# CHAPTER TWO

# THE PHYSICAL AND ENVIRONMENTAL SETTING OF THE CATCHMENT AREA OF WARNA DAM

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## CHAPTER TWO

## THE PHYSICAL AND ENVIRONMENTAL SETTING OF THE CATCHMENT AREA OF WARNA DAM

### (i) PHYSICAL FEATURES:

Location:

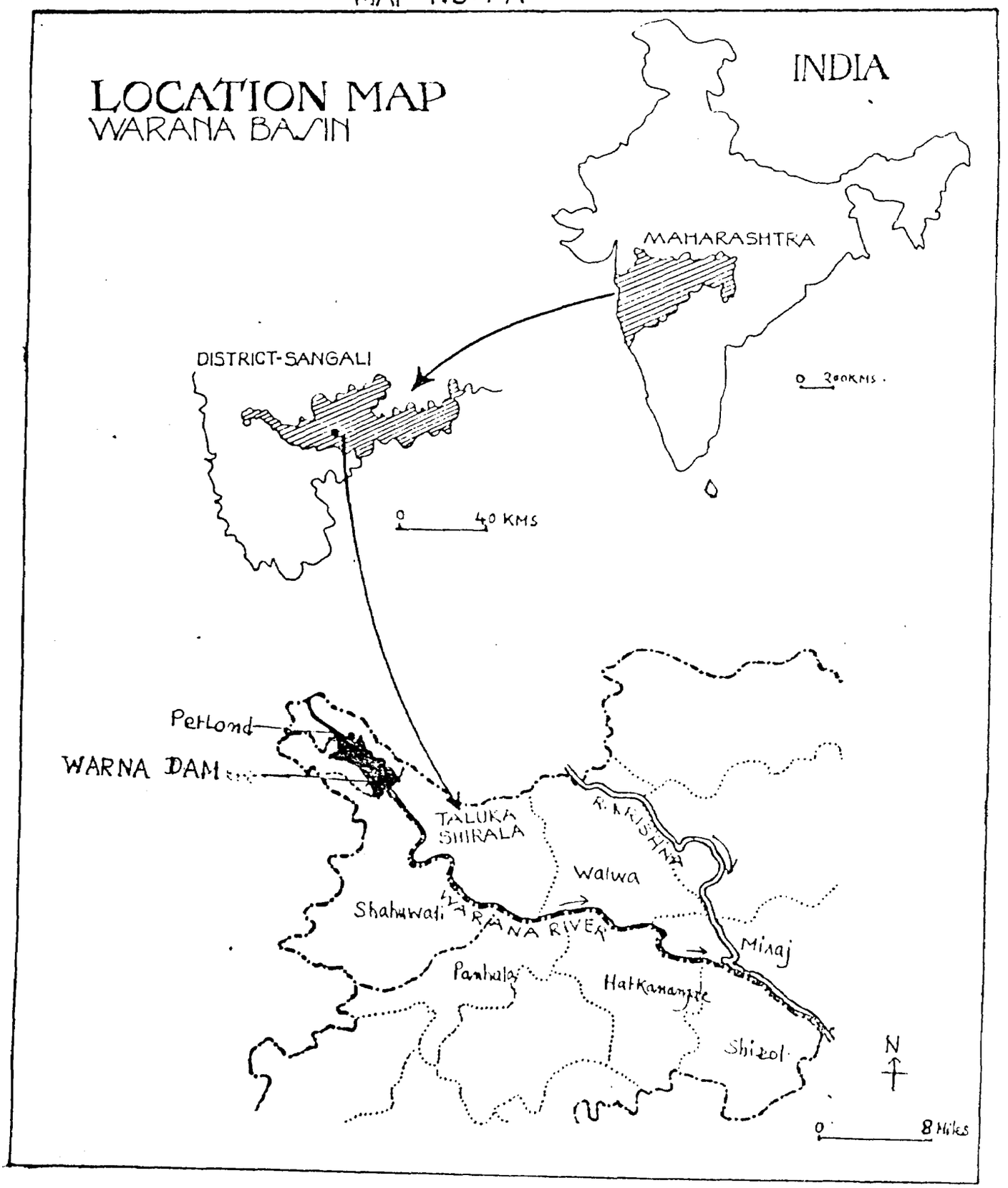
The Warna basin lies on the famous Deccan Plateau region in Maharashtra. The Warna river basin (Map No.1) lies between 16°30' and 17°16' North latitudes and 73°33' and 74°41' East longitudes. It covers the Shirala, Walwa and Miraj talukas of Sangli district and Shahuwadi, Panhala, Hatkanangale and Shirol talukas of Kolhapur district.

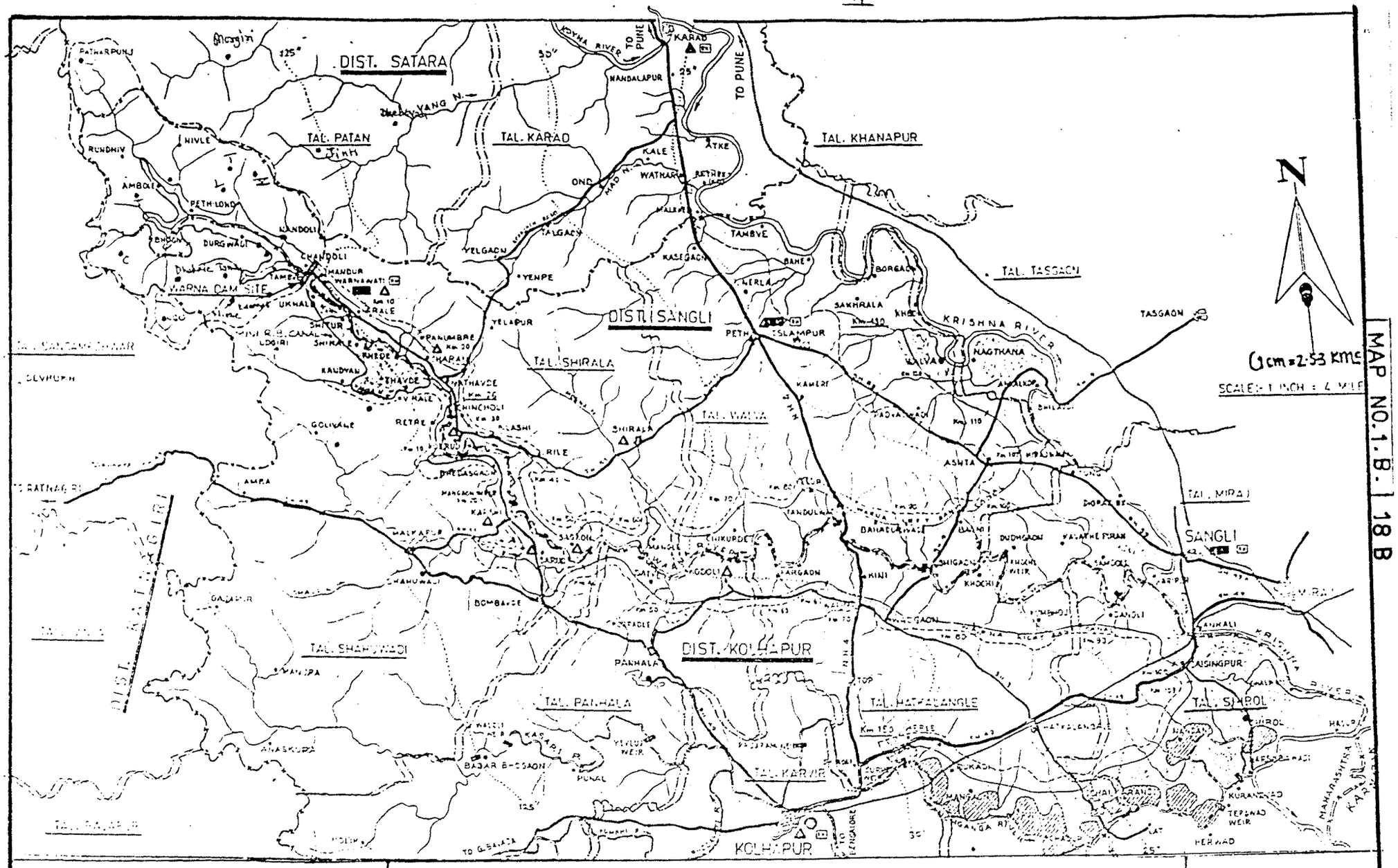
The present study area is upper part of Warna basin called as catchment area of Warna Dam. The total area is 301 sq kms and has covered the North-western part of the Shahuwadi taluka of Kolhapur district, Western part of the Shirala taluka of Sangli district, some South-western part of the Patan taluka of Satara district and some parts of the Sangameshwar taluka of Ratnagiri district. The study area lies between 17°5' N. and 17°15' north latitudes and 73°42' E. to 73°52' east longitudes (Map No. 2).

Relief:

Deccan trap influences the landscape of the catchment area of Warna Dam. The height of the study

MAP NO. 1. A.


LOCATION MAP
WARANA BASIN
INDIA
MAHARASHTRA
0 300KMS.
DISTRICT-SANGALI
0 40 KMS
PeTLond
WARNA DAM
TALUKA
SHIRALA
R. KRISHNA
Walwa
Shahuwadi
WARANA RIVER
Miraj
Panhala
Hatkanangle
Shirol
N
0 8 Miles




# WARNA IRRIGATION PROJECT

(DAM CATCHMENT AREA, AND COMMAND AREA)

region varies between 600 mtrs and 1,200 mtrs.

The important hill ranges in the Dam catchment area are -

(a) Western Ghats or Sahyadri main range

(b) Udgiri Range (main offshoot of Sahyadri)

(c) Walmiki hills (main offshoot of Sahyadri)

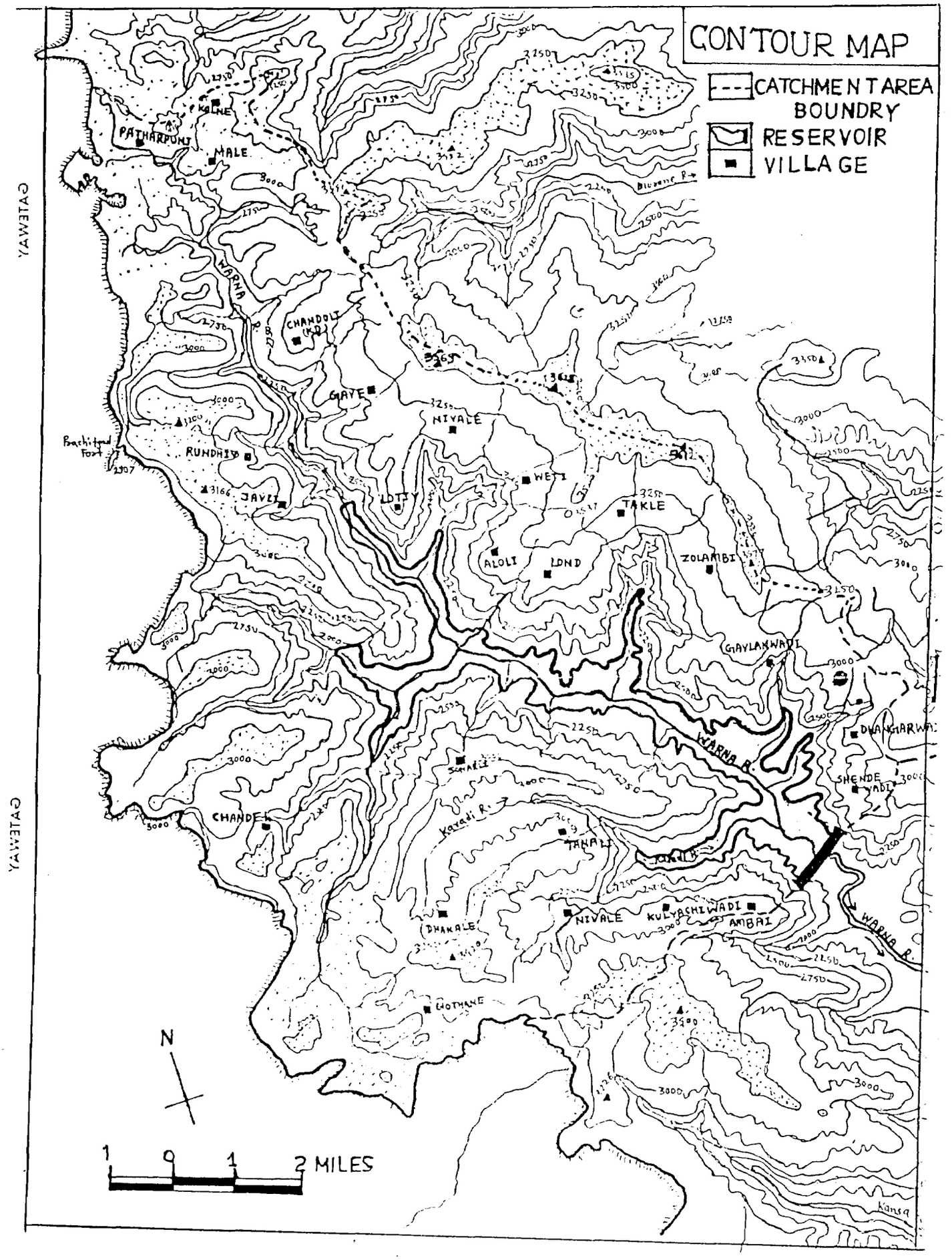
The summit levels of these ranges are remarkably flat (Sada). From a fairly broad base, these hills rise in a series of terraces which are not unlike a flight of steps, culminating in a summit level that is noted for its remarkable flat table lands (locally named as Sada)(Photograph No. 4. ). They are separated by low saddles. A laterite capping marks many of these platue's tops. This top-like natural landscape has earned the Swedish name 'Trape topography'. The highest points in this region are Walmiki Sada, 1,116 m, Rundiv Sada 985 m and Udgiri Sada 1,052 m.

The Western part of the Warna basin is a narrow and elongated one. The catchment area of the Warna dam has a triangular shape. The Warna valley opens out into a wide belt in the east. The upper part of the Warna basin is narrow and rugged. Prachitgad is an historical fort located in the Western part of this region (Photograph No. 2. ).

The typical topographical features are produced

MAP NO. 2 (A)

# THE CATCHMENT AREA OF WARNA DAM



2 Prachitgad Fort

3 Rundiv Fall

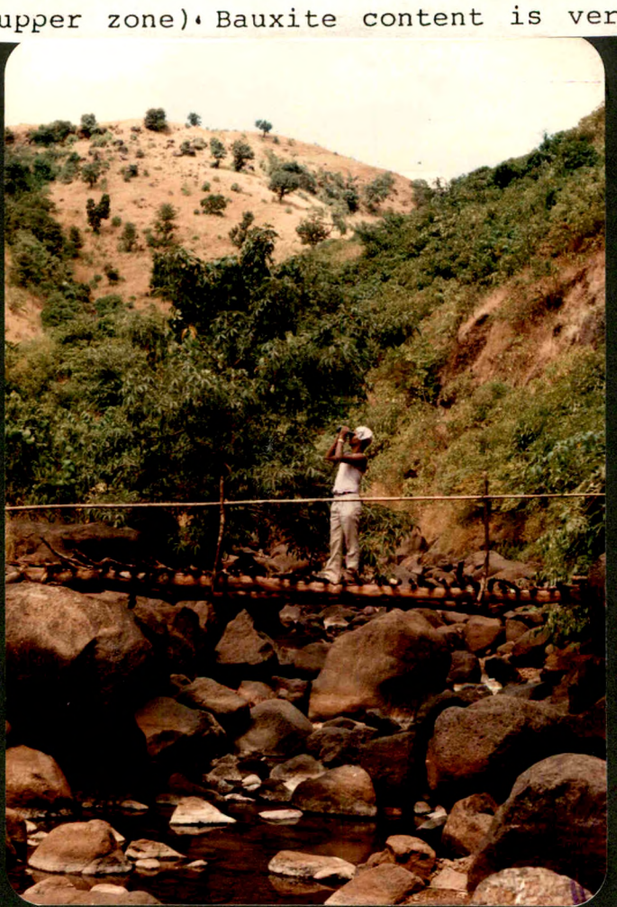
by the Warna river in its short course of 31 Kms in the dam catchment area. The important features are V-shaped valleys, water-falls [Rundiv water-fall carries height of about 50 metres (Photograph No. 3 )], amphi-theatres, deep gullys etc.. The diversified topography of this region has given rise to many problems like silt, erosion, land sliding during the heavy monsoonal downfall.

Drainage Pattern:

The river Warna is a major tributory of river Krishna. It rises close to the western crest of Sahyadri at a height of about 987 m above MSL at Patharpunj in Satara district. For the first 15 Kms Warna river runs north to south direction on the top (Sada) of the Sahyadri. Further it takes a eastward turn and falls down from Rundiv Sada creating a beautiful water-fall of about 50 mtrs high (Photograph No. 3 ). Later, the river runs from West to East till it joins the Krishna river at Haripur near Sangli. The total length of the river is 148 Kms of which about 31 Kms is included in the catchment area of Warna Dam.

The upper Warna river basin is fed by a number of tributaries, which originate on the top of the western hills, Walmiki Sada and Udgir Sada, and flow along the slopes of these hills with tremendous speed towards

05 Walmiki Sada (Barren Top)-The highest point (3628' above MSL) near Vetti (upper zone). Bauxite content is very high in this Region



04 A Sakav near Zolambi:-Only way to cross the stream during heavy monsoon.

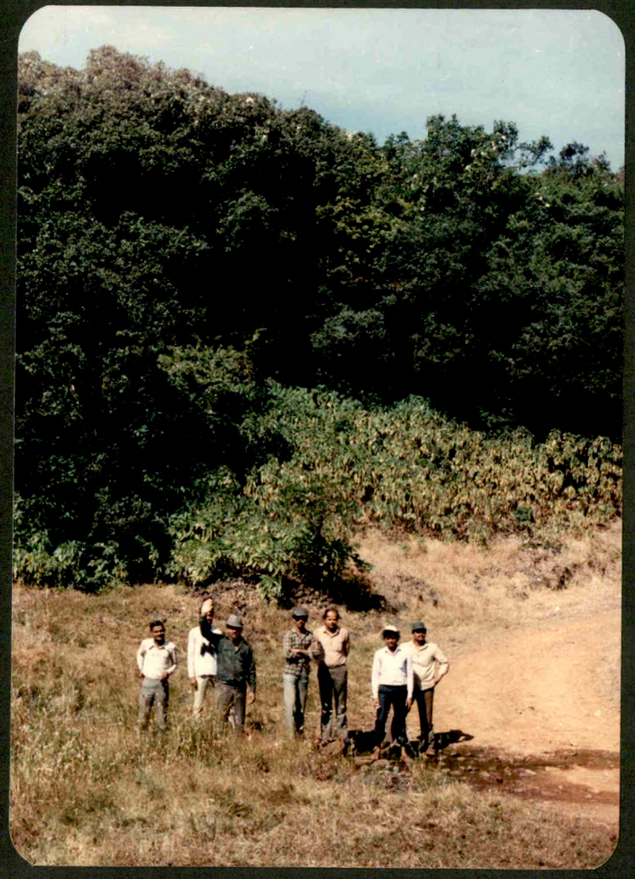
06 Zolambi (Middle zone)- The rich floral and faunal wealth of the Warna Valley.

07 Evergreen Dense Forest Near Zolambi (Middle zone)

08 Forgotten victims of Development, Conservation and even nature.

Earth quakes...Hit....Hope ?

09 The latest series of quakes raises troubling questions about the stability of the weak houses usually made from mixture of only stone and dried mud.

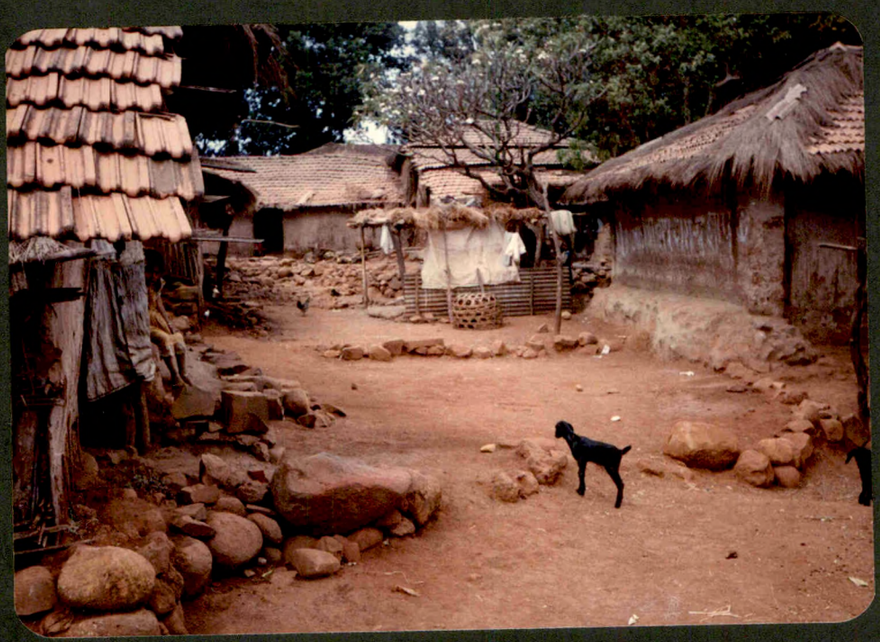


10 Ambai Devarai:- One of the best example of the Biodiversity conservation with the help of local people.
(In the lower zone)

11 Wheat and Maize are harvested in Rabi season on the structural terraces (irrigated through pat ) to the lower side of the village Kulyachiwadi (Tambve)

11 Harvesting season( Rice-Kharif) Kulyachiwadi (Tambve)-terraces on the top of the spur.

13 Kulyachiwadi Settlement-

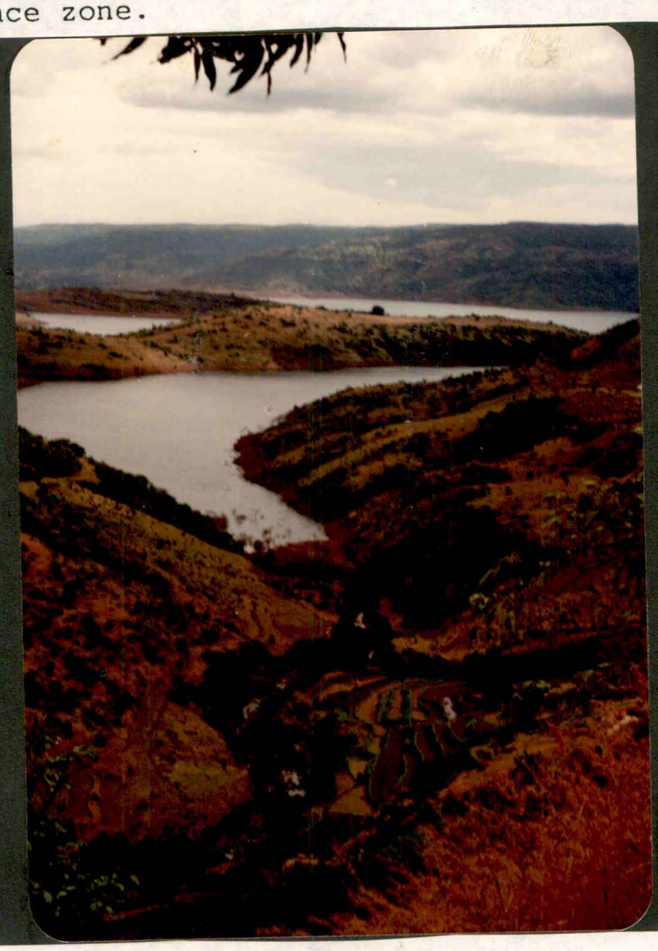


14 Kulyachiwadi (Tambve)- A traditional way of life.

15 Kulyachiwadi- Generation together.

16 Dr.R.N. Hardikar interviewing a villager in Kulyachiwadi.

17 Gavlanwadi (Lower zone)-Inter locking spur tops are cultivated in the submergence zone.



18 Gavlanwadi (Lower zone)- The alluvial terraces in the valley along a stream.

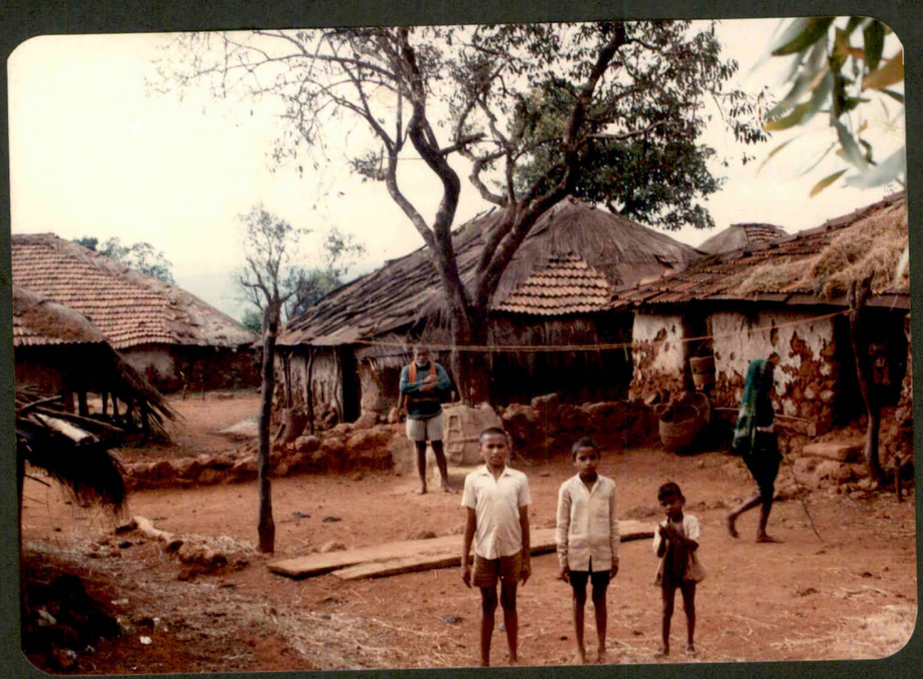
23 Looking to-wards Takale village- It is one of the largest isolated village in the Catchment Area of Warna Dam.

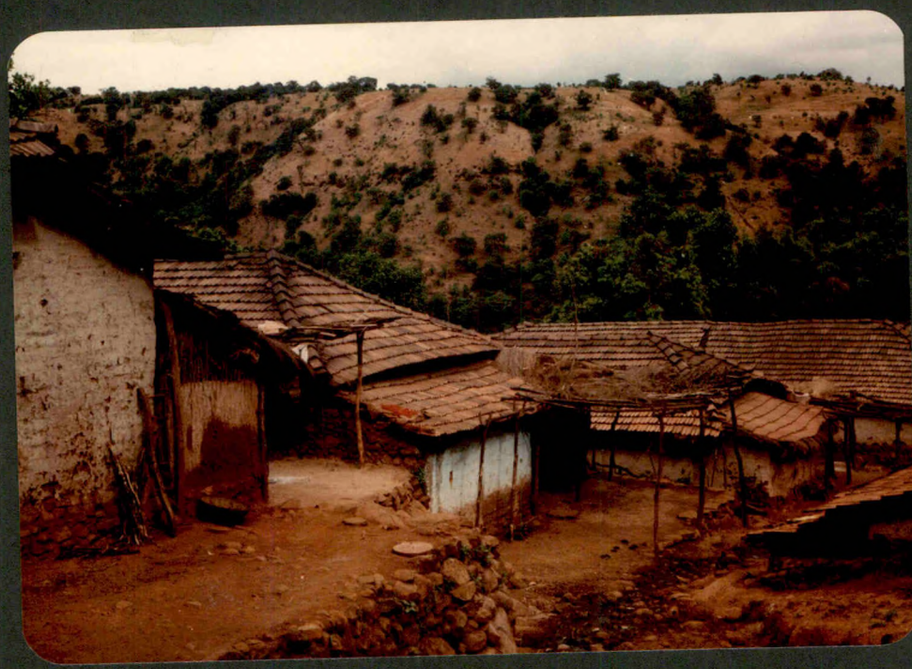
19 Village Takale:- Structural terraces on the top of the spurs harvesting season ( Rice-Kharif).

20 Zolambi live stock:- In search of water on Walmiki Sada.

21 Zolambi-Traditional way of life....

22 Zolambi- A Typical House



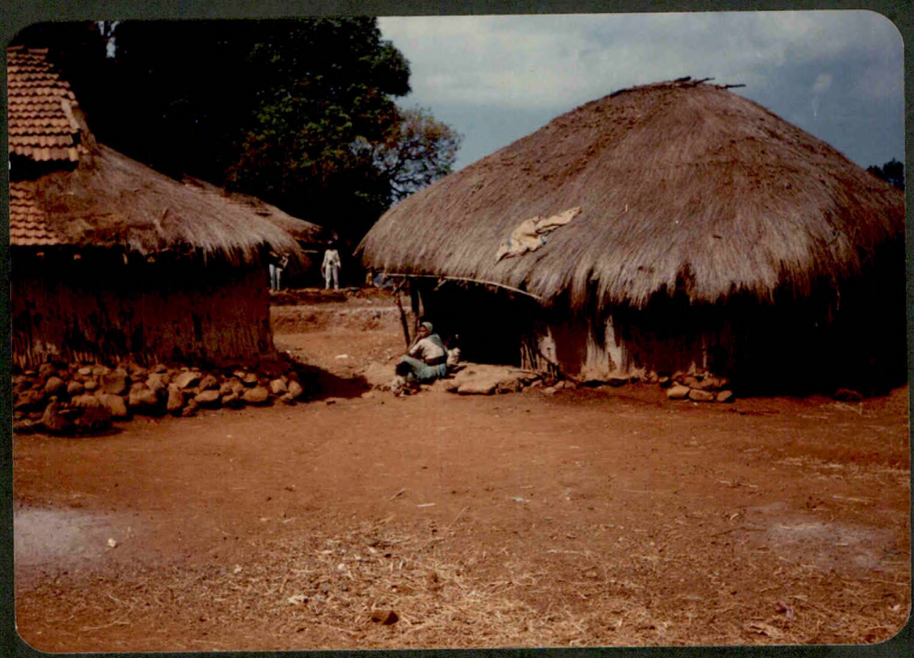


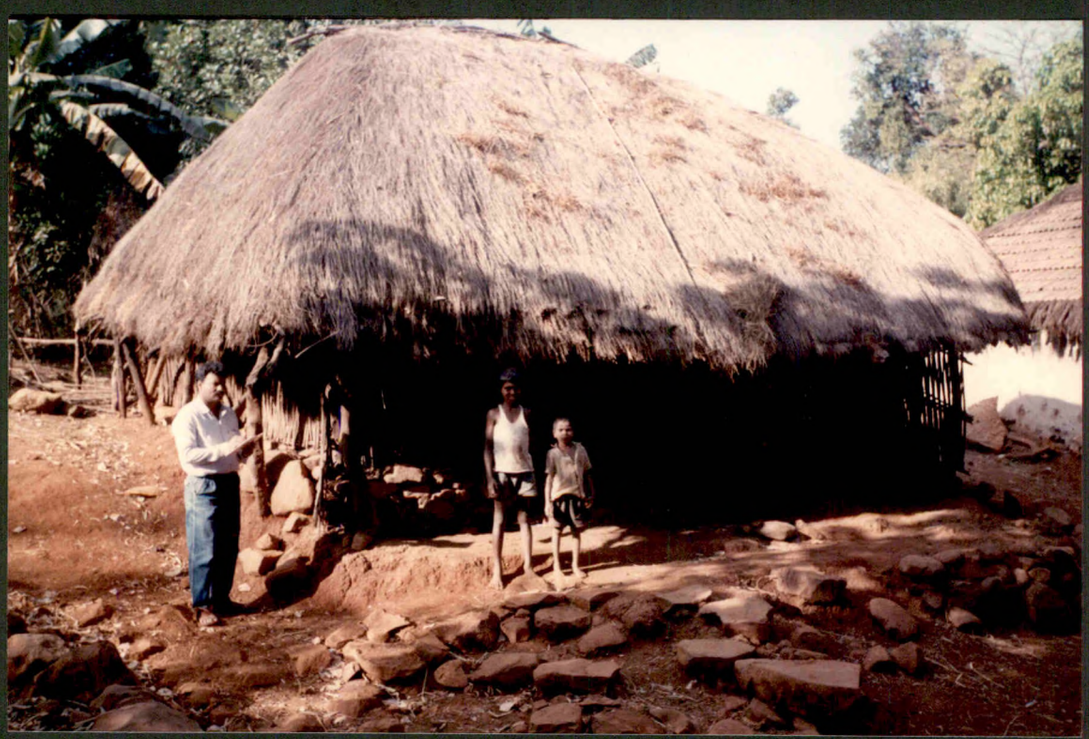
24 Settlement Pattern:- Gavlanwadi: houses are built along sloping side of the valley.

25 Water supplied from a perennial stream through tubes-A only luxury that villagers have been enjoing at village Gavlanwadi near Zolambi.

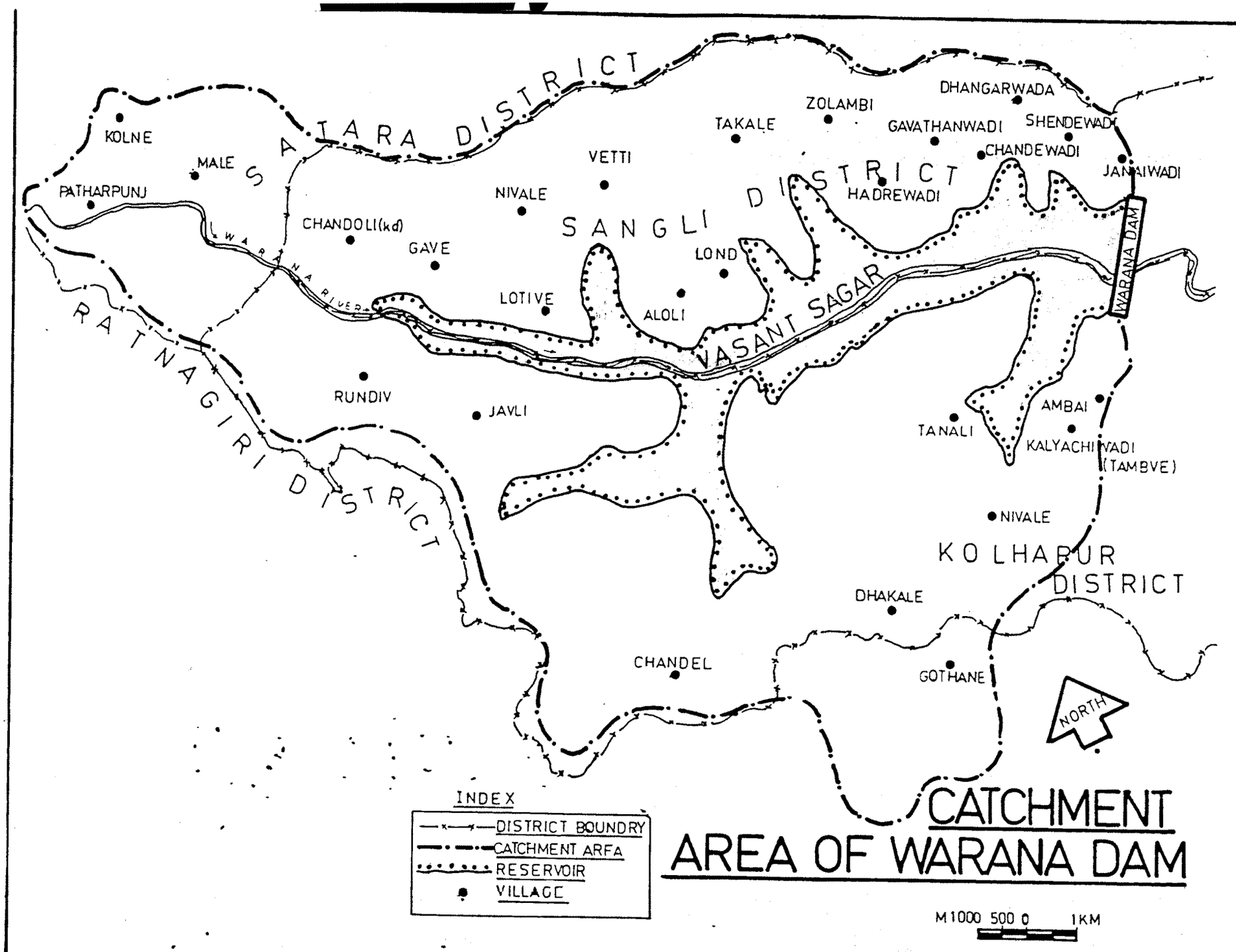
26 A perennial spring at village Zolambi. The only source of water for drinking, bathing, washing and even for irrigation purposes in the village.

27 Village Zolambi:- A post box and electricity lamp post (Solar) both are not in operation for years.





28 Rundiv (Interior zone)- A typical hut sheltered with grass while walls are made of Karvi Sticks and mixture of cow dung and mud is spreaded on both, out side and inside of the walls. The floor is built up by a mixture of cow dung and mud.




# CATCHMENT AREA OF WARANA DAM

MAP NO. 2 (B) 20A

the Western valley. Most of these streams have created water-falls such as those at Tandli-fall, Petlond, Zolambi, Lotiv, Siddheshwar. Government of Maharashtra has proposed to build a HYDEL power station near Tandli water-fall of 240 M.Wt. capacity. The upper course of the Warna river is most zigzag, because of the number of spurs which are interlocking. The river has a fall of 0.19 metre/Km.[1] The river starts at a height of 987 mtrs above MSL and meets the Krishna river at about 539 mtrs above MSL.

(ii) Climate:

The climate of the Warna Dam catchment area is cool and healthy in the hot weather, which becomes chilly during the rainy season. There is a typical west-monsoonal climate with three seasons:

Hot Summer - March to end of May

Rainy Season - June to September

Cold Winter Season - December to February

(Graph No. 1)

The rainfall distribution in upper Warna valley has been shown in Table-2. From the Graph No. 2 we can get the idea of total rainfall distribution for the last eighteen years at the ten centres Chandel, Patharpunj, Chandoli (Bk), Chandoli (Kd), Dhangarwada,

TABLE-1

Showing monthwise rainfall received at Chandoli (Bk) and the monthly temperature (max/min) recorded during the year 1993-94 (April 1993 to March 1994)

| Month | Rainfall mm | Temperature °C | |
|---|---|---|---|
| | | Maximum | Minimum |
| April 1993 | 28.80 | 31 | 21 |
| May 1993 | 123.60 | 27 | 21 |
| June 1993 | 552.00 | 26 | 21 |
| July 1993 | 1,162.35 | 24 | 20 |
| August 1993 | 792.30 | 26 | 20 |
| September | 236.40 | 31 | 16 |
| October 1993 | 184.70 | 29 | 14 |
| November 1993 | 9.40 | 29 | 12 |
| December 1993 | 3.40 | 31 | 06 |
| January 1994 | 00 | 34 | 09 |
| February 1994 | 00 | 39 | 12 |
| March 1994 | 00 | 34 | 19 |

Total rainfall 3,093.95

Average Maximum Temp. 30.1

Average Minimum Temp. 15.9

Source: Warna Dam Division

GRAPH NO-1.

# CHANDOLI (BR.)

MONTHWISE RAINFALL RECEIVED (1993-94)

MAX-MIN- TEMP- RECORDED (1993 94)

SCALE 1 CM = 100 mm RAINFALL

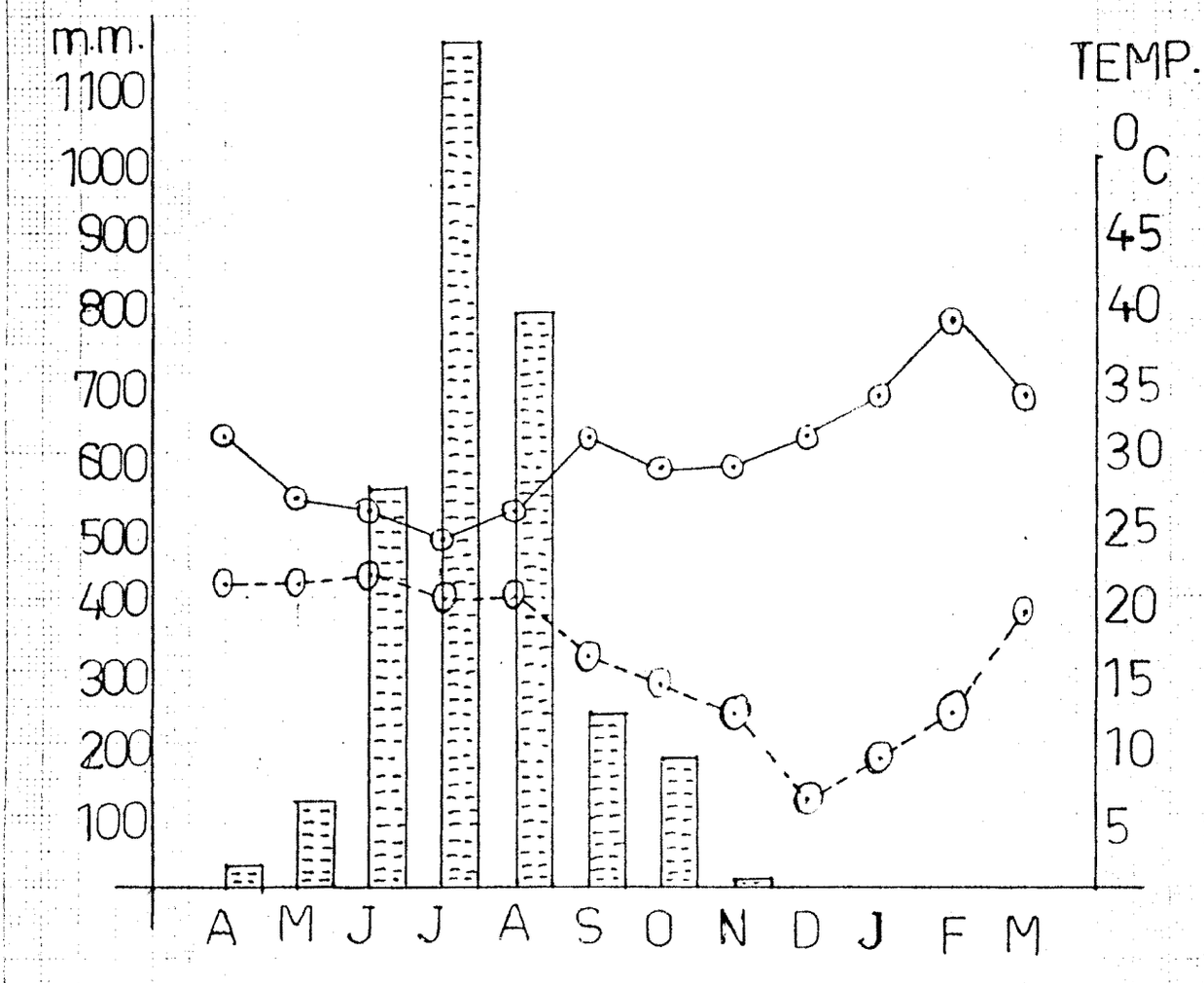
1 CM = 5 $^{0}$C TEMP

INDEX

RAINFALL

MAX-TEMP.

MIN-TEMP.




(SOURCE WARNA DAM DIV.)

TABLE-2

Showing the average annual rainfall received since 1976 at Chandoli (Bk.), Dhangarwadi, Lond, Zolambi, Nivale, Chandoli (Kd.) of Sangli district and Dhakale, Nivale, Chandel of Kolhapur district & Patharpunj of Satara district located in the catchment area of Warna dam.

| Year | | Rainfall mm |
|---|---|---|
| 1976 | ... | 6,424 |
| 1977 | ... | 5,639 |
| 1978 | | 6,169 |
| 1979 | | 5,345 |
| 1980 | | 5,978 |
| 1981 | | 5,045 |
| 1982 | | 4,930 |
| 1983 | | 5,259 |
| 1984 | | 5,075 |
| 1985 | | 4,786 |
| 1986 | | 4,180 |
| 1987 | | 3,554 |
| 1988 | | 4,866 |
| 1989 | | 4,505 |
| 1990 | | 6,437 |
| 1991 | | 5,562 |
| 1992 | | 4,618 |
| 1993 | | 5,736 |

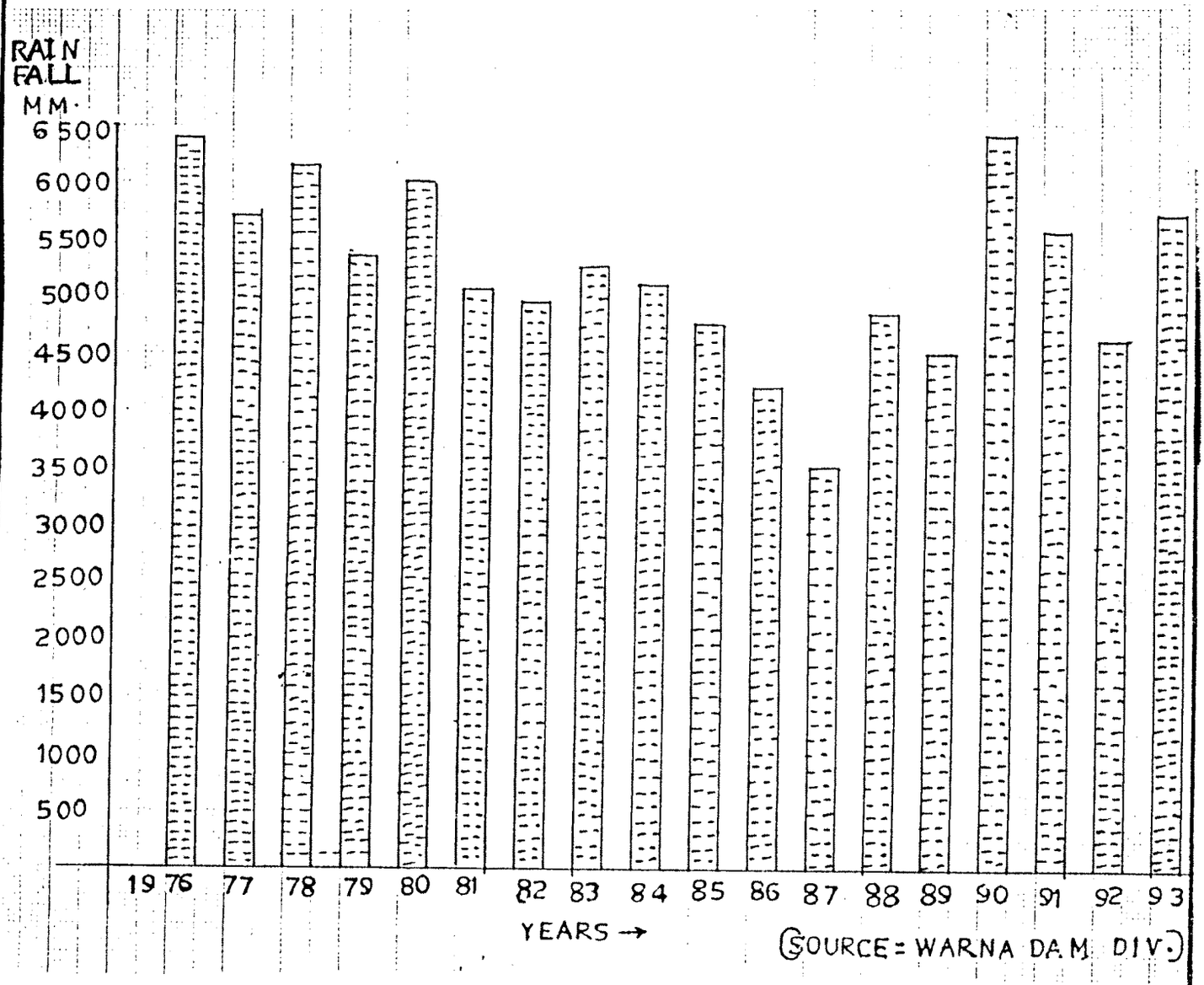
Source: Warna Dam Division

GRAPH NO-2

# AVRAGE ANNUAL RAIN FALL IN CATCHMENT AREA OF WARNA DAM.

(SINCE 1979 TO 93)

SCALE = 1 C.M. = 500 MM.




(SOURCE = WARNA DAM DIV.)

Lond, Zolambi, Nivale (Sangli district), Dhakale, Nivale (Kolhapur district).

There is rapid decrease in the amount of rainfall from west to east in this region. The western parts have received maximum rainfall (7,982 mm at Patharpunj, 7,693 mm at Chandel) and minimum in the eastern part of the dam catchment area (3,093 mm at Chandoli dam side) in the year 1993. Graph No. 1 indicates the maximum and the minimum temperature and normal annual rainfall at Chandoli centre in the year 1993-94.

(iii) Geology:

The only geological formation in Warna Basin is the Deccan Traps (cretaceous eocene).[2] The Deccan lava flows and is found usually in the form of horizontally bedded sheets. The lava flows are more or less uniform in composition corresponding to dolerite or basalt, which are dark grey or greenish grey in colour. The laterite soils occur in the upper part of the Warna basin. The area receives very high amount of rainfall which has made red laterite soils on uplands and reddish brown soils on hill slopes, the latter being developed on parent material of trap rock. On the top of the Udgiri, Walmiki and Rundiv Sadas rich bauxite layers are found. At present the bauxite ore is transported to Belgaum Aluminium factory from Udgiri region; while

the Rundiv and Walmiki bauxite quarries are not used for commercial purposes.

The soils in the upper Warna basin are not retentive of moisture and are fit for raising hill millets alone. Paddy, however, is grown on them in the valleys and along the slopes in terraces. Vegetables and Rubbi crops are grown where irrigation facilities are available (Photograph No.10 ).

(iv) Vegetation:

Warna dam catchment area is the wet and humid climatic area with steep slopes and narrow valleys covered bv dense forest (Photograph No. 6 ). The forest cover in this region could be classified as follows (Map No. 3):

1 Evergreen forest along the slopes of Sahyadri hills, in the valleys and at the foot of hills

2 Wet deciduous forest on the top of the hills and in the eastern catchment area of Warna dam

3 Dry deciduous forest on the slopes of the southern Udgiri hills of the region

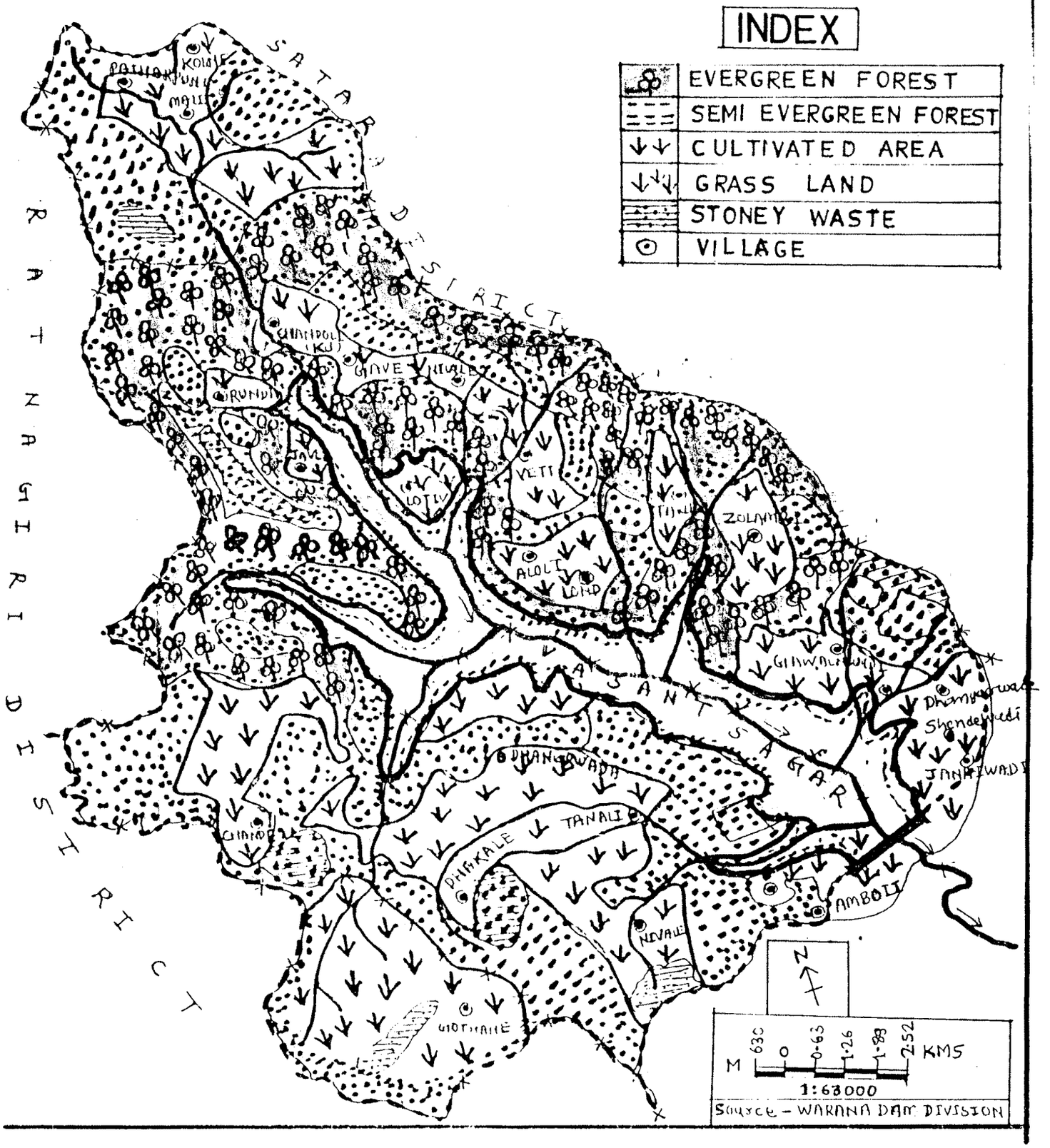
4 Grassy area is dotted with sparse tree growth.

The vegetation is dense, evergreen rain-forest

MAP NO. 3

# LAND USE PATTERN (1991-92)

## IN THE CATCHMENT APEA OF WARNA DAM



in the valley. The tree growth is luxuriant forming high forest chiefly of Jambhul, Pisa, Anjana, Hirda, Vada, Aina, Neem, Khair etc.. In the eastern region the wet deciduous trees are grown such as Vada, mango, Palas, Saga etc.. Recently in the year 1986 the whole dam catchment ara of 301 sq Kms has been declared as 'Chandoli Wildlife Sanctuary' (Chandoli, State Reserve Forest). The region is known for the rich wildlife. The main wild animals are bison, panther, samber, deer, fox, bear, birds, snakes etc.. Attempts are being made to preserve the biodiversity of this region.

## (V) WARNA IRRIGATION PROJECT:[4]

### BRIEF INTRODUCTION:

The Warna Irrigation Project envisages construction of a composite dam across river Warna near village Chandoli in Shirala taluka of Sangli district. The location of the dam is at 73°51'-50" east longitudes and 17°8'-10" north latitudes. The actual construction of dam started in the year 1976-77. The project has been included under Maharashtra Composition Irrigation-II for World Bank loan assistance. The second revised estimated (17.7.1986) cost of this largest earthen dam in Maharashtra is Rs. 288.47 crores. The hard works for Warna Project are likely to be completed by June 1994.

Salient features of the Warna Irrigation Project are as follows:

(a) Hydrology and Water Planning:

i) Catchment area - 301 sq kms (Map No. )

ii) Range of rainfall in catchment area - 3,170 to 6,980 mm

iii) 75 per cent dependable yield - 1,500 MCUM (52.96 tmc)

iv) Water availability - 1,282 MCUM (45.29 tmc)

v) Planned utilization - 1,042 MCUM (36.80 tmc)

vi) Gross storage - 968.43 MCUM (34.20 tmc)

vii) Live storage - 794.37 MCUM (27.70 tmc)

viii) Dead Storage - 148.06 MCUM (6.50 tmc)

(b) Dam Details:

(i) Type of Dam: Central earth dam in the river gorge with masonry dam either flanks. Left flank masonry dam accommodates irrigation and power outlets whereas right masonry dam is for spillway with four radical gates.

(ii) Length of Dam: 1,580 mtr.

(iii) Maximum Height: (above river bed): 77 mtr.

(iv) Full Reservoir Level: 626.90 mtr (F.R.L.)

(c) Canal Details:

(i) Left Bank Canal - L.B.C. - 100 Kms.

In the command area of L.B.C., 60,152 hectares of land will be irrigated from 78 villages from Shirala, Walwa, Tasgaon and Miraj talukas in Sangli district.

(ii) Right Bank Canal - R.B.C. - 182 Kms.

In the command area of R.B.C., 3,848 hectares of land will be irrigated from 104 villages of Shahuwadi, Panhala, Hatkanangale and Shirol talukas in Kolhapur district.

The head works of the Warna Project are almost (95 per cent) completed by June 1993 and a storage created of about 28 tmc water in Vasant Sagar by the end of September 1993. But the canal system, however, shall not be completed for a considerable period because of the lack of funds. In view of this the Government of Maharashtra decided to grant temporary permission for lift irrigation along the Warna river in Sangli and Kolhapur districts to utilize the huge storage of water in the Vasant Sagar.

(d) Land Acquisition and Rehabilitation:

(i) Area under submergence at the seat of dam and colony - 4,559 hectares.

(ii) Number of villages affected - 36, with Gaothan - 27 (18 from Sangli district and 9 from Kolhapur

district under direct submergence) - only land 9 villages, of which 7 villages (Jawali, Rundiv, Gave, Chandoli (Kd), Zolambi, Takale, Lotiv) are from Sangli district and two (Durgewadi, Tanali) are from Kolhapur district.

The rehabilitation of all the 27 direct submerging villages was completed before June 1986.[4] Of the total 27 direct submerging villages, 18 villages were in Sangli district (4,752 population of 853 families affected) and 9 villages were in Kolhapur district (2,279 population of 585 families were affected.)

(iii) Population affected due to direct submergence - 7,026 people (1,438 families) of which 4,752 people (853 families) were from Sangli district and 2,279 people (585 families) were from Kolhapur district. The resettlement of the uprooted villages due to direct submergence is shown in Map No.

In the catchment area of Warna Dam still 25 villages[5] (of about 5,000 people) are waiting for their settlement. The whole 301 sq kms of catchment area of Warna Dam has been declared as 'Chandoli Wildlife Sanctuary (State Reserve Forest) in 1986. First they were affected by the dam, then they became victims of conservation and recently after 8 December 1993

they have been struck by the earthquake. Thus, natural calamities and man-made problems have together created a big question-mark before the people living for centuries in the upper Warna valley - How to exist?

## NOTES AND REFERENCES

1 Hardikar, r.n. - "Slope Development for Better Landuse - A Case Study of Warna Basin", a U.G.C. Research Grant Project Report, 1979, pp. 7-28.

2 Government of Maharashtra - Maharashtra State Gazetteer, Sangli District - 1969, pp.

3 Government of Maharashtra - "Warna Irrigation Project" Warna Project Circle, Kolhapur 1992-93, pp. 2-6.

4 Government of Maharashtra - "Warna Irrigation Project", Warna Project Circle, Kolhapur, 1992-93, p. 16.

5 News item in Daily Pudhari - Sanjay Patil (Shirala) 19 Nov. 1993.