SLOPE, RELIEF)



duration of crop sowing, growing and harvesting are the same throughout the upper part of the catchment area of Warna dam. The ruggedness of the hilly terrain and heavy downfall during the monsoon season have dominated the agricultural system in the upper catchment area of the dam.

(A) Size, Shape and Slope of the Agricultural Fields:

Generally the size, shape and slope of the fields are influenced by the nature of physiography and drainage. Mostly the interlocking spurs are used for field terraces in the upper catchment area. These terraces are very narrow, elongated and irregular in shape than that we observed in the 'middle zone Zolambi' of the catchment area. It is only the sharp slopes and narrowness of the Warna valley which increase as we go upstream area. The river gorge is deep and having sharp slopes on both sides. The average size of the field is from 5 to 7 metres long and 3 to 5 metres wide on the moderate to gentle slopes. The length and width increase as the slope decreases on the top of the spurs. Here we found the angular, triangular, rectilinear shaped terrace fields. Most of the terraces are usually found unirrigated (rainfed). On the lower terrace land a few fields are irrigated by spring and stream canals (Paats). On the

sharp slope of the Sahyadri range 'Slash and burn' cultivation was practised by the villagers.

(B) Cropping Pattern:

Both the Kharif and Rabi crops are harvested in the upper catchment area. The cropping patterns in this area are strongly dominated by the physiography, climate and soil in the area.

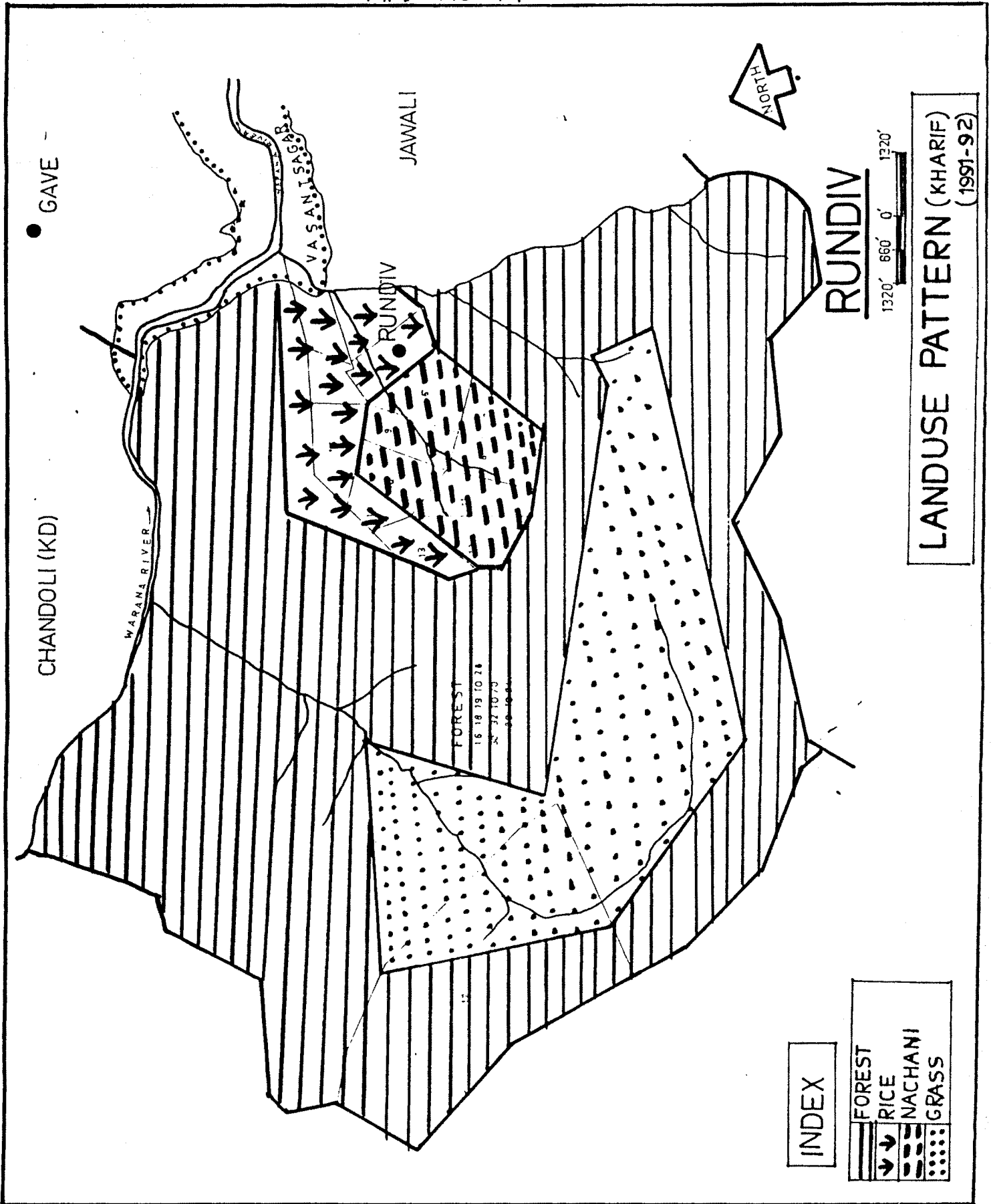
(i) Cropping Pattern in Kharif Season:

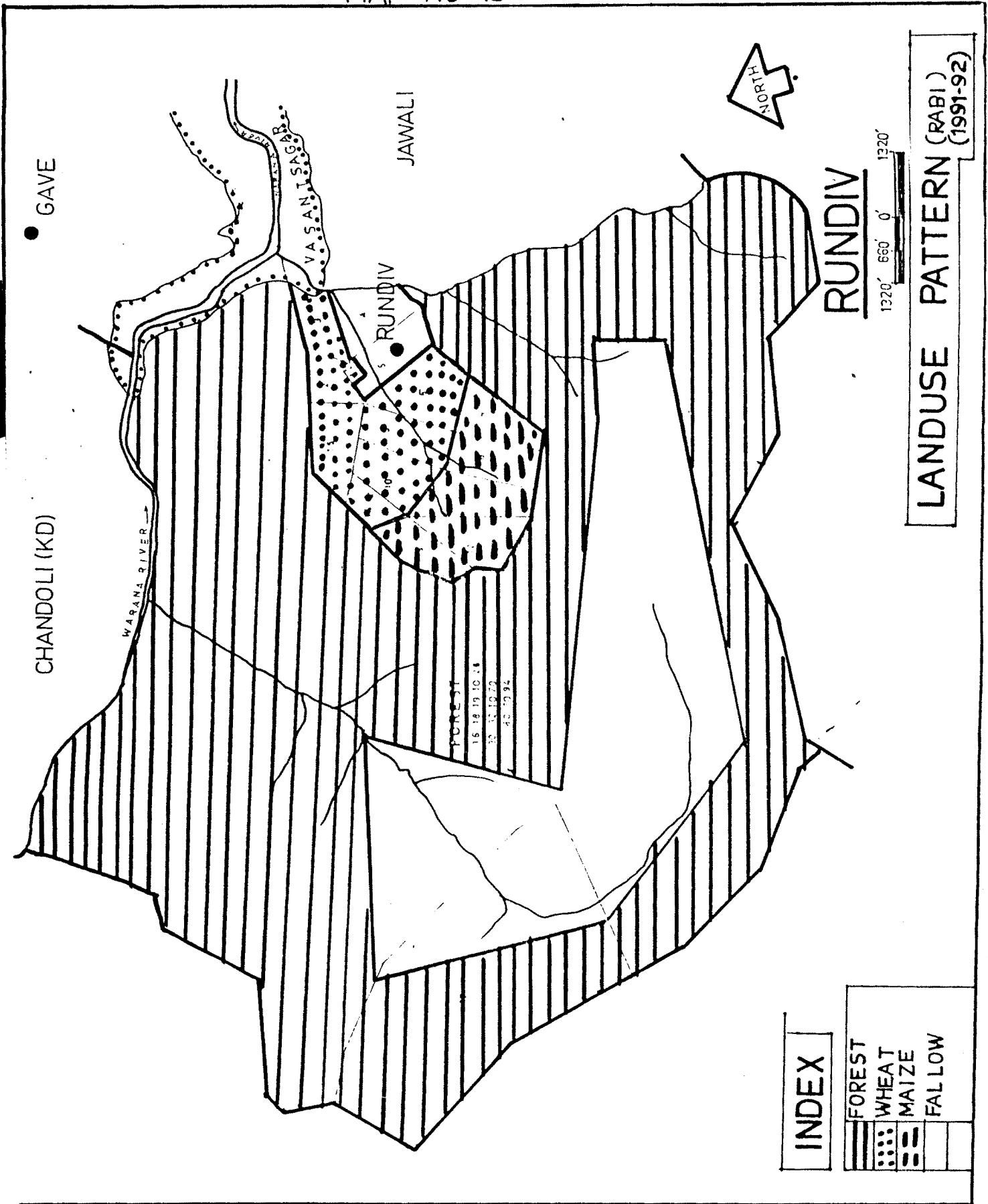
As in most of the lower parts of the catchment area, Kharif season continues mostly from May to July and harvesting period occurs in the months of August, September and October. Rice (wet paddy) and Nachani are the prime crops of this season in the area (Map No. 14). The lower structural terraces are used for rice cultivation, while Nachani, Vari, Barag, Rala are sown in on the sharp sloping fields of medium to poor quality. Wet paddy is sown in the months of June and July and it is harvested in the months of September and October. The average yield of rice is very poor compared to that of the middle and lower zones of the catchment area (less than 7 quintals per hectare).

(ii) Cropping Pattern in Rabi Season:

(Map No. 15)

The Rabi season generally continues from November





**INDEX**

	FOREST
	WHEAT
	MAIZE
	FALLOW

**RUNDIV**  
1320' 660' 0' 1320'

**LANDUSE PATTERN (RABI)  
(1991-92)**



and December to March, April and May. Wheat is the main crop in this season. Vegetables, pulses (Tur, Gram etc.), maize, Shalu are other crops harvested in the Rabi season. But the irrigation facilities are very poor, which has restricted the Rabi season. Only one hectare is irrigated in small pieces, along the stream, to the eastern and northern sides of the settlement.

(C) Crop Rotation:

The existing crop rotation cycles have been evolved after a long experience in the upper catchment area. They are well suited to the hilly area.

It was observed that on irrigated structural terraces, two crops are harvested each year without leaving land as fallow, i.e., in Kharif season rice is sown in and wheat or Gram in Rabi season. Whereas in the unirrigated fields rice, Nachani, Vari, Barag, Rala and Tur are harvested in alternate years. It was observed that rice (Kharif) and pulses (Gram) in Rabi is the most suitable crop rotation in the upper catchment area.

7. Horticulture:

According to climate, topography, soils and land-form conditions the upper catchment area is suitable

for Horticulture but no attempt has been made by the villagers in this area nor have government agencies ventured to promote the development of fruit trees in this area. Mango, Phanas, Jambhul, Alu, Karvand etc. fruit trees are found in the region.

#### 8. Livestock:

The people of Rundiv village are much interested in animal husbandry. According to 1990 livestock census there were 202 cattle, 15 buffaloes and 20 sheep. Domestic animal rearing is an important occupation which stands next to agriculture in the upper catchment zone. But because of the sharp slopes very few domestic animals are used for agricultural activities.

The poor quality of breeds, low quality of fodder, lack of market are the major barriers in the development of animal husbandry in the village.

Poultry breeding is another source of rural economy in this region. Almost each and every household is interested in poultry breeding. Local variety of hens and cocks are more suitable for rearing.

#### 9. Bee-keeping/rearing:

Even though the area is quite suitable for bee-keeping and honey production, we observed that very few villagers are interested in bee-keeping/rearing. Lack of market, remoteness of the area, lack of proper

training are the major barriers in the development of bee culture in the area.

#### 10. Rundiv Rural Settlement

##### (A) Population Structure:

The total population of the Rundiv village as recorded in 1991 census was 139 inhabitants; while in the year 1981 the population was 119 inhabitants. According to 1991 census there were 66 males, i.e., 48 per cent of the total population and 73 females, i.e., 52 per cent. Table No. 19 gives details in this regard.



TABLE-19

Village Rundiv: Occupational structure  
and literacy (1991)

Sr. No.	Occupation	M	%	F	%	Total	%
1	Cultivators	30	37.0	41	58.0	71	51.0
2	Agril. labourers	-	-	-	-	-	-
3	Forest/dam workers	-	-	-	-	-	-
4	Household industry	-	-	-	-	-	-
5	Marginal workers	-	-	-	-	-	-
	Cattle grazers	-	-	6	4.0	6	4.0
6	Others	4	5.0	-	-	4	3.0
7	Total workers	34	52.0	47	64.0	81	58.0
8	Non-workers	32	48.0	26	36.0	58	42.0
	Total population:	66	47.0	73	53.0	139	100.0
9	Literate	6	9.0	22	30.0	28	20.0

Source: Compiled by the author

The foregoing table clearly indicates that as in the case of other villages in the catchment area, female population was dominant, i.e., 52 per cent of the total. It was only because of the fact that male population finds its way to Bombay in search of livelihood. Out of the total population, 81 i.e., 58 per cent population was working population (male 34, female 47). The non-working population was 43 per cent of the total.

Out of the total population, only 20 per cent population is literate (or mostly illiterate) upto primary level. We observed that after the submergence of Warna dam villagers have no primary school even within a radius of 10 Kms. in any village in the upper zone of the catchment area. A private, one-teacher school has been opened by the villagers, where only 21 students (10 boys and 11 girls) were present when we visited the village in October 1993. There is no class-room as such; it is being conducted under a tree.

The number of houses and households were the same (i.e., 32 houses, 32 households) as recorded in 1991.

**(B) Social Amenities:**

The village is situated in the remote corner of the catchment area of Warna dam. Like other villages

in the upper zone of the catchment area there is absence of most of the essential amenities. There is no primary school in the village. A private school-cum-tuition class is conducted by a teacher. The village has no Post Office facility. The nearest bus stop from the village is Nayari in Konkan at a distance of about 20 Kms. and Chandoli dam at about 55 Kms distance. Villagers have to walk at least 12 hours to reach the bus stop at Nayari. The westward slope is quite sharp and dangerous to ascend. For the market facility the upper zone villages depend on Morgiri (Patan taluka) and Nayari (Sangameshwar taluka).

The economy of the village is agro-based. We observed that for years no modern technological changes have been made in the village. There is no electricity and lift irrigation facility. The landholdings are small in the area. Poor accessibility, inferior seeds, limited use of chemical fertilizers, and absence of plant protection measures, are the major barriers in the diffusion of modern technological changes in this area.

#### 11. Problems:

Like other villages in the upper zone of the catchment area, the villages have become totally isolated. They are facing several social, economic and physical

problems. They have become islanders. On the one hand sharp slopes of the Sahyadri, dense forest and on the other hand mighty Vasant Sagar reservoir are their companions in the area, with whom they are struggling for survival. The sociological and economic problems of the area are discussed in details in Chapter-IV.

Ecological Problems:

During our field studies we observed that like other zones in the upper zone-group the same ecological problems are faced by the villagers. They are cultivating the available lands which are not suited for cultivation. Thus the problem of soil erosion is creeping in the region. The overgrazing, overlogging, overfallowing, overploughing, deforestation, slash-and-burn agriculture are the important problems which have been neglected by the farmers. No conservation measures are taken into account and so the people in the area are not only getting poor returns from the agricultural operations, but also they are creating basic ecological problems to the rich biodiversity conservation in the area. But the question is again who is responsible for this vicious cycle. These aspects are discussed in Chapter-IV in detail.

## NOTES AND REFERENCES

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- 2 Saxena, P.B. "A Modern Approach in Geography For the Evaluation of Soils and Landform Systems of Landuse Planning in Himalayan Ecosystem of the Alaknanda Basin" Concept Publishing Comp., New Delhi, 1987, pp. 14-15.