

FOR LIMITED CIRCULATION

AGRICULTURAL DEVELOPMENT PERSPECTIVE
OF
SOLAPUR DISTRICT

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DRY FARMING RESEARCH STATION
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AGRICULTURAL DEVELOPMENT PERSPECTIVE ^{MS} ^{ees}

OF
SOLAPUR DISTRICT

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CHAPTER I

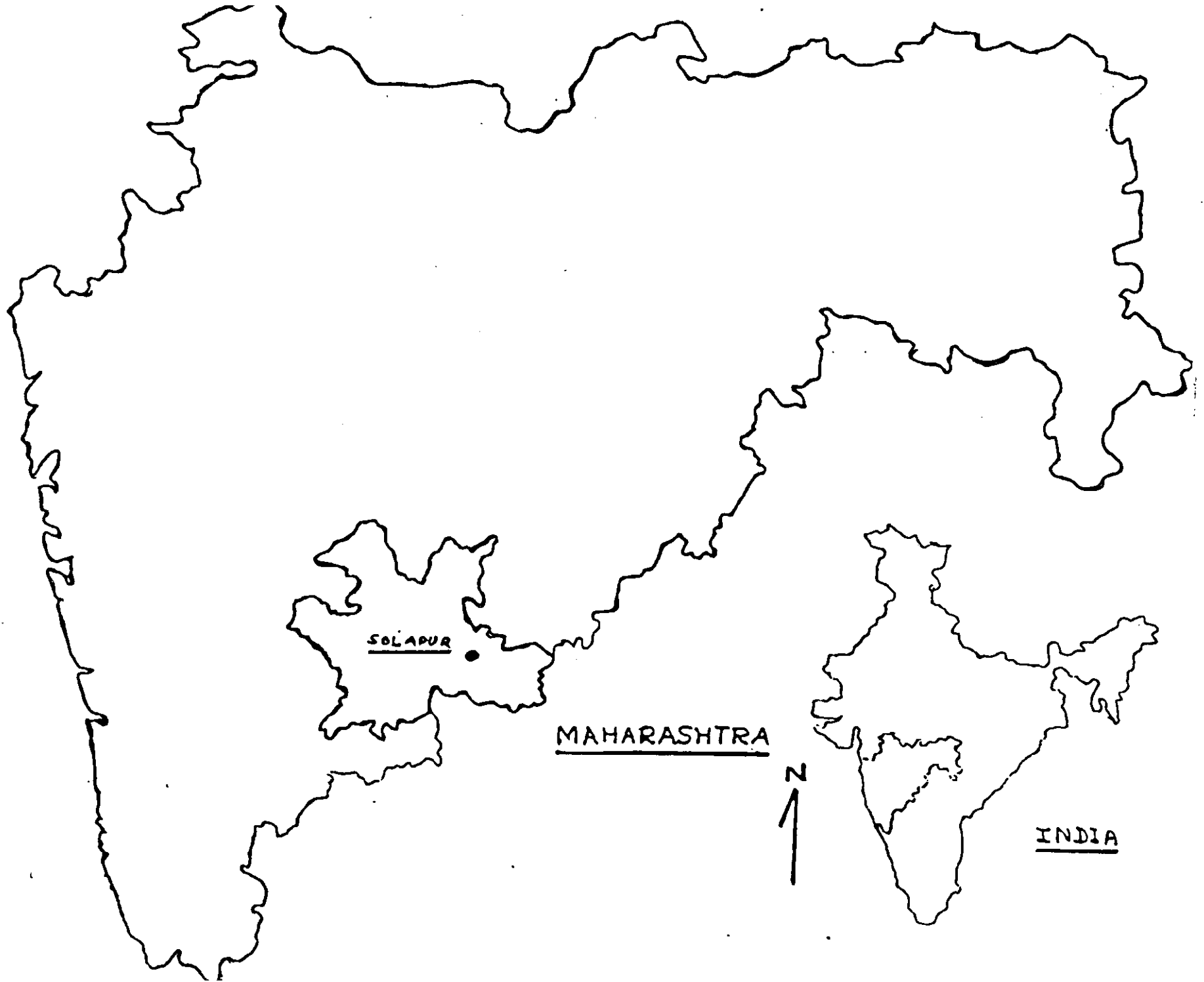
PROFILE OF SOLAPUR DISTRICT

The concept of disaggregated level planning is not really new in Indian Planning but it has never been seriously implemented. In Maharashtra the thinking began since the initiative of Professor D. R. Gadgil with Wardha Plan laying down the basic methodologies. The rationale of district planning can be set into multi-level spatial planning process with a homogenous planning unit. Though agriculture and allied activities would form the core of the district plan the other sectors must have their due position and respective allocations with linkages clearly spelt out. Moreover, a district development strategy would depend on broad typologies of districts and the main economic currents. Given the present planning process it would be necessary to compartmentalise the decisions according to the domains of higher level planning by only indicating the leads and probable targets. In the present exercise we intend to outline the planning contours of a chronically drought prone district of central India. The main emphasis of this document would be on agriculture and allied sectors but care is taken to indicate the sectorial linkages wherever possible.

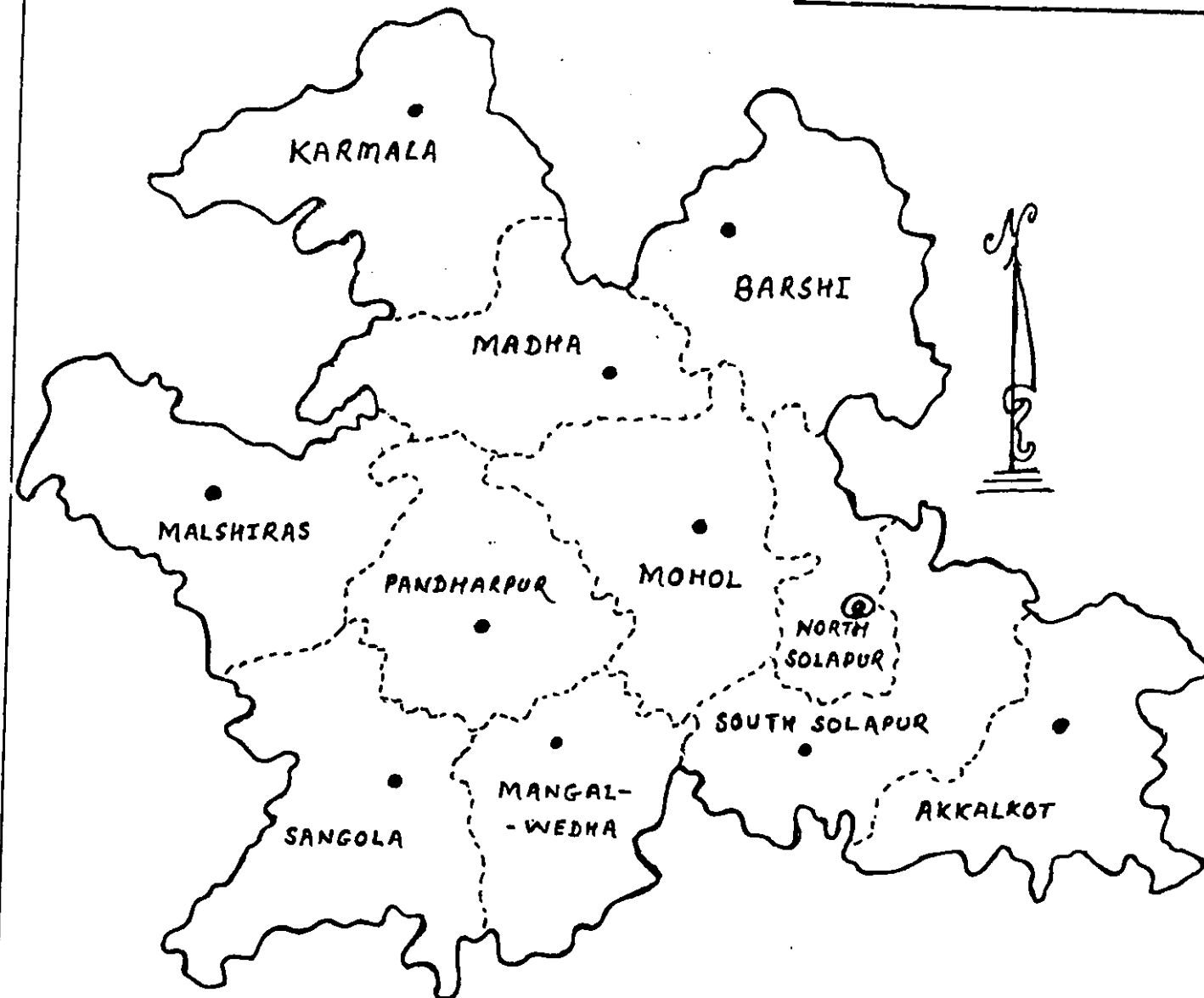
1.1 SOLAPUR : THE SETTING :

Solapur, in south Maharashtra, is situated between 17° 10' and 17° 32' north latitudes and 74° 42' and 76° 15' east longitudes. It is bounded by Ahmednagar and Osmanabad districts on north, Osmanabad and Andhra Pradesh in the east, Karnataka State in the south, and Pune district in the west. There are no important hill systems in the district. Only in the northern part a few spurrs of Balghat range pass through a few kilometers. Rolling topography is the typical topo sequence with very shallow, shallow soils on ridge, medium deep soils on slope and deep soils in the valley portion.

The whole district falls in Bhima and Sina river basin. Bhima river which rises in Sahyadri at Bhimashankar in Khed Tahsil of Pune district is the chief river with its right bank feeders, Nira and Man and left bank feeders Sina and Bhogavati. The length of the river is 289 kms in the district. The water courses of tributaries in the district may be reckoned at about 650 km. But the district could not fully exploit the benefits of the river systems.



SOLAPUR DISTRICT



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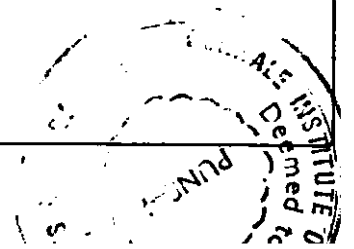


Table 1.1 Quantitative Profile of Solapur District

S.No.	Particulars	1950-51	1980-81
1	Area (in Sq. Km)	15057	14845
2	Total Population (in Lakhs)	15	26
3	Density of Population (Per Sq. Km)	100	174
4	Literacy	(1961)	(1981)
	Male	36.9	53.6
	Female	12.6	26.9
	Total	25.1	40.7
5	Area Under Forest as % of Total Geographical Area	(1950-51) 2.26	(1982-83) 2.17
6	Cultivable Area as % of Total Geographical Area	87.33	88.54
7	Cultivable Area per Agriculture Worker (ha)	(1950-51) 3.30	(1982-83) 2.14
8	Gross Cropped Area ('000 hectares)	1095	1124
9	Cropping Intensity (%)	-	(1982-83) 105.9
10	% of Uncultivated land (Current Fallows + Other Fallows)	-	9.65
11	Gross Irrigated Area as % of Gross Cropped Area	(1950-51) 8.10	(1982-83) 13.7
12	Net Irrigated Area as % of Net Cropped Area	6.92	12.81
13	Area Irrigated By		
	a) Canals % of Net Irrigated Area	9.46	33.33
	b) Wells % of Net Irrigated Area	90.54	74.77

Contd...

Table 1.1 : Contd...

	(1950-51)	(1982-83)
14 Area Irrigated Under		
a) Foodgrain % Of GCA	6.48	8.72
b) Sugarcane % Of GCA	0.55	2.13
c) Groundnut % Of GCA	0.27	1.16
d) Cotton % Of GCA	0.18	0.45
e) Fruits % Of GCA	-	0.14
f) Jowar % Of GCA	-	4.80
g) Bajra % Of GCA	-	0.44
		(1980-81)
15 Soil Conservation		
a) Area Bunded (ha) as % of Cultivable Area	5.02	63.11
b) Area Reclaimed (ha) (1980-81) & (1987-88)	6000	15000
	(1961)	(1982)
16 Agri Implements (Per ha NCA)		
a) Ploughs 1)Wooden	0.01	0.01
2)Iron	0.02	0.04
b) Oil Engines & Elec. Motors With Pumps & EP Per Ha of N.I.A. (1960-61) & (1982-83)	0.03	0.39
	(1977)	(1982)
17. Live Stock (*1977-78) & (*1982-83)		
a) Draft Bullocks Per ha *Net Cropped Area	0.15	0.17
b) Milk Animals per 1000 Persons (1980-81)	49.41	52.99
	(1950-51)	(1980-81)
18 Electricity		
a) Electricity Generated (Mkwh)	0.1	20.4
b) Electricity Consumed (Mkwh)	4	470
c) Towns Electrified	4	10
d) Villages Electrified	-	1092
	(1950-51)	(1987-88)
19 Co-operation (Societies)		
a) Agril. Credit Society		848
b) Agril. Non-credit Society	500	1003
c) Non-Agril. Credit and Non-Credit Society		2366
	(1950-51)	(1987-88)
20 Working Capital (000 Rs.)		
a) Agril. Credit Society		1655252
b) Agril. Non-credit Society	21424	976417
c) Non-Agril. Credit and Non-Credit Society		2715818

Note : Years are mentioned in brackets.

The geographical foundation of soils prevailing in Solapur district is mainly from Deccan Trap of volcanic origin viz. "Basalt". The soil is underlain by partially decomposed basaltic rock locally known as "murum" which overlies parent material. On account of more or less complete absence of leaching the soils are base saturated the exchangeable calcium being the predominant cation. The free lime content is fairly high (5 to 10 percent). The soils exhibit varying degree of erosion and truncated profile. Generally soils are clay in texture with predominant montmorillonite clay mineral. Because of the clay minerals, the soils exhibit swelling and shrinkage property on wetting and drying develop cracks after rainy season. The soils are generally low in total nitrogen, low to medium in available phosphorous and high in available potash. Crops do exhibit iron deficiency due to excessive soluble calcium. The soils in the district can be classified mainly on the basis of depth because the moisture storage capacity is governed by the depth. Medium deep soils (22.5 to 90 cms) dominate the soil profile with 45 percent of area followed with 25 percent of deep soils of more than 90 cms of depth. About 30 percent of the area is under shallow soils.

Solapur district has a population of 25.8 lakhs of which about 80 percent is rural population. The decadal change in population between 1951-61, 1961-71 and 1971-81 work out to be 23.6, 21.2 and 14.8 percent respectively. It is essential to note that the district can be classified as one of the net out-migratory district because the main stay of rural population offers little scope for achieving decent level of living. Cultivators and agricultural labourers form the main strata of the workers. Household industries, manufacturing and repairs also engage a significant portion of workers. The employment profile of the district suggests that there is a large scope in the household and other industrial sector. The carrying capacity of the main workers is also quite large. This indicates that there is a necessity for diversifying the employment profile by withdrawing surplus man-power of agricultural sector. The level of literacy in the district is not very high even when almost all the villages have an access to educational facilities, Table 1.2 shows the access to infrastructural facilities by villages and population as revealed by 1981 census. It may be noted that the district has fairly good infrastructural development. But market, medical facilities and roads lagging far behind other amenities.

The district is spread over 1501 thousand hectares with 11 tahasils. Though the entire district comes under scarcity zone by rainfall and aridity index it has a substantial area with annual rainfall in the range of 500 to 600 mms. All the talukas have kharif as well as rabi season precipitation and hence the cropping pattern is well diversified across crops but concentrated over kharif season. Total cropped area of the district is 1124 thousand hectares of which 39 thousand hectares are cropped twice with a meagre cropping intensity of about 106 percent. The district has 2.17 percent of forest cover with only a few hills in the north and some spread over small shrub

forests. Pasture lands are 4.58 percent of the total cultivable area and this sustains the livestock of the region. The uncultivated land (other fallows and current fallows) account 9.65 percent of the total cultivable land which can support the livestock economy of the district.

The district is one of the chronic drought hit districts of the state and hence agricultural sector presents quite a low profile in the economy. Among the other sectors of the economy the household industries and other rural industries contribute a significant share. This is followed by tertiary sector. The population dependent on agriculture however is largest as compared to the other sectors of the district economy (Table 1.3). The district hence offers a little scope for intensive commercialised agriculture.

The district has a low growth profile compared to the neighbouring district and the state. The growth rate in aggregate productivity of major crops works out to be 1.80 percent over the three decades ending at 1980-81 as compared to 2.30 percent of the state.

Table 1.2 : Infrastructural Development of Solapur District

Amenities	Proportion of population / village served by Infrastructural facilities	
	% of Villages	% of population.
Education	99.0	99.7
Medical	23.3	45.0
Drinking Water	100.0	100.0
Post and Telegraph	45.5	70.1
Market/Bazar	15.6	30.0
Communication	60.2	75.5
Approach by Pucca Roads	30.4	46.2
Power	76.3	87.3

Source : District Census Handbook of Solapur, 1981.
Census of India.

Table 1.3 : Employment Profile of Solapur District

Total Workers (Numbers)		974,800
Work Participation Rate	Main	81.66
per 1000 Population	Main & Marginal	89.64
Proportion of Agriculture Workers to Total Workers (Cultivators & Agricultural Workers)		70.07
Proportion of Cultivators to Total Workers		14.22
Proportion of Agricultural Workers to Total Workers		55.85
Proportion of Workers Engaged in Other Household Industries etc. to Total Workers		3.63
Proportion of Non-Workers to Total Population		11.28
Carrying Capacity of Workers (Non-Workers Per Head of Main Worker)		1.38

Source : District Census Handbook of Solapur, 1981.

Table 1.4 Growth Rate in Aggregate Productivity

	1950-51 to 1971-72	1973-74 to 1980-81	1950-51 to 1980-81
Solapur	1.12 **	2.43 *	1.80 **
Maharashtra State	1.30	2.51	2.30 ***

Note : 1) *, **, *** indicate statistical significance at 10, 5 and 1 percent levels.

2) Aggregate productivity is computed by taking average farm harvest prices of three normal year around 1968-69.

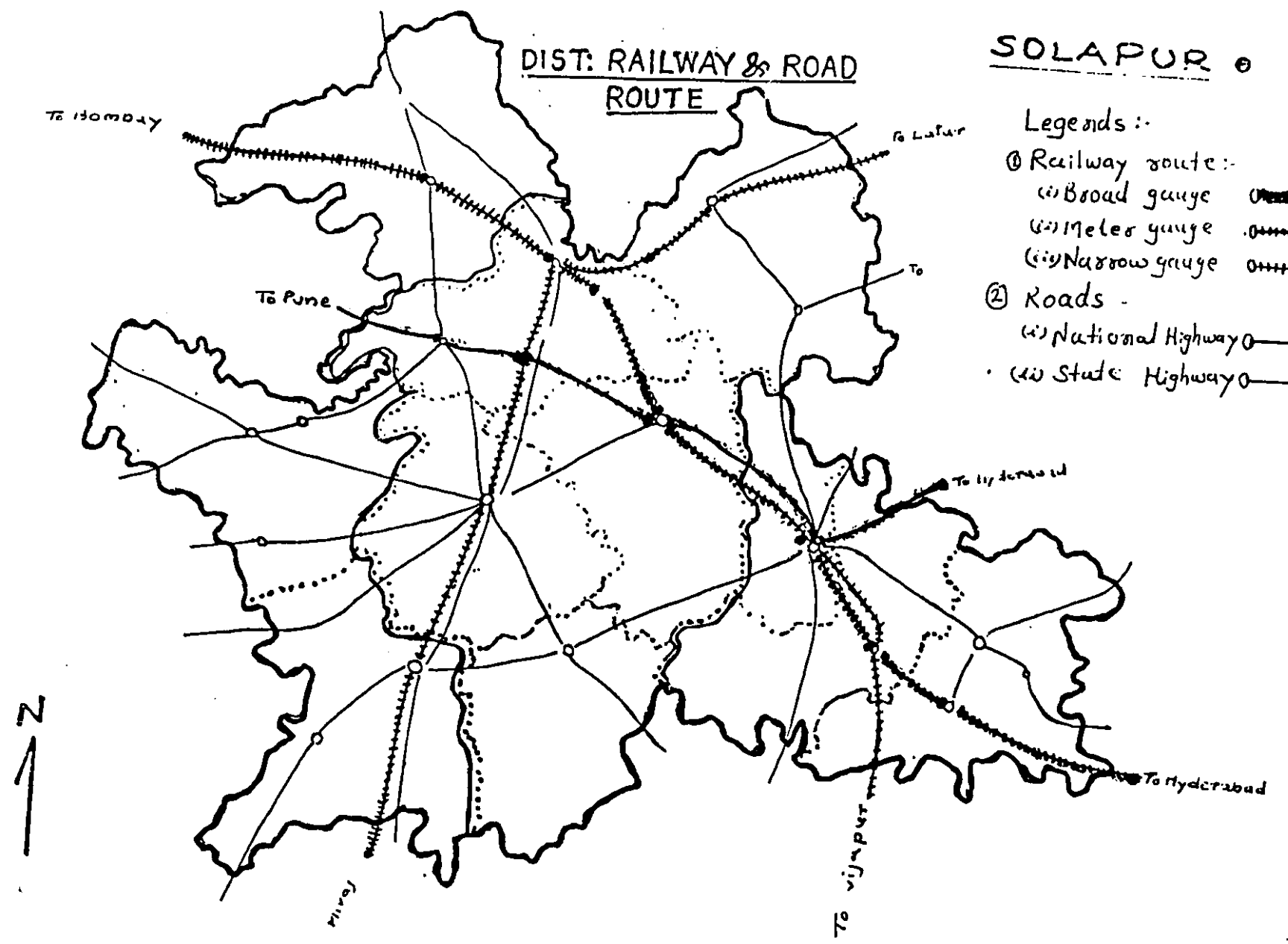
Jowar, Bajra and red gram are the major crops with wheat, gram, sunflower taking the secondary position. The cropping pattern is dominated by low value - low density crops and hence the financial flows from farm sector are limited. Sugarcane, cotton, groundnut and sunflower account for about 10 percent of the gross cropped area which is indicative of lower level of commercialised agriculture. Horticulture offers a great scope in this district with pomegranate, grapes and lime taking

DIST: RAILWAY & ROAD
ROUTE

SOLAPUR ⊙

Legends :-

- ① Railway route :-
 - (i) Broad gauge ⊖⊖⊖⊖⊖⊖
 - (ii) Meter gauge ⊖⊖⊖⊖⊖⊖
 - (iii) Narrow gauge ⊖⊖⊖⊖⊖⊖
- ② Roads -
 - (i) National Highway ⊖—⊖
 - (ii) State Highway ⊖—⊖



the lead. Ber has picked up as a promising fruit crop in the recent past. The average size of holding is quite large in the district with more than 70 percent of the area under the holding above 5 hectares. Irrigation has a limited scope in the district with only 12.8 percent net sown area irrigated. Ujani Dam on Bhima river irrigates about 40 thousand hectares of the 171.4 thousand hectares potential. With the dominant black soils it is not unlikely that this level of irrigation would not lead to certain environmental problems.

Table 1.5 : Growth rates in production of principal crops
Solapur District 1950-51 to 1980-81

CROPS	GROWTH RATES
Total Jowar	0.40
Bajra	3.26 ***
Cereals	1.20 *
Pulses	0.62
Foodgrains	1.14 *
Sugarcane	4.52 **
Groundnut	-3.80 ***

Note : Significance levels as indicated in earlier table

Having a limited scope under crop husbandry sector the structure of the district economy has leaned towards allied agricultural activities which offer better income flows with less uncertainty. Animal Husbandry and allied agricultural industries open up such opportunities in the area. Both dairy and poultry are already showing promises in Akluj and Sangola tahsil of the district. Other industries include agro-processing and textile units with a large untapped potential.

1.2 Dry Farming Research Station :-

The history of agriculture in Solapur reveals that famine is of common occurrence from ages due to inadequate and illdistributed rains. Partial and complete failure of both kharif and rabi crops result in famine. Drinking water becomes an acute problem along with the shortage of food commodities especially fodder for cattle. Most of the development expenditure has to be diverted towards relief measures and providing alternative employment to the affected population. The cyclical impact of this phenomena leaves development work unaccomplished.

Paradasani Commission (1960), Irrigation Commission (1962) Facts Finding Committee (1973) and Subramaniam Committee (1987) have studied the problem of scarcity and famine in detail to suggest the measures for alleviation of impact. The famines of 1972-73 and 1986-87 were most severe in nature in the recent past which have affected most adversely the economy of the scarcity zone in general and Solapur district in particular.

Keeping in view the natural constraints of the district and considering the importance of dryland agriculture in the Old Bombay State, the then British Government initiated the Dry Farming Programme at Manjri - near Pune in 1923. The centre was shifted to Solapur in 1933 where efforts are continuously on to evolve suitable techniques to improve the rainfed agriculture. The then Imperial Council of Agriculture Research (now ICAR) also supported the project. Solapur Centre gave technical leadership in the country with supporting centres at Rohtak (now in Pakistan) Bijapur, Bellary, Raichur etc. From time to time various techniques of soil and water conservations and crop production were developed and made available to the farming community and Government for implementation. This includes contour cultivation, strip cropping, contour bunding, famous Bombay Dry Farming Method etc. It has made a good impact as evident from the increased production under different rainfed condition.

Earlier work at Solapur was concentrated on soil and water conservation. Fertilizer use also came in to existence after independence. However, crop production strategy was developed with effect from 1970 when All India Co-ordinated Research Project on Dryland Agriculture was launched by ICAR with 21 centres spread in the country. The dynamic leadership of the then Project Director Dr. Ch. Krishnamurthy, lead the country on sound footing and hence the project continues to contribute significantly all over the country to meet the requirement of different parts. Solapur centre has also given leadership in contingent crop planning. Efforts are being made to diversify the agriculture and find out alternate land use. Results of research on pasture, dryland horticulture, agro-forestry, organic recycling etc. have opened new vistas in modern agriculture for stabilising and increasing production and income from each unit area. Now, sufficient information is available to meet various local situations. Hence, integrated efforts are required to be made in the District Production Planning

The significant contribution from the Dry Farming Research Station, Solapur in the various farming sector can be narrated briefly as under alongwith the expected impact.

- i) Soil and water conservation
- ii) Cultivation practices
- iii) Crop improvement
- iv) Cropping systems
- v) Agricultural engineering
- vi) Watershed management

i) Soil and water conservation :

Black soils are characterised by low infiltration rate and swelling and shrinkage property. These soils are highly erodable. During rainy seasons high intensity causes runoff and ultimately soil losses. This also induces in nutrient loss. Hence, in eroded soils, the crop growth is affected severely. The various measures have been suggested from time to time with specific objective which are given below.

- a. Contour cultivation : To reduce runoff and soil loss on account of rolling topography and tillage operations.
- b. Strip cropping : To reduce beating action of rain drop and spurting of soil particles by primary crop canopy of erosion permitting and resisting crops.
- c. Contour bunding : To provide mechanical soil structure across the soil slope to act as barrier for runoff and soil loss in shallow and medium deep soils.
- d. Graded bunding : To provide mechanical soil structure across the soil slope as barrier for runoff and soil loss in deep black soils with provision of safe disposal of excess runoff.
- e. Compartmental bunding : To increase opportune time for intake of water by providing small mechanical structures in between banded areas.
- f. Live bunding : To establish Khas (Vetiver)) and/or subabhul (Leucaena) in between banded areas at definite interval to increase opportune time of intake of water.

ii) Cultivation practices :

- a. Famous Bombay Dry Farming method deals with package of practices which includes ploughing once in three years, 3-4 harrowing during rainy seasons, wide spacing between rows, specific 3 interculturing operations. This helps in moisture conservation and boosting crop production.
- b. In case of kharif cropping weed control for first 30 days has been found to be most effective to avoid competition for moisture and nutrients.
- c. Fertilizer use has been found to be most important factor for boosting crop production next to soil moisture. The efficient utilisation of fertilizer nutrients, the placement below the seed has been found most essential. Two-bowl-ferti-drill, a bullock drawn implement carries out the operation very effectively which can be adopted by the farmers. The State Government gave subsidy for converting drill into Two-bowl-ferti-drill.

- d. Shivaji multipurpose implement : A bullock drawn Shivaji multipurpose implement has been developed which can carry out all field operation more efficiently excepting ploughing. Large scale manufacture is still awaited. Seed and fertilizer placement alongwith seed covering can be carried out by only one pair of bullocks. This needs to be manufactured on a large scale.
- e. Dry seeding : In order to utilise the soil moisture efficiently, the dry seeding of most of the kharif crops excepting groundnut is recommended by taking advantage of weekly rainfall probability data for each tahsil.

iii) Crop improvement :

Screening and testing of crops and their varieties for drought tolerant, pest and disease resistance, high yield etc. are in progress. Following crops and their varieties have been evolved and found suitable for Solapur district.

Kharif - Bajra	- ICTP 8203 WCC-75
	*
Sunflower	- SS-56 Morden EC 68414
Groundnut	- K-4-11
Red gram	- BDN-2 NO 148 ICPL 87
	*
Moth bean	- MBS-27
	*
Horse gram	- Sina Man
Rabi - Sorghum	- M-35-1 Swati Lakadi Jeur-2 Selection-3
Gram	- Vikas
	*
Safflower	- Bhima

* These varieties are evolved at Solapur centre

iv) Cropping systems :

Even though monocropping is the rule, there is scope for increasing cropping intensity by adopting intercropping and double (sequential) cropping. Following cropping systems have been recommended for different soil types.

- a. Very shallow soils - grasses
- b. Shallow soils - bajra + moth bean / horse gram in 2:1 proportions
- c. Medium deep soils (upto 45 cm)
 - i) Bajra + red gram (2:1)
 - ii) Sunflower + red gram (2:1)
- d. Medium deep soils (60-90 cm)
 - double cropping
 - i) bajra - gram / safflower
 - ii) cow pea for fodder / udid - rabi sorghum/safflower
 - iii) Sunflower - gram

Besides seasonal crops the recommendations are also available for alternate land use, horticulture crops and contingent crop plan.

Alternate Land Use :

Very shallow soils and to some extent shallow soils should be put under pasture, horticulture, silviculture and agro-silvi-horti-pasture systems which would give better monetary returns over a period of time.

- a) For this purpose besides blue panic, marvel-8, siratro, a legume viz. stylo haemata has been found to be most promising.
- b) Subabhul for fuel, fertilizer and fodder has been found to be very good species for dry land agriculture.
- c) Agave for fiber can be grown very successfully in very shallow soils, which can be further used for paper industry.
- d) Horticulture crops like ber, pomegranate, custard apple, mango, tamarind, aonla, drum stick, wood apple etc. have been found to be most suitable for drylands. These can be intercropped with grasses or seasonal crops.

Contingent crop planning :

Aberrant weather conditions calls for alternate strategy for crop planning which has been very well developed for different rainfall situations and soil types for kharif and rabi seasons. For delayed onset of monsoon crops like sunflower, red gram and castor should be preferred for kharif seasons to stabilise the production to the extent of 60 to 70 percent.

v) Agricultural Engineering :

This covers development of implements as well as soil and water conservation. Development of improved implements is essential for efficient utilisation of bullock power and natural resources.

Runoff collection in dug out farm pond, storage and recycling for giving life saving irrigation and for boosting production from dryland is part and parcel of water management selection of site, designing, reducing seepage and deep percolation losses, efficient systems of giving irrigation etc., are important aspects of agricultural engineering which are also attended to in research. Efforts are required to make the farm pond technology economically feasible by introduction of high value crops like fruit crops and vegetables.

vi) Watershed Management :

This is an integrated approach for efficient utilisation of natural resources for the benefit of mankind. This includes all aspects already mentioned above by properly locating the various activities at different places in the watershed. Human resource is also important without which it would be futile to attempt an exercise. In watershed management there is a community approach to the problems of soil and water conservation, utilisation of ground water, plant protection, planting according to soil types etc. Hence collective and co-operative efforts are essential for watershed management. Such exercise is being done at Sasure in Barshi tahsil (sub-region II) in the Operational Research Project. Benefits of watershed management has to be worked out collectively instead of individual farmers.

1.3. BASIC PHILOSOPHY OF DISTRICT DEVELOPMENT PLANNING

Solapur is one of the often referred semi-arid district of the state. Rainfall and water resources do not offer a great potential to design an intensive commercialised agricultural system. The experiments at the dry farming research stations have proved the necessity of adopting the dry land technology with watersheds as the basic and integrated planning unit. Accordingly some experiments have proved extremely encouraging but it is essential to dovetail these with a proper institutional set up. Further, the watershed based approach alone may not absorb the abundant surplus manpower from agricultural sector. Hence, as a supplementary strategy based on the allied agricultural activities e.g., dairy, poultry, fishery, sericulture, resin making etc., and rural small scale industries like textile, pottery, agro-processing need to be chalked out. Voluntary agencies can take a lead in establishing and supporting these activities because the population is basically risk averse. The surplus manpower has to be gainfully employed in productive and growth oriented activities. This would in turn may help to alleviate the poverty level and inject an impetus for development.

1.4. Sub-Regionalisation -

Solapur district with geographical area of about 14845 sq. km. has 11 revenue tahsils. The following criteria were been chosen for sub-regionalisation of the district for effective strategy formulation :

A. Water availability period (WAP)

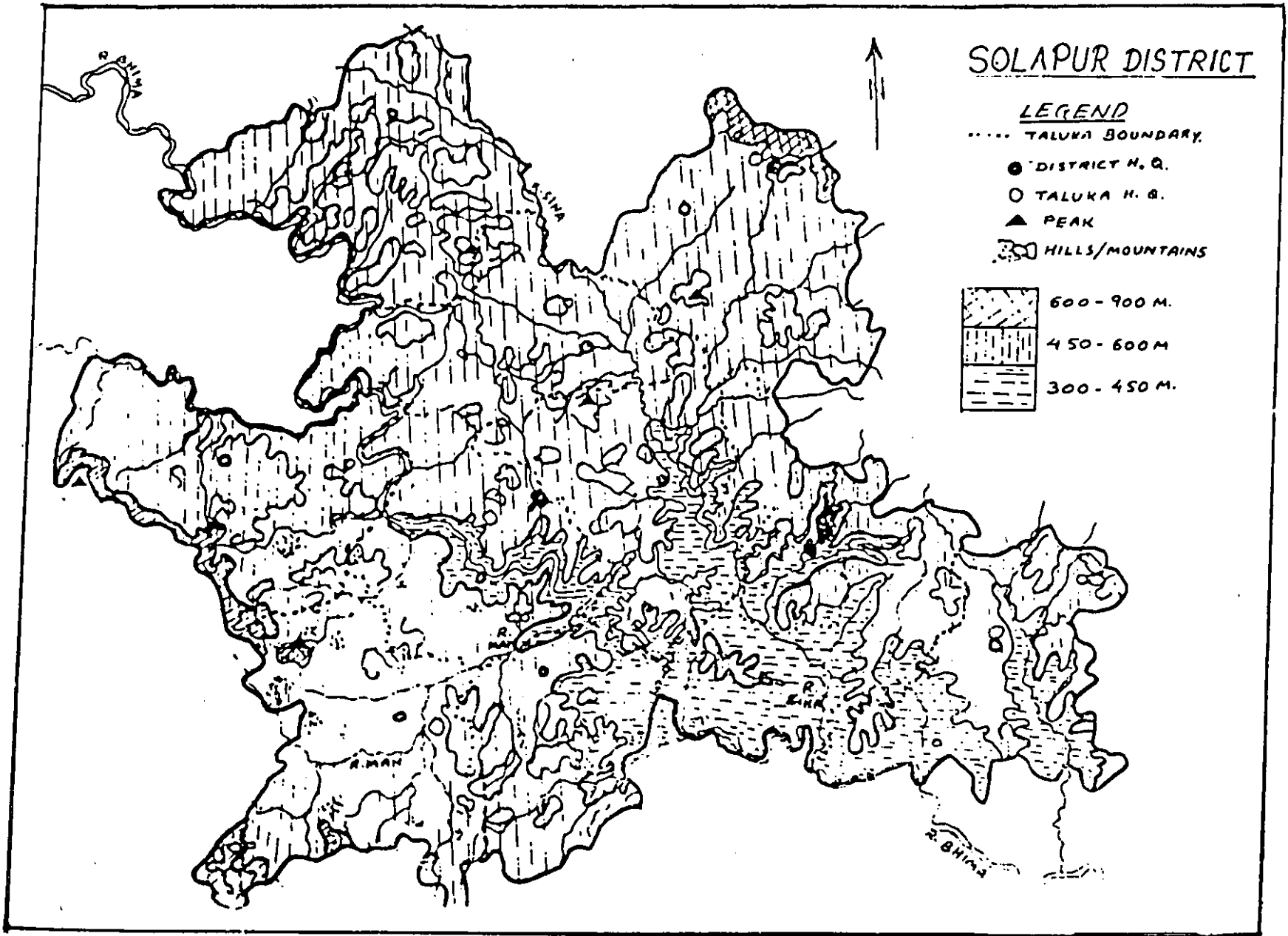
The relationship of potential-evapotranspiration with rainfall governs the water availability period for crop growth and hence it is important factor to be considered (see Map) There are tahsils where the WAP is less than 100 days while there are tahsils where the WAP exceeds 130 days. This criteria is useful for regionalisation since it gives a composite effect of soil and precipitation.

- | | |
|-----------------------------|---|
| a) WAP exceeding 130 days | North Solapur, South Solapur, Mangalvedha, Pandharpur, Barshi |
| b) WAP between 100-130 days | Karmala, Mohol, Madha and Akkalkot. |
| c) WAP below 100 days | Malsiras and Sangola. |

B. Soils -

Cropping intensity is mainly governed by the soil types. There are various properties of soil which can be considered. However, soil depth criteria is the most important to be considered as it decides the moisture storage capacity and cropping season. This^{is} also cross checked with fertility index (See Map)

- | | |
|--|--|
| a) Predominantly Deep soils (more than 90 cm depth) | Akkalkot, North Solapur South Solapur |
| b) Predominantly Medium deep soil (22.5 to 90 cm depth) | Mohol, Barshi, Pandharpur Madha, Mangalwedha |
| c) predominantly Shallow soils (Depth less than 22.5 cm) | Malshiras, Karmala, Sangola |



C. Rainfall during Kharif -

Kharif season rainfall is quite important in the district since it decides the intensity of cropping and the success of the agricultural season. The tahsils in Solapur can be grouped as given below -

- | | |
|---|---|
| a) Rainfall during Kharif season exceeding 400 mm | Akkalkot, North Solapur, South Solapur and Barshi |
| b) Rainfall between 300-400 mm during Kharif season | Mohol, Pandharpur, Madha and Karmala |
| c) Rainfall less than 300 mm during Kharif season | Malsiras, Mangalvedha and Sangola. |

D. Total Annual Rainfall -

Total annual rainfall ranges between 500 to 750 mm in the district. Tahsils of Solapur can be grouped in to three broad groups as below :

- | | |
|-----------------------------------|---|
| a) Rainfall more than 700 mm | North Solapur, South Solapur and Akkalkot (3) |
| b) Rainfall between 600 and 700mm | Pandharpur, Mohol and Barshi (3) |
| c) Rainfall less than 600 mm | Malsiras, Karmala, Mangalvedha, Sangola and Madha (5) |

On the basis of above four criteria and land use capability sub-regionalisation of the district has been done as under :-

Sub-region I -

Total annual rainfall between 700 to 750 mm, kharif rainfall more than 400 mm, WAP exceeding 130 days and predominantly deep soils (more than 90 cm) - Akkalkot, North Solapur and South Solapur (3).

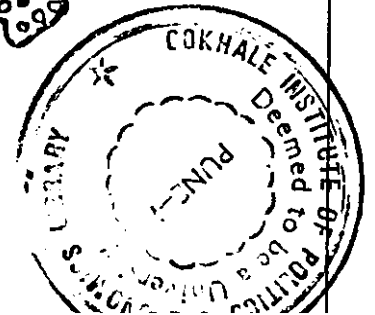
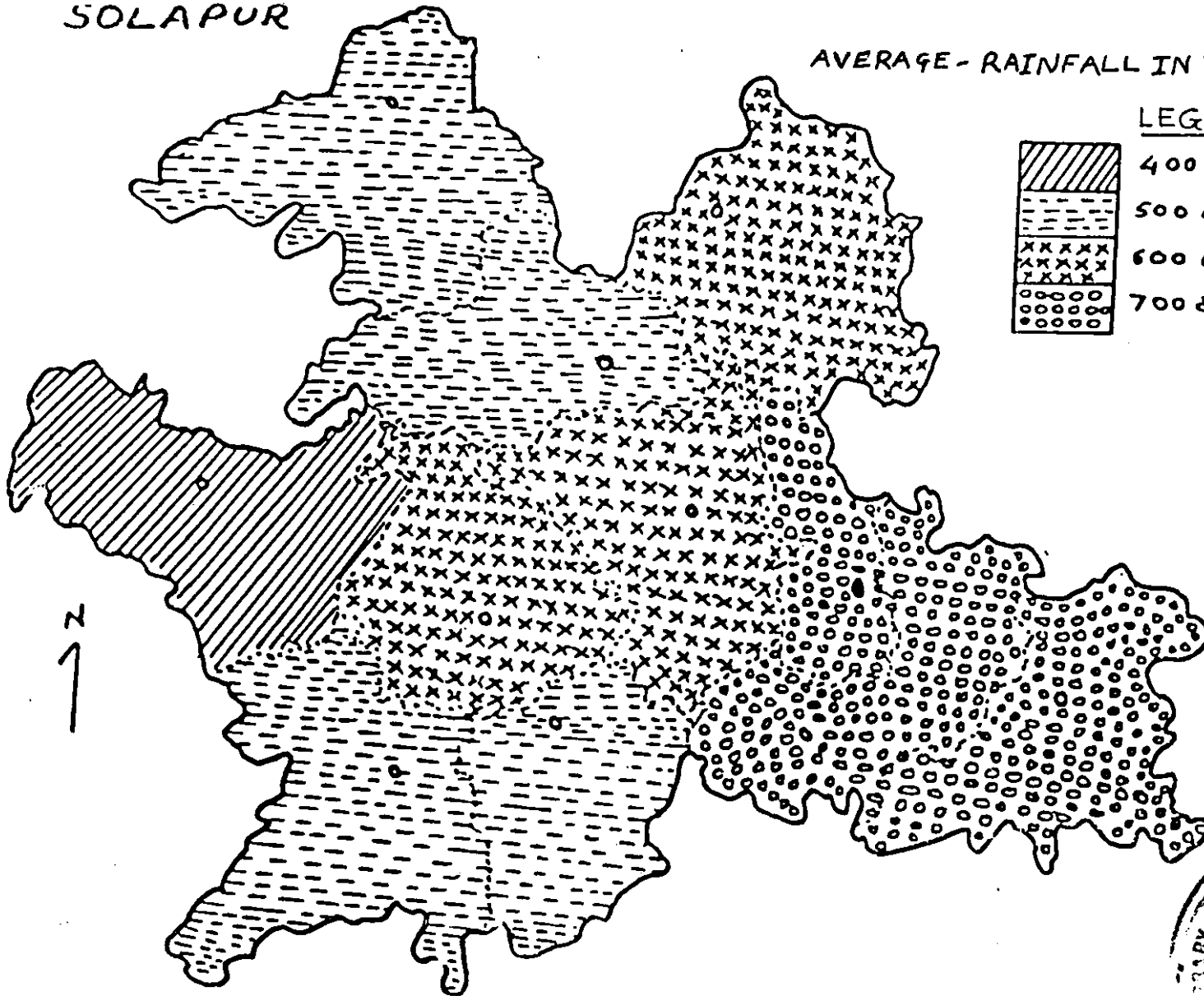
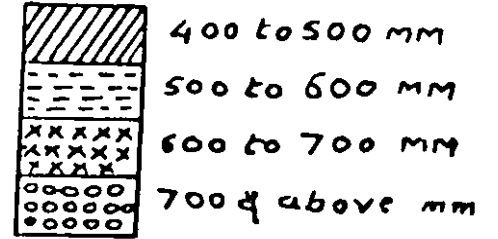
Sub-region II-

Total annual rainfall between 600-700 mm, kharif rainfall between 300-400 mm, WAP between 100-130 days and predominantly medium deep soils (22.5 to 90 cm) - Mohol, Barshi, Pandharpur, Madha and Mangalvedha (5).

SOLAPUR

AVERAGE - RAINFALL IN 'MM'

LEGEND

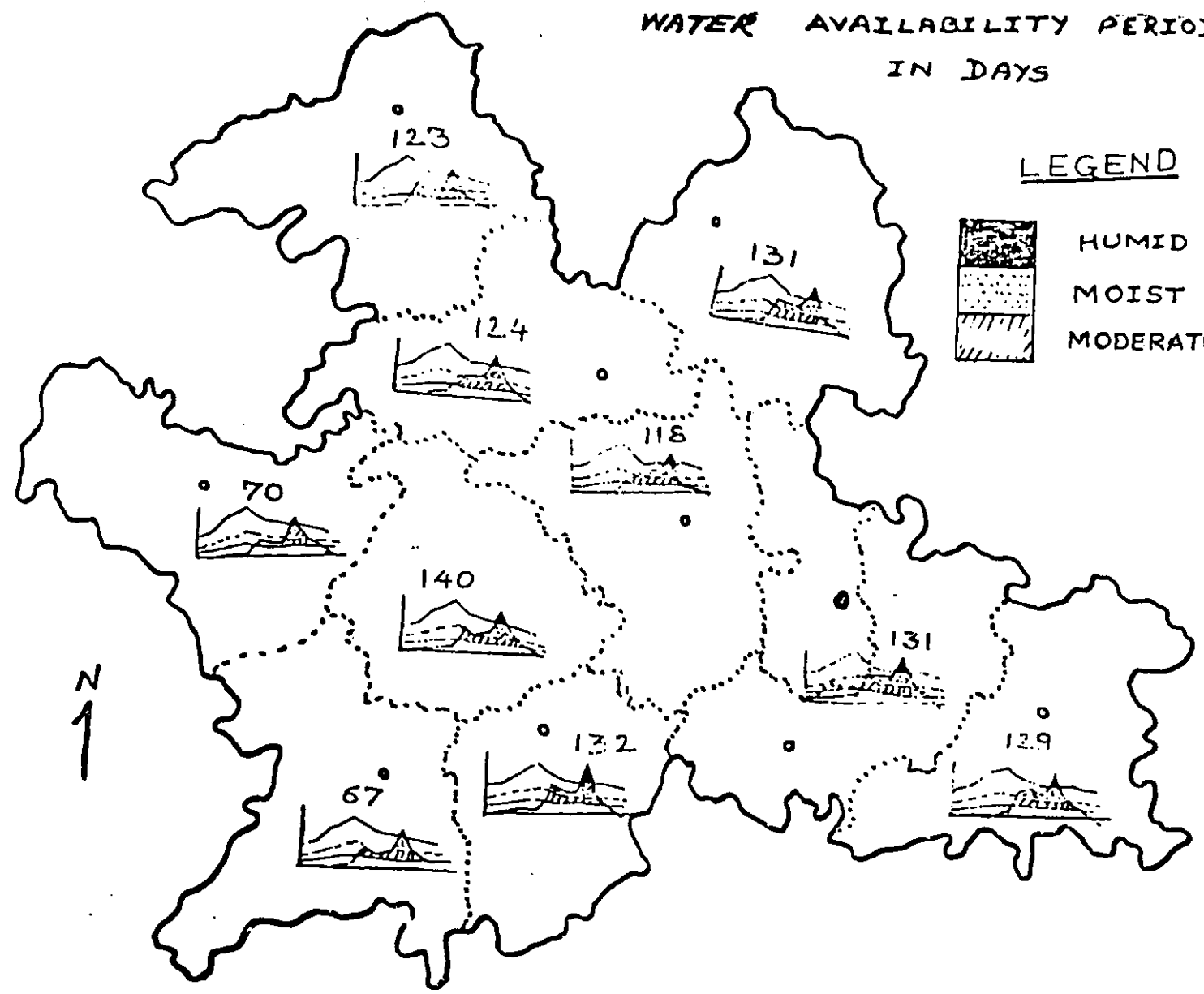


WATER AVAILABILITY PERIODS IN DAYS

LEGEND








- HUMID
- MOIST
- MODERATELY DRY

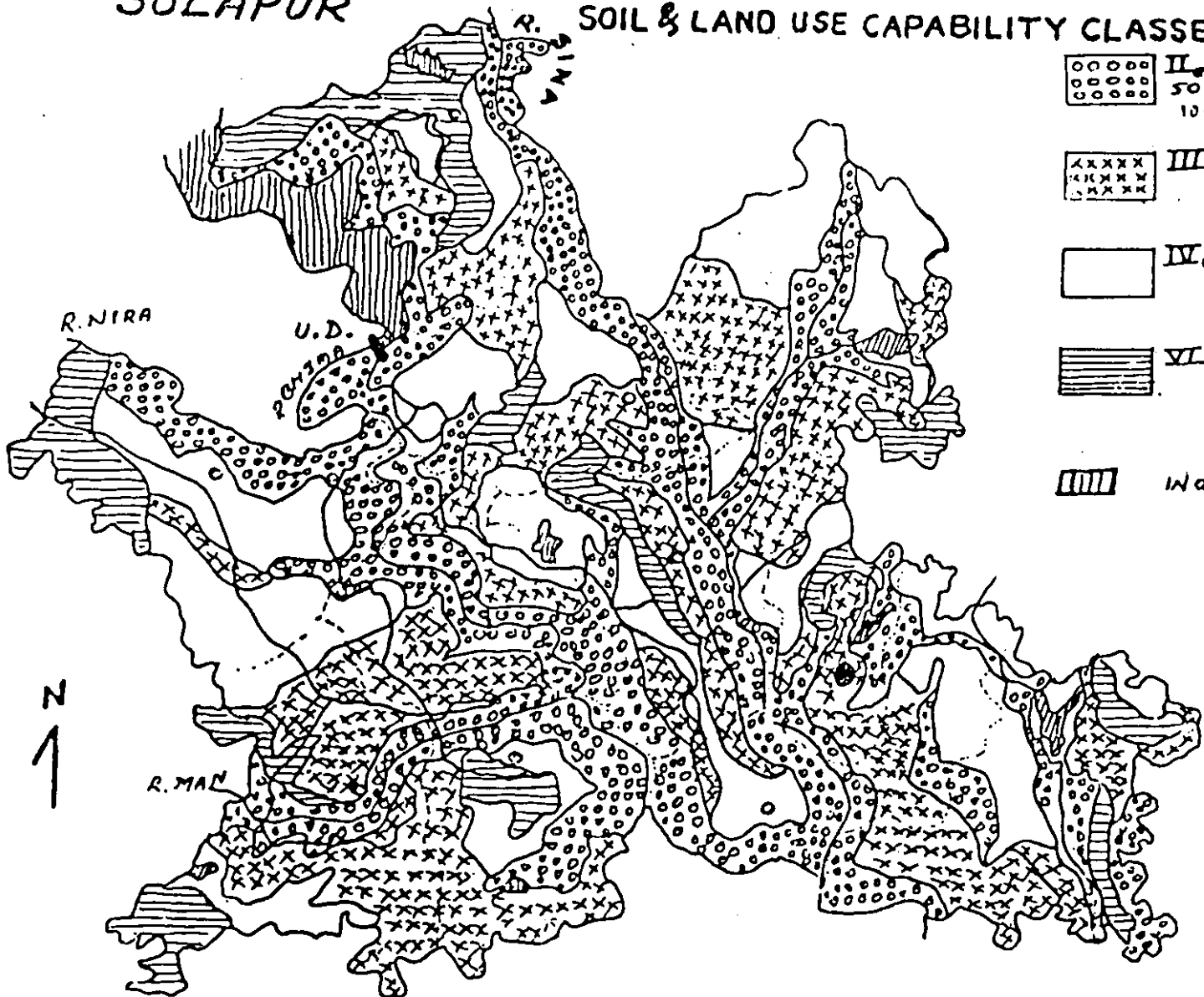


SOLAPUR

SOIL & LAND USE CAPABILITY CLASSES

LEGEND

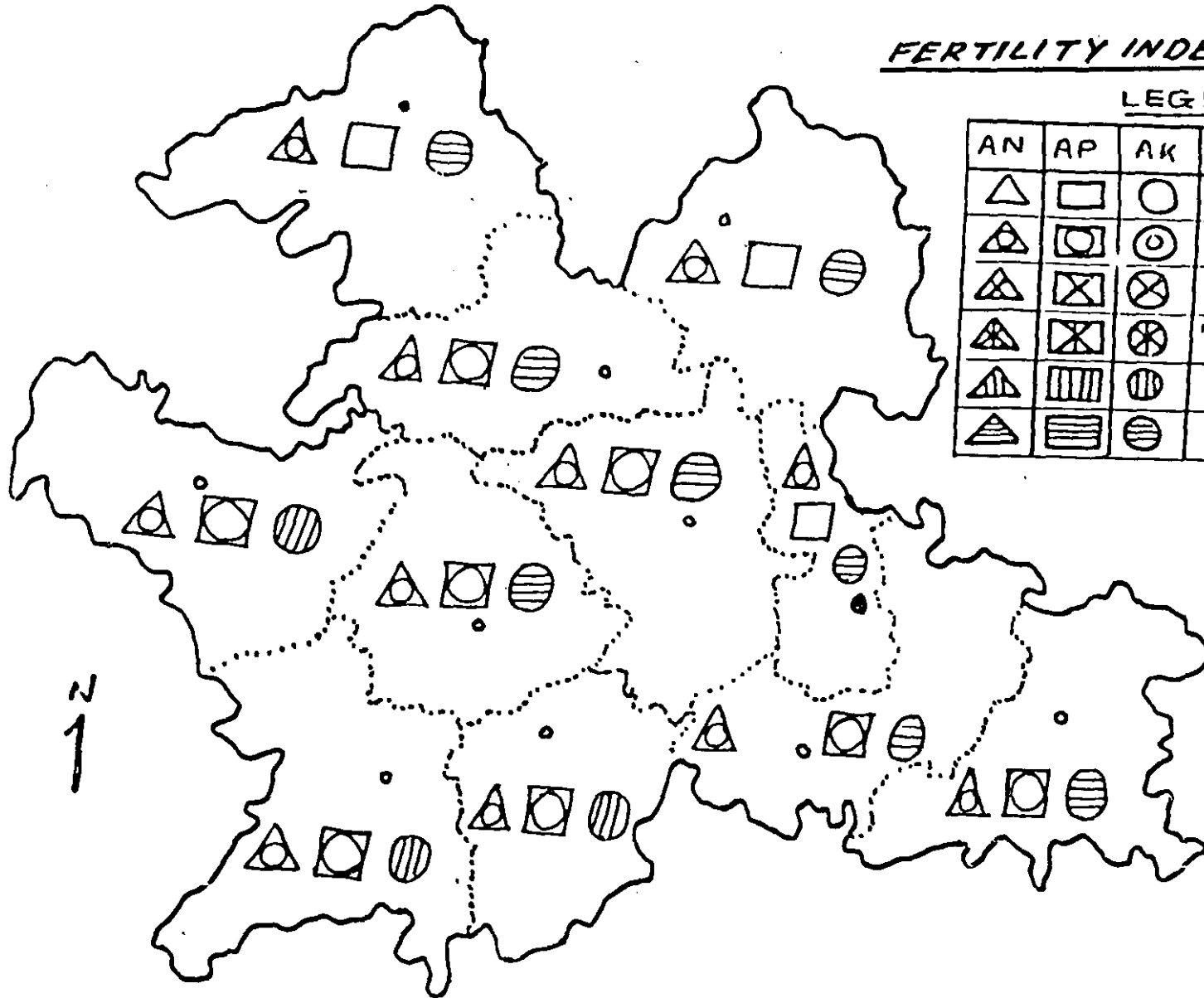
- 
II_e Deep to very deep
50 to 100 & above
100 cms
- 
III_e Medium deep
25 to 50 cm
- 
IV_{cs} Shallow gravelly
Sandy loam
7.5 to 25 cm
- 
VI_{est} Very shallow
0 to 7.5 cm
- 
 Water bodies.



FERTILITY INDEX (FI)

LEGEND

AN	AP	AK	Availability	FI
△	□	○	VL	0.5-0.75
△	□	○	L	0.76-1.25
△	□	○	M	1.26-1.75
△	□	○	Mode H	1.76-2.25
△	□	○	H	2.26-2.75
△	□	○	VH	2.76-3.0



Sub-region III -





Total annual rainfall between 500 to 600 mm, kharif rainfall below 300 mm, WAP less than 100 days and predominantly shallow soils (less than 22.5 cm) - Malsiras, Karmala and Sangola. (3).

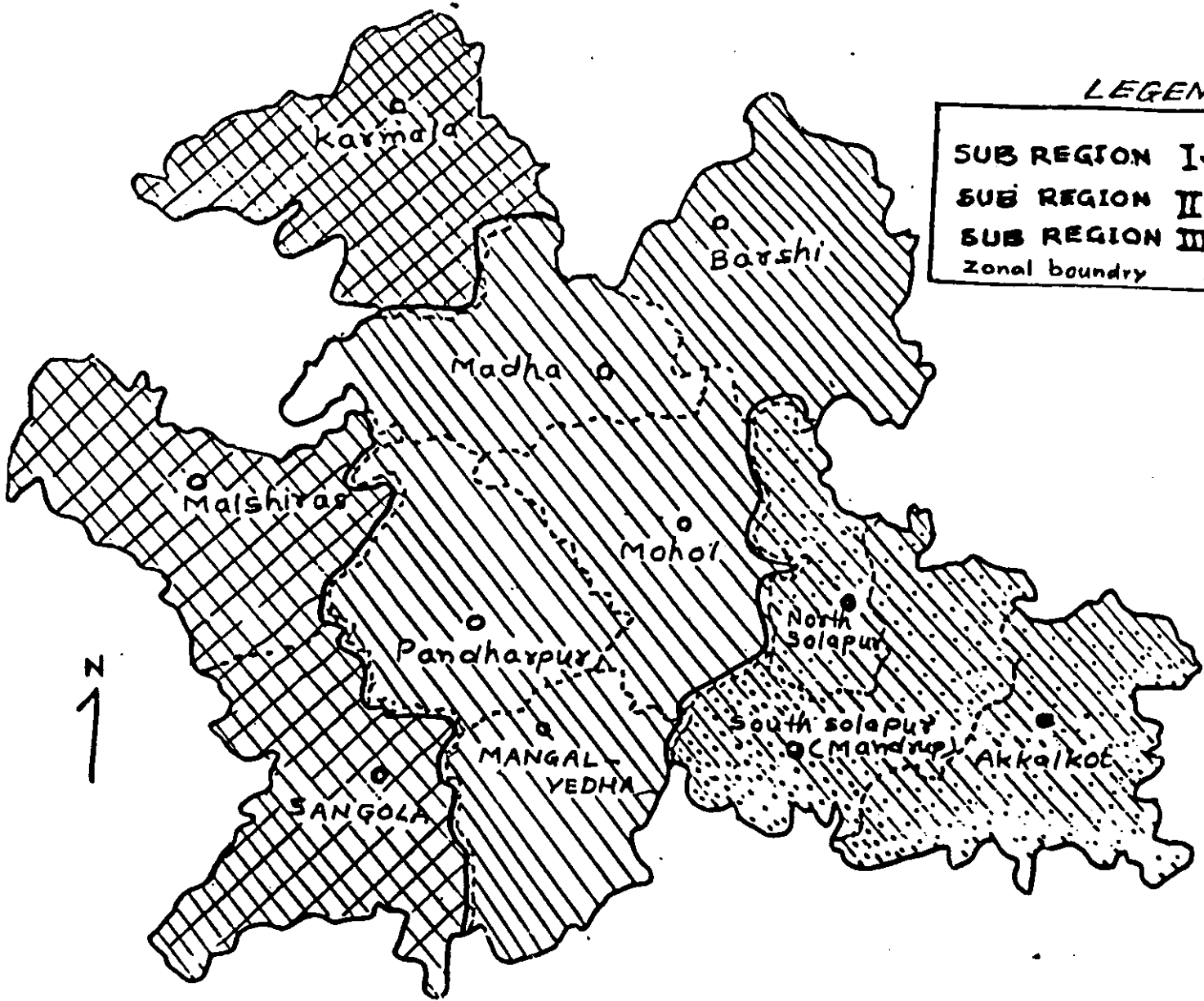
Thus regionalisation of Solapur district has been done in sub-region I,II & III with 3,5,and 3 tahsils respectively. The data in respect of natural resources, other economic activities and achievements were compiled for these sub-regions.

NRSA Approach :

Sub-regionalisation of Solapur district attempted at ARPU Ahmedabad is based on NRSA map and the geomorphic topological information (the note is enclosed in Appendix I). There are only a few departures here from the sub-regionalisation attempted by our team. The differences arise in the case of Barshi and Karmala talukas. We have preferred to include Barshi in second sub-region keeping in view the predominantly medium deep soils and rainfall ranging between 600 to 700 mms. Moreover the cropping systems followed in this taluka bear similarities with sub-region II. In the case of Karmala, the inclusion in the third sub-region was guided by the predominant shallow soils, lower precipitation levels along with the rabi cropping system.

LEGEND

SUB REGION I. 3 TANSILS.	
SUB REGION II. 5 TANSILS.	
SUB REGION III. 3 TANSILS.	
Zonal boundry	



APPENDIX I.1

A NOTE PREPARED AT ARPU AHMEDABAD

Sub-regionalisation of Solapur district of Maharashtra State.

1. Geomorphological Features :

The district occurs in the Deccan Plateau region and hence is dominated by the moderately to severely dissected basaltic plateau. The dominant geomorphic features identified by the NRSA on 1 : 250000 scale map are as under:

Map Connotation	Geomorphic Unit	Description
1. HDP	Highly Dissected Basaltic Plateau	Basaltic Plateau with high hills and narrow valleys
2. MDP	Moderately Dissected Basaltic Plateau	Same but with moderate dissection
3. UDP	Undissected Basaltic Plateau	Basaltic Plateau without much dissection gently undulating terrain mostly valley floors

2. Sub-regionalisation on the basis of NRSA Map

The NRSA Map indicates that solapur district has almost a uniform plateau of occurrence of HDP, MDP and UDP areas in the central, Northern and South-Western portions. The land terrain indicates ridge to valley floors near the rivers, and emerge as a uniform dendritic pattern of drainage from NW to SE. Only one area in the South East near Solapur proper has a large coverage under MDP and could be separated out as a different geomorphic terrain. Under such almost identical pattern of hills to valley regions, the sub-regionalisation could be also attempted on drainage pattern i.e., hills forming the upper-most boundary with the lower boundary abutting the river course. In view of this the district is divided into 4 subregions as under.

Sub-region 1

This subregion extends from the South-Western district boundary which is dominated by low altitude hill range (HDP) and highly dissected plateau. The lands in the sub-region slope down towards the valley of the Bhima river flowing into the district from Indapur and passing over Pandharpur and then towards South-East. This subregion extends over nearly 35% of the district and has dominantly rugged terrain with much less area under MDP. The areas under UDP are near the valley of the river Bhima and its tributary. The soils in the HDP are expected to be gravelly shallow black becoming medium deep in the HDP and deep to very deep near the valley bottom (UDP). The soils in the HDP region are susceptible to severe erosion.

Sub-region 2

This subregion is a leaf-shaped area enclosed between the two valleys of the river Bhima in the South-West and another big river Sina in the East, the northern and NE boundary abutts the district boundary of Solapur. The geomorphic units indicate typical occurrence of HDP range in the central portion sloping on either sides of this ridge towards the valleys. This typical 'ridge to valley' formation indicates occurrence of shallow gravelly soils on the ridges (HDP), becoming medium and deep to very deep towards valleys. The soils are however, medium black and black with basaltic origin. The soils on the upper reaches are susceptible to severe erosion. This subregion covers nearly 25% of the district.

Sub-region 3

This subregion covering about 20% of the NE portion of the district has almost equal distribution of HDP and MDP areas and also UDP basins. The geomorphic units indicate alternate ridge to valley portions, with shallow soils on the upper plateau areas (HDP) becoming medium to deep and very deep towards valleys. The area is bounded by the river Sina in the West and South-West.

Sub-region 4

This subregion covering about 20% area in the South-East indicates occurrence of a large area under MDP with UDP spread near the valleys. The soils in the MDP area are expected to be medium deep becoming deep to very deep towards valleys. The erosion hazard is medium.

Ground Water Resources

On the basis of the geomorphic features and the occurrence of the lineaments the predicting for ground water potential indicated by NRSA is as under :

Sub-region 1

The terrain is highly rugged with a large area under HDP. The ground water potential is therefore poor in HDP moderate in MDP and good in UDP area. The gw can however, be expected to occur near the lineaments (fractures & faults) in good quality.

Sub-region 2

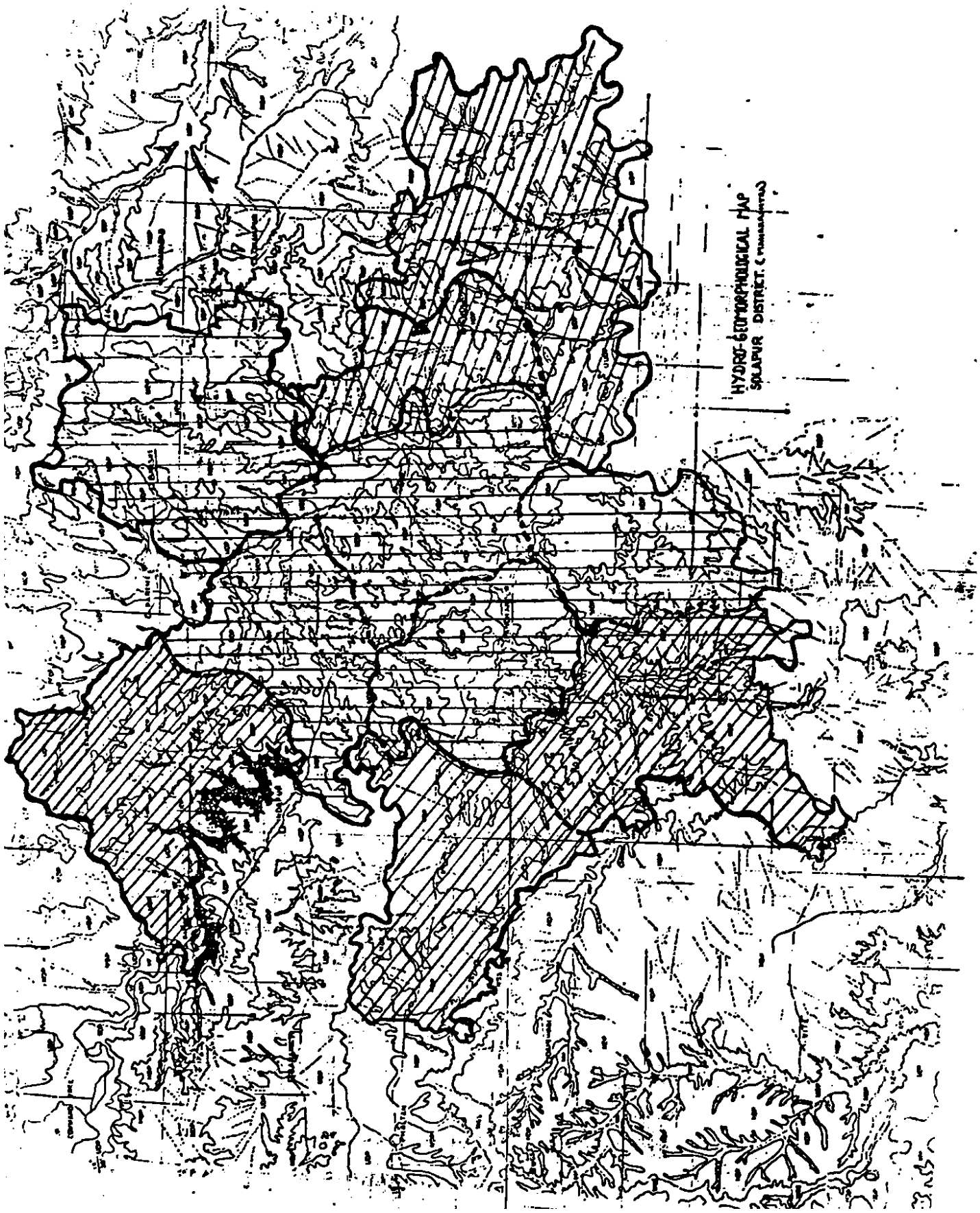
The central ridge portion covered under HDP indicates poor g.w. potential. Whereas in MDP area which is quite extensive the potential can be moderate. However, in the UDP areas near river valleys the possibility of getting groundwater is greater with good quantity. The lineaments are less in number as compared to sub-region 1.

Sub-region 3

The distribution of HDP, MDP and UDP is almost equal. This is indicating of poor, moderate and good g.w. potential in respective areas. The number of lineaments is also less.

Sub-region 4

Quite a large area is under MDP and next to that is UDP. The g.w. potential can be expected to be moderate in MDP and good in the UDP.



HYDRO-GEOMORPHOLOGICAL MAP
SOLAPUR DISTRICT.

CHAPTER II

LAND AND WATER RESOURCES

The soil is a basic media for crop production. The water resources are also important to enhance the agricultural production. Being a predominantly rainfed cropping system all agricultural and economic activities of the district depend on land and water resources, their use and limitations. A prerequisite of planning for crop production activities as well as the other economic activities is the analysis of the status and utilisation of these resources.

2.1 Rainfall :

Table 2.1 indicates that the kharif season rainfall is maximum in sub-region I followed by II and III. While the rabi season rainfall is similar in all the sub-regions indicating that there are chances of rabi cropping. Similarly, due to fairly well distributed rains in every month (June to September Table 2.2), the kharif cropping is somewhat assured in sub-region I and II. and can be supported by rabi crops. But the sub-region III is quite weak in this respect. The data from Table 2.2 also indicate that there are chances of dryspells in the month of July and August indicating the kharif cropping is risky in the sub-region III. The water availability in the sub-region III is hardly 87 days. Considering the rainfall and its distribution, kharif cropping is assured in sub-regions I and II while rabi cropping has some scope in sub-region III.

2.2 Soil :

Soil and land use planning surveys are being carried out by Department of Agriculture. Information is still awaited in the form of reports from the concerned departments for soil surveys. The available information on distribution of soils and land use capability classes are presented in Tables 2.3 and 2.4 respectively.

In sub-region III proportion of shallow soils is 55 percent and deep black soil is 11 percent. The proportion of deep black soil is maximum in sub-region I (36 percent). Taking into consideration the proportion of shallow soil in all the regions, there is a scope to divert these lands for agro-forestry silvi-pasture, horticulture etc. Similar conclusion also emerges out of the land use capability data. Further, the weak natural resource base of sub-region III can also be seen here and this region calls for supporting activities.

Table 2.1 : Seasonwise Average Rainfall (mm) in Sub-Regions

Sub-Region	Kharif	Rabi	Summer	Total	Water Availability Period (No. of Days)
I	433.5 (60)	227.0 (32)	56.4 (8)	716.9 (100)	130
II	349.4 (57)	214.1 (35)	46.2 (8)	609.7 (100)	129
III	281.8 (51)	221.5 (40)	47.5 (9)	550.8 (100)	87
Weighted Mean	346.0 (56)	218.9 (36)	48.6 (8)	613.5 (100)	---

(Figures in parentheses indicate the % of total rainfall)

Table 2.2 : Monthly Rainfall Distribution (mm) in the Sub-Region

Month	Sub-region I	Sub-region II	Sub-region III
April	13	11	12
May	22	24	20
June	110	92	92
July	118	94	65
August	107	92	65
September	189	184	155
October	70	70	66
November	33	25	36
December	7	9	8
January	6	4	7
February	3	3	2
March	6	3	4
Total	684	611	532

Table 2.3 : Distribution of Soils in Solapur District
(Area in 000'ha)

Sub-Region	Deep black	Medium black	Shallow black	Total	Prop to Dist. Total
I	108.4 (36)	103.4 (34)	91.2 (30)	303.0 (100)	23.0
II	152.0 (24)	240.9 (38)	244.7 (38)	637.6 (100)	48.0
III	45.5 (11)	131.9 (34)	213.7 (55)	391.1 (100)	29.0
Total	305.9 (23)	476.2 (36)	549.6 (41)	1331.7 (100)	100.0

(Figures in parenthesis indicate % to total soil types)

Note : Figures are based on estimates of Soil Testing Office of Solapur district.

Table 2.4 : Distribution of Land by Land Use Capability Classes
(Area in 000'ha)

Sub-Region	Land Use Capability Class			Total
	II _e	III _e	IV cs & VI est	
I	129.5 (43)	83.3 (27)	90.2 (30)	303.0 (100)
II	201.6 (32)	134.8 (21)	301.2 (47)	637.6 (100)
III	88.4 (23)	101.1 (26)	201.6 (51)	391.1 (100)
Total	419.5 (31)	319.2 (24)	593.0 (45)	1331.7 (100)

(Figures in parentheses indicate % to total)

Note : Figures are based on estimates of Soil Testing Office of Solapur district.

2.3 Land Use Categories :

The uncultivable land was proportionately more in sub-region III and II (Table 2.5). There is large scope to bring these areas under agro-forestry or horticulture plantation in these sub-regions. Moreover, there is a scope to bring the land

under horticulture system and develop the allied agricultural activities like sheep and goat rearing. As regards the sub-region I, being an assured rainfall region, there is a considerable scope to bring some area under horticulture, horti-pastoral development and to increase the dairy development programme as the affiliated market of Solapur City is available.

Land utilization from Table 2.6 indicates that the total cropped area has decreased in sub-region I and II, while it remained constant in sub-region III during the year 1977-80 to 1980-83. Similar situation is also observed in net sown area. The cropping intensity remains unchanged in all the regions.

It is interesting to note that the land cultivated more than once increased in sub region II and III. This data indicates that the same land might have been diverted to horticultural plantations from sub-regions II and III. Fallow land also increased in sub-region I and II, while it decreased in sub region III.

As regards total cropped area, 48% area was in sub-region II, followed by sub-region III (28%) and sub-region I (23%). Similar trend was observed in the case of net cropped area, area cropped more than once and fallow lands. The larger uncultivated land, recent horticultural plantation and supporting livestock activity in sub-region three indicates allied agriculture based economic activities.

Table 2.5 : Land Use Pattern According to Sub-Regions

(Area in '00 ha)

Sr. No.	Name of The Item	Sub-Region I		Sub-Region II		Sub-Region III		Total	
		1977-78	1980-81	1977-78	1980-81	1977-78	1980-81	1977-78	1980-81
		1979-80	1982-83	1979-80	1982-83	1979-80	1982-83	1979-80	1982-83
1.	Total Geographical Area	3279	3279	6933	6933	4798	4798	15010	15010
2.	Area Under Forest	33 (1.0)	33 (1.0)	105 (1.5)	105 (1.5)	189 (3.9)	189 (3.9)	327 (2.1)	327 (2.1)
3.	Land Under Non-Agri. Use	16 (0.5)	17 (0.5)	18 (0.3)	21 (0.3)	7 (0.1)	9 (0.2)	41 (0.3)	47 (0.3)
4.	Non-Cultivable Land	79 (2.4)	79 (2.4)	235 (3.4)	235 (3.4)	374 (7.8)	370 (7.7)	688 (4.6)	684 (4.6)
5.	Land Not Available For Cultivation	95 (2.9)	96 (2.9)	253 (3.7)	256 (3.7)	381 (7.9)	379 (7.9)	729 (4.9)	731 (4.9)

Contd...

Table 2.5-Continued

Sr. No.	Name of The Item	Region-I		Region-II		Region-III		Total	
		1977-78	1980-81	1977-78	1980-81	1977-78	1980-81	1977-78	1980-81
		1979-80	1982-83	1979-80	1982-83	1979-80	1982-83	1979-80	1982-83
6.	Cultivable Land But Not Under Use	83 (2.5)	83 (2.5)	112 (1.6)	111 (1.6)	170 (3.5)	169 (3.5)	365 (2.4)	363 (2.4)
7.	Permanent Pasture & Grazing Land	121 (3.7)	121 (3.7)	199 (2.9)	199 (2.9)	315 (6.5)	315 (6.5)	635 (4.2)	635 (4.2)
8.	Land Under Trees and Gardens	10 (0.3)	11 (0.3)	33 (0.5)	33 (0.5)	8 (0.2)	9 (0.2)	51 (0.3)	53 (0.3)
9.	Total Cultivable Land Not Under regular Cultivation	214 (6.5)	215 (6.5)	344 (5.0)	343 (5.0)	493 (10.2)	493 (10.2)	1051 (7.0)	1051 (7.0)
10.	Net Cultivable Land	2937 (89.6)	2935 (89.6)	6231 (89.8)	6229 (89.8)	3735 (78.0)	3737 (78.0)	12903 (86.0)	12901 (86.0)
11.	Current Fallows	94	196	287	310	254	192	635	698
12.	Other Fallows	69	52	254	305	204	190	527	547
13.	Total Fallows	163	248	541	615	458	382	1162	1245
14.	Net sown Area	2774	2687	5690	5614	3277	3354	11741	11655
15.	Land Cultivated More Than Once	147	189	384	325	249	175	780	689
16.	Gross Cropped Area	2921	2876	6074	5939	3526	3529	12521	12344
17.	Cropping Intensity CGA/NSA %	105	107	107	106	107	105	107	106

(Figures in parantheses are percentage of total geographical area)

Table 2.6 : Land Utilisation

(Figures in '00' ha)

Item	Sub-regions			District Total
	I	II	III	
A) Total Cropped Area				
1977-80	2920.6 (23.32)	6074.3 (48.52)	3526.3 (28.16)	12521.2 (100)
1980-83	2875.7 (23.29)	5939.0 (48.11)	3529.4 (28.60)	12344.1 (100)
* Percent	-1.60	-2.23	+0.10	-1.42
B) Net Sown Area				
1977-80	2773.6 (23.62)	5690.0 (48.47)	3277.3 (27.91)	11740.9 (100)
1980-83	2687.0 (23.06)	5613.7 (48.16)	3354.7 (28.78)	11655.4 (100)
* Percent	-3.13	-1.35	+2.36	-0.73
C) Intensity Of Cropping				
	107	106	105	106
D) Land Cultivated more than once in a year				
1977-80	147.0 (18.84)	384.3 (49.25)	249.0 (31.91)	780.3 (100)
1980-83	188.7 (27.40)	325.3 (47.23)	174.7 (25.37)	688.7 (100)
* Percent	+28.36	-15.36	-29.84	-11.74
E) Total Fallow				
1977-80	256.4 (16.28)	685.0 (43.48)	633.7 (40.24)	1575.8 (100)
1980-83	330.0 (20.01)	762.3 (46.23)	556.6 (33.76)	1648.9 (100)
* Percent	+28.70	+11.28	-12.17	+4.64

(* indicates percentage increase/decrease over the last 5 years)

2.4 Irrigation :

Table 2.7 presents distribution of wells over sub-regions.

It would be seen that the number of wells are more in sub-region II followed by sub-region III and I. As regards installation of diesel and electric pumps, it is observed that the number of diesel pumps are more in sub-region III (3980) followed by sub-region II and I. The number of wells electrified are more in sub-region II (4916) followed by sub-region I and III. There is scope to electrify the wells in sub region III.

As regards energized wells per thousand ha cropped area, it is observed that 16 wells per thousand hectares were energised in sub-region I, while 11 and 8 wells were energised from sub region III and II respectively. There is considerable scope to energise more number of wells in all the sub-regions.

Watershed management is likely to be the prime agricultural development strategy in the district. Solapur is one of the worst drought prone district of the country with 500 to 750 mm of annual average precipitation. An integrated watershed management approach based on five major components need to be carefully designed. Table 2.9 gives some of the basic characteristics of the watersheds falling in the sub regions. The data indicates that there are 64 watersheds in the district of which 44 percent are in sub-region II, 23 percent and 33 percent in sub-region I and III respectively. These watersheds belong to Sina and Bhima basins.

The proportion of total area of watersheds is maximum (52%) in sub-region II followed by sub-region III and I. Similar observation is also recorded in case of average area per watershed and total potential irrigable area. However, potential irrigable area per watershed is more in sub-region III followed by sub-region II and I. It would be necessary to consider the Horti-pastoral, Silvi-pastoral and other supporting systems while planning for the treatment of watersheds. In other words the watershed can be a unit for development region but its definition need not limit the scope of the treatments suggested.

The data on source wise irrigated area in the sub regions are presented in Table 2.8. It can be observed that the proportion of surface and well irrigation was highest (55% and 46% respectively) in sub-region II, followed by sub-region III. However, the area irrigated was the highest (15%) in sub region III followed by sub region II (11%) and sub region I (6%), indicating irrigation potential in sub region I. But when we analyse the density of wells & proportion of irrigated area, it can be observed that sub-region II has better surface irrigation facilities as compared to sub-region I & III. But looking into longer water availability there seems to be further scope for development of irrigation in sub-region I & III.

Table 2.7 : Distribution of Wells According to Sub-regions

S.No.	Particulars	Sub-region I		Sub-region II		Sub-region III		District Total	
		1978-79	1980-81	1978-79	1980-81	1978-79	1980-81	1978-79	1980-81
1.	No. of wells used for Irri.	18848	20325 (8)	22487	25829 (15)	14757	17571 (19)	56092	63725 (14)
2.	No. of wells with pumps	5480	5510	8337	8534	7661	7785	21478	21829
	2.1 Diesel Pump	880	785 (-11)	3618	3618 (-)	3901	3980 (2)	8399	8383 (-1)
	2.2 Electric Pump	4600	4725 (3)	4719	4916 (4)	3760	3805 (1)	13079	13446 (3)
3.	No. of wells per 1000 ha. cropped area		71		43		50		52
4.	No. of energised wells per 1000 ha. cropped area		16		8		11		11
5.	No. of energised wells to total wells		23		19		22		21

Note : 1. Figures in parentheses indicate % increase over previous period
2. Figures are averages of the three years

Table 2.8 : Sourcewise Area Irrigated Across Sub-Regions
(Area in ha.) (1982-83)

Source	Sub-region I	Sub-region II	Sub-region III	Total
Surface (1982)	827 (2.0)	19233 (55.0)	14894 (43.0)	34954 (100.0)
Wells (1982)	16639 (16.0)	47790 (46.0)	39215 (38.0)	103644 (100.0)
Total	17466 (13.0)	67023 (48.0)	54109 (40.0)	138598 (100.0)
Total Cropped Area	287570	593900	352940	1234410
% of Irrigated area over total cropped area	6	11	15	11

(Figures in parentheses indicate percentages to total)

Table 2.9 : Water Sheds According to Sub-Regions

Sub-Region	No. of Water-sheds	Total area of water-sheds (ha.)	Average area per water-shed (ha.)	Potential irrigable area (ha.)	Potential irrigatable area per watershed (ha.)
I	15 (23)	271229 (18)	18082	13168	878
II	28 (44)	768153 (52)	27434	29065	1038
III	21 (33)	453181 (30)	21580	22702	1081
Total	64 (100)	1492563 (100)	23321	64935	1015

(Figures in parentheses indicate percentages to total)

CHAPTER III

CROP HUSBANDRY

3.1 Cropping Pattern :

Solapur district falls under scarcity zone with usual prolonged dryspells and hence crop production is a risky enterprise. The district faces severe drought normally four times in every decade with varying intensities. In the district mainly bajra, redgram, horsegram, mothbean, groundnut and sunflower are grown in kharif season, while sorghum, safflower, gram and sunflower are grown in the rabi season. Sugarcane cultivation is also concentrated in some pockets of all the sub-regions. Horticultural crops particularly ber, pomegranate cultivation is also increasing at a faster rate. The data for the trienniums 1977-78 to 1979-80 and 1980-81 to 1982-83 on cropping pattern sun-regionwise in the district are presented in Table 3.1.

It is evident from the Table that millets are dominating as crop group. Area under kharif pearl millet was higher in sub-region III. New drought tolerant varieties like ICTP 8203, WCC-75, RHR-1 can be introduced in this region. The productivity level is the main constraint for rabi sorghum in sub-region I and III. It would be advisable to introduce the sorghum variety like Swati in these first and third sub-regions in addition to the drought tolerant variety like Maldandi 35-1. for the shallow soils with less than 45 cm depth, Lakadi, Jeur selection-3 are better suited than Maldandi 35-1.

Among pulses pigeonpea crop has great scope in the sub-region I & II. Hence, there is a need to introduce the varieties like No. 148 as sole crop or inter crop in pearl millet or short duration varieties like ICPL-87 under double crop system. Minor pulses are grown on lighter type of soil, however, their productivity is very poor and hence varieties like Man and Sina of horsegram and MBS-27 of mothbean need to be introduced. Similarly, some area under these crops can be diverted for agro-forestry.

Due to fodder problem during rabi season, the area under gram crop remained less as compared to rabi sorghum. However, the productivity of gram can be increased with the varieties like Vikas, Vishwas and Phule G-12. Sugarcane cultivation is concentrated in sub-region III, where 4 percent of the total cropped area is under this crop. There are sugar based industries but the productivity need to be increased by adopting the improved technology.

Cotton cultivation is relatively higher in the sub-region III and I, indicating good scope for textile industries in these sub-regions. Productivity can be increased by introduction of high yielding varieties like Varalaxmi and SRT-1 in these regions. In the region I, some area under cotton is cultivated in rabi season as rainfed crop for which research efforts are required to identify suitable varieties and package of practices.

Amongst the oilseeds, groundnut and safflower are the main oilseed crops grown in the district. Considering the area under these crops, groundnut production can be increased in the sub-region I by introduction of improved varieties like UF 70-103, JL-24, SB-XI etc. The introduction of Bhima variety of safflower has been explored in the sub-region III and II in order to increase the productivity of safflower crop. The crop performs better with limited irrigation which needs to be explored further.

Maximum area under fodder crops is concentrated in the sub-region I and hence it is necessary to introduce dairy based industries in this region along with sub-region III. Similarly, introduction of improved varieties of fodder crops is also required to increase the production.

3.2 Irrigation Pattern of Crops :

Solapur district has only 11% irrigated area, The major crops grown under irrigation are sugarcane, sorghum, maize, cotton, groundnut, wheat, fruits and vegetables.

Cropwise area under irrigation by sub-regions is presented in Table 3.2. Amongst the cereal crops sorghum was largely grown under irrigated conditions in sub-region II, while the crops like wheat, bajra and maize were having more acreage under irrigation in the sub-region III.

Pigeonpea and greengram are major pulses of the district. Acreage of gram crop under irrigation was more in sub-region II, while irrigated pigeonpea and green gram acreage was more in sub-region III. In the sub-region II, pulses and food grains were grown under irrigated condition in large scale as compared to sub-region I and III. Sugarcane cultivation with irrigation facilities was more in the sub-region III, while the fruit crops were grown in the sub-region I, indicating that there is a great scope for sugar based industries in the sub-region III and fruit processing industries in the sub-region I.

Area under irrigated cotton was mainly concentrated in the sub-region III (72.4 percent of the district total) shows there is a scope for textile industries and allied activities in the sub-region III. Amongst the oilseed crops, irrigated groundnut was cultivated largely in the sub-region II. It is necessary to introduce the varieties of crops in the sub-region I and III. Area under irrigated fodder crops was also more in the sub-region II & III as dairy activities are predominantly undertaken here. Considering the overall performance of irrigated crops, the sub-region II was having 49% of the total irrigated area under different agricultural crops. Since the canal irrigation from Nira right bank canal and Ujani project is concentrated in this region.

Table 3.1 : Cropping Pattern According to Sub-Region (Area in ha.)

Sr. Crop No.	SUB-REGIONS							
	I		II		III		Total	
	Triennium		Triennium		Triennium		Triennium	
	1977-78 to 1979-80	1980-81 to 1982-83	1977-78 to 1979-80	1980-81 to 1982-83	1977-78 to 1979-80	1980-81 to 1982-83	1977-78 to 1979-80	1980-81 to 1982-83
1. Paddy	2511 (0.8)	2427 (0.8)	2816 (0.5)	1807 (0.3)	885 (0.2)	780 (0.2)	6212 (0.5)	5014 (0.4)
2. Wheat	7743 (2.6)	3866 (1.3)	24337 (4.0)	16692 (2.8)	19163 (5.4)	16199 (4.6)	51243 (4.1)	36757 (3.0)
3. Kharif Sorghum	691 (0.2)	1072 (0.4)	9294 (1.5)	7798 (1.3)	3396 (1.0)	3062 (0.9)	13380 (1.1)	11932 (1.0)
4. Rabi Sorghum	170075 (58.1)	179829 (62.5)	374754 (61.7)	385531 (64.9)	169676 (48.1)	189012 (53.6)	714506 (57.1)	754372 (61.1)
5. Total Sorghum (3 + 4)	170766 (58.3)	180901 (62.9)	384048 (63.2)	393329 (66.2)	173072 (49.1)	192074 (54.5)	727886 (58.2)	766304 (62.1)
6. Bajra	10219 (3.6)	8356 (2.9)	23997 (4.0)	15869 (2.7)	37519 (10.6)	35598 (10.1)	71735 (5.7)	59823 (4.8)
7. Maize	896 (0.3)	723 (0.2)	5407 (0.9)	6388 (1.1)	3302 (0.9)	5357 (1.5)	9605 (0.8)	12468 (1.0)
8. Rala	- (-)	59 (0.02)	- (-)	24 (-)	- (-)	51 (0.01)	- (-)	134 (0.01)
9. Other Millets	1181 (0.4)	765 (0.3)	4895 (0.8)	1485 (0.2)	1785 (0.5)	105 (0.02)	7861 (0.6)	2355 (0.2)
10. TOTAL MILLETS	182166 (62.3)	190081 (66.1)	412940 (68.0)	410707 (69.1)	212376 (66.2)	227828 (64.6)	807482 (64.5)	828616 (67.1)

Table 3.1 : Contd....

Sr. No.	Crop	SUB-REGIONS							
		I		II		III		Total	
		Triennium		Triennium		Triennium		Triennium	
		1977-78 to 1979-80	1980-81 to 1982-83	1977-78 to 1979-80	1980-81 to 1982-83	1977-78 to 1979-80	1980-81 to 1982-83	1977-78 to 1979-80	1980-81 to 1982-83
11.	Gram	5733 (1.9)	6210 (2.2)	18274 (3.0)	17261 (2.9)	6542 (1.9)	6355 (1.8)	30549 (2.4)	29826 (2.4)
12.	Pigeon Pea	26859 (9.2)	26240 (9.1)	28997 (4.8)	26394 (4.4)	3656 (1.0)	3802 (1.0)	59512 (4.7)	56436 (4.6)
13.	Green Gram	1985 (0.7)	1701 (0.6)	3018 (0.5)	2825 (0.5)	1140 (0.3)	615 (0.2)	6143 (0.5)	5141 (0.4)
14.	Other Pulses	7867 (2.7)	4579 (1.7)	45767 (7.6)	18998 (3.3)	21681 (6.3)	12261 (3.5)	75315 (6.0)	35838 (2.9)
15.	TOTAL PULSES	42444 (14.7)	38730 (13.6)	96056 (15.9)	65478 (11.1)	33019 (9.5)	23033 (6.5)	171519 (13.6)	127241 (10.3)
16.	TOTAL FOOD GRAINS	235760 (80.7)	235827 (82.0)	541556 (89.2)	501072 (84.4)	268745 (76.2)	273197 (77.4)	1046061 (83.5)	1010096 (81.8)
17.	Sugar Cane	2590 (0.9)	3848 (1.3)	4807 (0.8)	6195 (1.0)	11649 (3.3)	12876 (3.6)	19046 (0.6)	22919 (1.8)
18.	Spices & Condiments	1495 (0.5)	1682 (0.6)	2348 (0.4)	2477 (0.4)	736 (0.2)	678 (0.2)	4579 (1.4)	4837 (0.4)
19.	Fruits & Vegetables	2476 (0.7)	2740 (1.0)	4039 (0.6)	4205 (0.7)	1086 (0.3)	1397 (0.4)	7592 (0.5)	8342 (0.8)
20.	TOTAL FOODCROPS	242312 (82.9)	244097 (84.9)	552750 (91.0)	513949 (86.5)	282216 (80.0)	288148 (81.6)	1077278 (86.0)	1046194 (84.8)

Table 3.1 : Contd....

Sr. Crop No.	SUB-REGIONS							
	I		II		III		Total	
	Triennium		Triennium		Triennium		Triennium	
	1977-78 to 1979-80	1980-81 to 1982-83	1977-78 to 1979-80	1980-81 to 1982-83	1977-78 to 1979-80	1980-81 to 1982-83	1977-78 to 1979-80	1980-81 to 1982-83
21. Cotton	2824 (1.0)	5323 (1.8)	3033 (0.5)	3261 (0.5)	6546 (1.9)	5320 (1.5)	12403 (1.0)	13904 (1.1)
22. Other Fibre Crops	1542 (0.5)	1135 (0.4)	944 (0.1)	632 (0.1)	78 (0.02)	125 (0.03)	2564 (0.2)	1892 (0.2)
23. TOTAL FIBRE CROPS	4366 (1.5)	6458 (2.2)	3977 (0.6)	3893 (0.6)	6624 (1.9)	5445 (1.5)	14967 (1.2)	15796 (1.3)
24. Groundnut	10238 (3.5)	9957 (3.4)	9203 (1.5)	10224 (1.7)	8719 (2.5)	6079 (1.7)	28160 (2.2)	26260 (2.1)
25. Linseed	N.A. (-)	950 (0.3)	N.A. (-)	755 (0.1)	N.A. (-)	581 (0.2)	N.A. (-)	2286 (0.2)
26. Saf-floor	11306 (3.9)	6040 (2.2)	26926 (4.4)	26001 (4.4)	18867 (5.3)	22313 (6.3)	57099 (4.6)	54354 (4.4)
27. Other Oilseeds	5107 (1.7)	8283 (2.9)	3497 (0.6)	4654 (0.8)	1748 (0.5)	1045 (0.3)	10352 (0.8)	13982 (1.1)
28. TOTAL OILSEEDS	26651 (9.1)	25230 (8.8)	39626 (6.5)	41634 (7.0)	29334 (8.3)	30018 (8.5)	95611 (7.6)	96882 (7.8)
29. Tobacco	25 (-)	62 (0.02)	25 (-)	62 (0.01)	12 (-)	8 (-)	62 (-)	132 (0.01)
30. Other Medicines & Narcotics	94 (0.03)	70 (0.02)	128 (0.02)	47 (-)	21 (-)	11 (-)	243 (0.02)	128 (0.01)

Table 3.1 : Contd...

Sr. Crop No.	SUB-REGIONS							
	I		II		III		TOTAL	
	Triennium		Triennium		Triennium		Triennium	
	1977-78 to 1979-80	1980-81 to 1982-83	1977-78 to 1979-80	1980-81 to 1982-83	1977-78 to 1979-80	1980-81 to 1982-83	1977-78 to 1979-80	1980-81 to 1982-83
31. TOTAL MEDICINES & NARCOTICS	119 (0.04)	132 (0.04)	153 (0.02)	109 (0.01)	33 (-)	19 (-)	305 (0.02)	260 (0.02)
32. Fodder Crops	N.A. (-)	5750 (2.0)	N.A. (-)	4109 (0.7)	N.A. (-)	3096 (0.9)	N.A. (-)	12955 (1.1)
33. Miscellaneous Non-Edible Crops	18612 (6.5)	5903 (2.1)	10924 (1.9)	30206 (5.2)	34423 (9.8)	26214 (7.5)	63959 (5.2)	62323 (5.0)
34. TOTAL NON-EDIBLE CROPS	18612 (6.5)	11653 (4.1)	10924 (1.9)	34315 (5.9)	34423 (9.8)	29310 (8.4)	63959 (5.2)	75278 (6.1)
35. Net Sown Area	277360 (95.0)	268700 (93.0)	569000 (93.7)	561370 (94.5)	327730 (92.9)	335470 (95.0)	1174090 (93.8)	1165540 (94.4)
36. Area Sown more than once	14700 (5.0)	18870 (7.0)	38430 (6.3)	32530 (5.5)	24900 (7.1)	17470 (5.0)	78030 (6.2)	68870 (5.6)
37. GROSS CROPPED AREA	292060 (100.0)	287570 (100.0)	607430 (100.0)	593900 (100.0)	352630 (100.0)	352940 (100.0)	1252120 (100.0)	1234410 (100.0)

Notes : N.A. = Not Available
 (-) = Percentage is negligible
 (Figures in Parentheses are Percentages to total).

**Table 3.2 : Cropped Area Under Irrigation
Year 1982-83**

(Area in ha.)

Sr No	Crop	Sub-Region I	Sub-Region II	Sub-Region III	Total
1	Rice	354 (16.66)	1097 (51.62)	674 (31.72)	2125 (100.00)
2	Wheat	2068 (10.21)	6738 (33.26)	11455 (56.54)	20261 (100.00)
3	K.Jowar	1243 (18.88)	4110 (62.44)	1229 (18.67)	6582 (100.00)
4	R.Jowar	4806 (10.15)	26523 (56.01)	16021 (33.84)	47350 (100.00)
5	Total Jowar	6049 (11.22)	30633 (56.80)	17250 (31.98)	53932 (100.00)
6	Bajra	137 (2.98)	1714 (37.24)	2751 (59.78)	4602 (100.00)
7	Maize	248 (3.33)	3402 (45.74)	3788 (50.93)	7438 (100.00)
8	Other cereals	186 (35.36)	279 (53.04)	61 (11.60)	526 (100.00)
9	Total Cereal	9012 (10.14)	43893 (49.38)	35979 (40.48)	88884 (100.00)
10	Gram	874 (12.11)	4951 (68.61)	1391 (19.28)	7216 (100.00)
11	Tur	--	368 (25.43)	1079 (74.57)	1447 (100.00)
12	Green Gram	--	--	79 (100.00)	79 (100.00)
13	Total Pulses	874 (10.00)	5319 (60.84)	2549 (29.16)	8742 (100.00)
14	Total Food grains	9886 (10.13)	49212 (50.41)	38528 (39.46)	97626 (100.00)
15	Sugarcane	4823 (19.90)	8026 (33.12)	11387 (46.98)	24236 (100.00)
16	Total Fruits	885 (55.07)	555 (34.54)	167 (10.39)	1607 (100.00)

Contd...

Table 3.2 - Contd...

Sr No	Crop	Sub-Region I	Sub-Region II	Sub-Region III	Total
17	Total Vegetables	1885 (33.48)	3318 (58.92)	428 (7.60)	5631 (100.00)
18	Total Food Crops	18930 (14.26)	62847 (47.36)	50930 (38.38)	132707 (100.00)
19	Cotton	22 (0.40)	1486 (27.22)	3952 (72.38)	5460 (100.00)
20	Other Fibre Crops	111 (23.97)	352 (76.03)	--	463 (100.00)
21	Total Fibre Crops	133 (2.25)	1838 (31.03)	3952 (66.72)	5923 (100.00)
22	Groundnut	981 (7.62)	8518 (66.12)	3383 (26.26)	12882 (100.00)
23	Other Oilseeds	26 (50.98)	20 (39.22)	5 (9.80)	51 (100.00)
24	Total oilseed crops	1007 (7.79)	8538 (66.02)	3388 (26.20)	12933 (100.00)
25	Tobacco	48 (48.48)	49 (49.49)	2 (2.02)	99 (100.00)
26	Other Medicine & Narcotics	82 (70.09)	31 (26.50)	4 (3.42)	117 (100.00)
27	Total Medicine & Narcotics	130 (60.19)	80 (37.04)	6 (2.78)	216 (100.00)
28	Fodder Crops	531 (22.68)	1807 (77.19)	3 (0.13)	2341 (100.00)
29	Total Non Edible crops	1801 (8.41)	12263 (57.27)	7349 (34.32)	21413 (100.00)
	Total Area Under Irrigation	20731 (13.45)	75110 (48.73)	58279 (37.81)	154120 (100.00)

Table 3.3 : Fruit Crops Area According to Sub-Regions
(Area in ha)(1989-90)

Sr No	Fruit Crop	Sub-Region I	Sub-Region II	Sub-Region III	Total
1	Grape	617.24 (34.64)	1059.61 (59.47)	104.9 (5.89)	1781.75 (100.00)
2	Banana	444.29 (35.49)	591.46 (47.24)	216.29 (17.28)	1252.04 (100.00)
3	Mango	1.2 (14.20)	3 (35.50)	4.25 (50.30)	8.45 (100.00)
4	Sweet Orange	5.48 (4.79)	90.14 (78.86)	18.69 (16.35)	114.31 (100.00)
5	Mandrain Orange	0.4 (4.86)	5.25 (63.79)	2.58 (31.35)	8.23 (100.00)
6	Sour Lime	169.61 (12.98)	1010.49 (77.32)	126.82 (9.70)	1306.92 (100.00)
7	Pomegranate	244.73 (13.27)	956.54 (51.88)	642.37 (34.84)	1843.64 (100.00)
8	Guava	46.74 (19.15)	119.8 (49.09)	77.48 (31.75)	244.02 (100.00)
9	Papaya	14.81 (6.77)	184.14 (84.20)	19.75 (9.03)	218.7 (100.00)
10	Chiku	4.2 (6.89)	23.84 (39.12)	32.9 (53.99)	60.94 (100.00)
11	Ber	50.31 (7.72)	362.25 (55.58)	239.26 (36.71)	651.82 (100.00)
12	Custard Apple	1.35 (2.65)	27.81 (54.68)	21.7 (42.67)	50.86 (100.00)
13	Anjir (Fig)	0.4 (8.79)	2.15 (47.25)	2 (43.96)	4.55 (100.00)
14	Coconut	3.83 (6.67)	21.33 (37.14)	32.27 (56.19)	57.43 (100.00)
	Total	1604.59 (21.10)	4457.81 (58.63)	1541.26 (20.27)	7603.66 (100.00)

(Figures in parantheses are percentages to total)

3.3 Horticultural Crops :

The portion of area under horticultural crop is presented in the Table 3.3. It is seen that very less area is under horticultural plantation in all sub-regions. The maximum area is under grapes, banana, lemon, pomegranate and ber. As much as 59 percent of the total area under horticulture plantation is in the sub-region II. Considering the above mentioned fruit crops, the largest area of these crops is in sub-region II. Therefore it is essential to introduce the horticulture based agro-processing industries in the sub-region II, in order to get the good returns to the producers. There is also considerable cultivation of grapes and banana in the sub-region I, where marketing infrastructure needs to be developed.

**Table 3.4 : Review of Principal Vegetable Crops
of Solapur District, Year 1989-90**

Sr No	Name of Vegetable	Total Area (ha)	Per Hectare Yield in Quintal	Total Yield Of the District in Tonnes	Value of the Total Yield of the District in '000'Rs
1	Onion (Kh)	710 (8)	200	142	355 (13)
	(Rb)	2708 (29)	225	609.3	1523 (57)
2	Chilli	2753 (30)	80	220	330 (12)
3	Garlic	245 (3)	10	2.45	8.6 (0.3)
4	Brinjal	877 (9)	200	175	105 (4)
5	Sweet Potato	310 (3)	250	79	118 (5)
6	Okra	69 (0.7)	150	10.35	51.7 (2)
7	Cauliflower	8	200	1.6	3 (0.2)
8	Cabbage	98 (1)	200	19.6	39 (1.5)
9	Tomato	877 (9)	200	175.4	105 (4)
10	Methi	345 (4)	25	8.32	16.6 (1)
11	Other Vege	283 (3)	-	-	
Total		9283			2656

(Figures in parantheses are percentages to total)

As regards ber and pomegranate cultivation the area is increasing in the sub-region III, still there is scope to increase the area under these crops. Amongst various vegetables onion, chilli, brinjal and tomato are largely grown in the district (Table 3.4). Considering the irrigated area in sub-region I and market accessibility of Solapur city, ample scope is available for marketing of these vegetables in this sub-region. Similarly agro-based industries like tomato ketchup, tomato sauce, chilli powder etc. need to be established.

3.4 Fertilizer, Pesticides and Technology

Due to shortage of organic manure to the major crops and higher prices of oil cakes, the farmers are inclined to use the chemical fertilizers for most of the crops and the major input goes to cash crops like sugarcane, cotton, groundnut and horticultural crops. The tahsilwise consumption of fertilizers is not available hence the data of District is given in Table 3.5. It is observed that the consumption of nitrogenous fertilizers is more particularly urea and the next is phosphatic fertilizers like superphosphate. During the year 1989-90, the consumption of urea and superphosphate was 45673 and 23735 tonnes, respectively in the district. Amongst the mixed/complex fertilizer, the consumption of suphala (15:15:15), 10:26:26 was more compared to other complex/mixed fertilizers. Use of diammonium phosphate has increased for the crops like groundnut and the consumption during the year 1989-90 was 6556 tonnes.

Use of pesticides is not so common for the control of crop pests. The pests like sorghum shoot fly, pigeonpea and gram podborer, groundnut leaf roller, aphids, sunflower hairy caterpillar, rodent, white grub are the major pests in the region. During the year 1989-90, the pesticides like endosulfan, phosphomidon, Dimethoate, Parathion, monocrotophos, Quinalphos, BHC 10% are mainly used for the pest control. Maximum quantity of endosulfan, phosphomedon and BHC was used for control of different pests of the crop. (Table 3.6) The plant protection measures are taken on large scale in horticultural uses and hence the consumption by big farmer is more than small and marginal farmers.

3.5 Forest :

Even though it is envisaged that 33% area should be brought under forest, it is difficult to be achieved in Solapur District. Land covered under forest is only 653 ha under DPAP and 874 ha under fuel wood for rural area schemes. The data presented in table 3.7 indicates large fluctuation in year to year area covered under forest. Social forestry department is also engaged in development of forest on farmers fields, village panchayat lands and along roadsides. The data presented in table 3.8 indicates that in sub-region III, both reserved and unclosed forest area is highest. Similarly, roadside forest is also highest in sub-region III. The total number of benefitted farmers is only 707 in the district.

As per recommendation of Dry Farming Research Station, very shallow and shallow soils should be diverted for pasture forests and dryland horticulture crops. Even though this amounts to considerable area, it is desirable that atleast large amount of this total area be diverted for Silvi-horti-pastoral system.

Table 3.5 : Consumption of Fertilizer in Solapur District (1989-90)

Sr. No.	Name of the fertilizer	Consumption of fertilizer (Tonnes)
1	Urea	45673
2	Ammonium Sulphate	300
3	Superphosphate	23735
4	Muriate of Potash	2314
5	Sulphate of Potash	985
6	Di-ammonium Phosphate	6556
7	Suphala 15:15:15	12156
8	Urumphos (20:20:0)	6820
9	Sampurna 19:19:19	5250
10	10:26:26	7546
11	18:18:10	3186
12	15:5:5	370
13	10:20:20	5661
14	20:10:10	2844
15	7:10:5	862
Total		124258

Table 3.6 : Use of Pesticides per Crop Area (1989-90)

Name of Campaign	Name of Insecticide	Pesticide Consumption	Area Cropped (ha)
1 Stem fly control on sorghum	Endosulfan (35 EC)	82.0 lit	234.00
2 Aphid control on green gram	B.H.C. 10 % dust	26.0 MT	1300.00
3 Leaf Roller on groundnut	Phosphamidon 85 WSC	278.0 lit	2780.00
4 Groundnut Aphids	Phosphamidon 85 WSC	302.0 lit	3020.00
5 Groundnut Leaf spot NODP	Sulphur (80Wp)	3.0 MT	1500.00
6 Sunflower hairy caterpillar (Control under NODP)	Endosulfan (35 EC)	3994.5 lit	5592.50
	B.H.C. 10 % dust	124.15 MT	6207.50
7 Safflower Aphid (Control under NODP)	B.H.C. 10 % dust	51.10 Mt	2555.00
	Dimethoate (30 EC)	1883.5 lit	3767.00
	Phosphamidon 85 WSC	470.9 lit	3924.50
8 Podborer control (campaign under NPDP on red gram)	M.Parathion dust	7.5 MT	375.00
	Endosulfan (35 EC)	1200 lit	1200.00
	Quinalphos 25 EC	390 lit	390.00
	Monocrotophos 36 WSC	330 lit	600.00
9 Podborer control under red gram under special component scheme	B.H.C 10% dust	23.9 MT	1195.00
	M.Parathion dust	20.0 Mt	1000.00
	Endosulfan (35 EC)	1601 lit	1601.00
	Quinalphos 25 EC	300 lit	300.00

Table 3. 7 : Land Covered Under Forest

(Area in ha)

Year	Scheme for fuel wood for rural area	DPAP Programme
1983	200	-
1984	100	-
1985	25	-
1986	-	-
1987	50	107
1988	335	399
1989	67	29
1990	97	118
Total	874	653

Table 3.8 : Area Covered Under Social Forestry in ha

Forest Type	Sub-Region I	Sub-Region II	Sub-Region III	Total
Reserved Forest	204 (1.20)	2526 (14.83)	14306 (83.98)	17036 (93.72)
Unclosed Forest	195 (17.09)	-	946 (82.91)	1141 (6.28)
Total	399 (2.20)	2526 (13.90)	15252 (83.91)	18177 (100.00)
Forest Trees Along Road Side Km	26 (18.57)	39 (27.86)	75 (53.57)	140 (100.00)

(Figures in parantheses are percentages to total)

3.6. Extension Support :

Agricultural extension programme is implemented by various agencies. The role of each agency is also fixed. The state Agril. Universities are engaged in imparting training of Agril. Extension Staff upto District level, while the supporting staff is further given training by the District Level Officers. The Office of the Principal Agril. Officer is the nodal agency for transfer of technology with the help of other agencies. The Agril. Development Officer, Z.P. provides inputs through Maharashtra Seed Corporation, Fertilizers and Pesticide Firms. Inputs are provided as per availability and requirement of the district. The distribution is done through Co-operative Societies and Block Development Officers. Village level workers are responsible for dissemination of technical information.

Besides various development departments including Soil and Water conservation, horticulture, animal husbandry and veterinary forest and social forestry, fisheries etc. they plan their programme propaganda, which is also made through Training and Visit Scheme. Irrigation development network also prepares the information about availability of irrigation water from various sources. However, the various activities are not synchronized properly. The district Central Co-op Bank plays vital role in supply of inputs on credit through co-op. societies.

Under the guidance of State Agril. University, certain pilot projects are launched during kharif, rabi and summer seasons. The results of pilot projects are very encouraging. The production under pilot project is 2 to 3 times more than average. A better co-ordination between different agencies helps in getting better returns to the farmers. Pilot projects on rabi sorghum, kharif and rabi pluses have shown the usefulness and effectiveness of technology. However, what is required is the continued support of such activity for at least five years.

Ambitious horticultural programme launched by the State Dept. Of Agril. has created good impact awareness during 1990-91. Solapur district stood first in plantation which indicates good co-ordination of various agencies. Training of VLW and farmers was organised in which University Scientists participated and informed about latest technology.

The Farmers Rallys are organised not only at the Research Stations but also at sugar factories, in villages etc., in these different private firms, social and cultural organisations also participate. The various activities are also given due publicity through local news papers. The extension workers and scientists contribute popular articles to the newspaper. All India Radio, Solapur station organises group meeting every month to chalk out the technical programme for broadcasting. Special programmes such as 'Nabhowani Sheti Shala' giving 28 lessons on Dry farming Technology was also organised by Solapur station with the help of university scientists. Thus there is very good extension support in the district which extends in various sub-regions.

3.7. Production Profile :

The information regarding production and productivity of important crops of solapur district for the year 1987-88 is presented in Table 3.9.

Amongst the cereal crops, the highest production is of sorghum which is usually grown under rainfed and under receding soil moisture conditions. This is the main staple food of the rural population and hence the crop is grown on all types of soil which ultimately results in productivity of 475 Kg/ha. In fact, soils below 45 cm depth are not suitable for growing rainfed rabi sorghum. Moreover the management level at the farmers level is also very poor. Inputs, especially fertilizer use is least for this crop.

Even though the crop of wheat shows highest productivity, it is mainly from irrigated areas. Compared to production potentials of this crop, the productivity is also very low. In fact there is a policy to discourage growing wheat in the district. However the farmers do grow as second crop under irrigated conditions, the sowing date varies due to which the crop suffers.

Amongst the pulses, pigeonpea (tur) and gram are important crops. Tur is grown in kharif cum rabi season as rainfed crop while gram is grown in rabi season, usually under irrigated condition as second crop. Productivity of these crops is 369 and 560 Kg/ha in 1987-88 respectively. Even though the productivity is low, it is quite stable over years and these pulses do fetch a good price in the market.

The oilseed production is mainly from groundnut, safflower and sunflower. Groundnut is grown both in kharif and summer seasons. During Kharif, it is mainly a rainfed crop while during summer it is mainly irrigated crop usually grown after Rabi sorghum. Delayed sowing of summer groundnut results in delayed harvesting in kharif season, resulting poor land preparation for next crop. Productivity of summer groundnut is practically double that of Kharif groundnut. Safflower is mainly under rainfed condition. However, the productivity increases with two protective irrigations to the tune of 100 percent.

Area under sunflower crop has increased considerably during last decade. The crop has replaced considerable area under kharif groundnut. This crop is grown under rainfed conditions during kharif and rabi seasons as well as under irrigated conditions during rabi and summer seasons. Productivity of crop is low during kharif due to poor management practices while during rabi and summer it is fairly good. The farmers are tempted to grow this crop due to low cost of cultivation, especially seed cost. However, productivity is affected since very shallow and shallow soils are also put under this crop which are not suitable. This crop is best suited for intercropping with pigeon-pea (Tur).

Sugarcane is the most important commercial crop of the district for production of sugar and jaggery. The productivity varies considerably between planting seasons as well as level of management. Even though Adsali (July) plantation gives highest productivity, the area is least and remains under the crop for about 18 months. Suru (January) planting is having least duration (12 months) with fairly good productivity. The pre-seasonal plantation lies in between the two and is also suitable for intercropping with crops like onion, potato and vegetables to get more monetary returns. The productivity of sugarcane in different planting system is 150, 125 and 100 t/ha, for adsali, pre-seasonal and Suru plantation, respectively.

Cotton has a definite place in the district. It is grown mainly as rainfed crop in sub-region I and irrigated crop in sub-region I & III. Cotton is taken as rainfed rabi crop in deep black soil for rotation with rabi jowar. Irrigated cotton is coming up again due to cotton spinning mills in the district. The productivity of rainfed and irrigated Kapas is 10 to 12 quintals and 25-30 quintals potential per hectare, respectively.

Table 3.9 : Production and Productivity of Principal Crops in Solapur District. Year 1987-88

Crops	Per Hectare Yield In Kg	Production ('00' MT)	Crops	Per Hectare Yield In Kg	Production ('00' MT)
Rice	808	21	Linseed	370	10
Wheat	959	348	Sesamum	107	3
Jowar	475	3652	Groundnut (Pod)	1608	550
Bajra	248	64	Sugarcane (Jaggery)	8734	2664
Maize	811	167	Cotton	241	7
Other Grains	700	14	Mesta	889	24
Total Food Grains	498	4266	Tobacco	500	1
Gram	560	176	Total Medicinal & Narcotics	500	1
Tur	369	73	Chilli	784	29
Udid	286	2	Turmeric	1375	330
Mung	300	6			
Lentil	308	4			
Other Pulses	236	77			
Total Pulses	385	338			

3.8. Productivity potentials :

Production potential of different crops can be increased considerably by improving planning and management aspects of agriculture. Select right crop for right soil and irrigated and rainfed conditions. The use of inputs such as improved seed, fresh water and plant protection is the important key to increase production. Productivity should be increased by adopting suitable management practices. In agriculture, management aspect contributes much more than inputs, since it is "how and when"

these inputs are used determines the productivity. To elaborate this point, it can be stated that the production of rabi sorghum can be increased even though the area under the crop is reduced, by improving the fertilizer use efficiency, plant protection and protective irrigation at the right time of crop growth. Same is the case with other crops like gram, pigeonpea, safflower, groundnut, sunflower, sugarcane and cotton. Timely sowing (or planting), timely protection and fertilizer use (spot application) and placement by means of two bowl ferti-seed-drill, limited irrigation at critical stages of crop growth etc. are essential factors for boosting the production of different crops. This can be achieved only if the farmers are aware of the improved technology by giving guidance from time to time and providing inputs in adequate quantity at right time.

The above aspects are also applicable to crops other than foodgrains. In the case of horticulture, crops like ber, pomegranate, grapes, mango, tamarind etc. there is also scope of improving the production by better management practices. These crops are usually grown under well irrigation and hence the water is at the command of the farmer in contrast to canal irrigation. In order to increase the efficiency of canal water, the cropping in command area should be so adjusted to provide irrigation to all farmers at right time. Quantity of water to be given and frequency of irrigation should be related to soil type, stages of crop and method of irrigation.

Based on increased production potential, there is a room to increase agro-based industries in the district. Sugar industry is the main industry which has extended to each district. The cane development programme has been supported by the seed production programme launched by the university. Besides sugar production, the by-products such as molasses and baggases can be used for alcohol and chemical production and paper industry respectively. Pressmud cake which is also a by-product of sugar industry is a good source of plant nutrients, and found most useful for crop production as a result of continuous research.

Increased area and production of cotton is essential for cotton spinning mills already started in the district. Two cotton spinning mills at Valsang and Sangola (sub-region I and III respectively) have been found to be most efficient. This can create large employment potential for rural population.

Agro-based industries can be started based not only on the excess produce but also for processing and marketing to earn foreign exchange. Knowledge about fruit preservation, packing and marketing need to be enhanced. Grape grower associations and other fruit crop grower associations have already launched such programmes. Increase in production of food grain and oilseed crops would also help in increasing agro-based industries such as flake making from sorghum, starch from maize, tapioca and sorghum, jaggery from sweet sorghum, oil extraction plants from more production of groundnut, safflower and sunflower.

CHAPTER IV

LIVE STOCK ECONOMY

Allied agricultural sector is an important supporting sector in drought prone economy of a district like Solapur. Livestock business is one of the major activity which supported the farmers economy to a considerable extent. It can be maintained on the by-product obtained from crop production activity and in addition to the low cost, the farmer can get milk, mutton and eggs which help to meet the financial and nutritional requirements of the household. Moreover, good quality of organic manure can be obtained and used in crop production activity to enhance the higher production as well as to sustain the soil health.

4.1 Livestock :

In Solapur district livestock development has achieved importance. Being a scarcity area the farmers have to diversify their farm activity to maintain his family. Data from Table 4.1 would indicate the increased bullock and cow population by 3 and 13 percent, respectively during last five years (1977-1982). The increase was more in sub-region II. It was observed that he-buffaloes were increased in sub-region I which were used for breeding as well as draft purposes. As regards cows and buffaloes in milk, the highest increase was in sub-region III followed by sub-region II. In sub-region I sheep population has increased considerably, (30 percent) while the goat population has increased in sub-region III. The total livestock and poultry birds have increased by 12 and 24 percent respectively in the sub-region III during last five years. The population of the exotic breeds of cows has tremendously increased during the five years. The increase was higher in sub-region II followed by sub-region I and III.

The data on milk production according to sub-region are presented in Table 4.2 for the year 1989-1990. Milk collected by Government and Non-Government agencies was highest in sub-region III. Both cow and buffalo milk collection in I and II regions was there but no buffalo milk collection was observed in sub-region III. From total amount of milk the proportion was highest in sub-region III. There are six chilling plants in the district which can be increased in accordance with the quantity of milk production in this region as well as in sub-region II.

As regards slaughter houses position (Table 4.3) it was observed that there was an increase in the number of animals slaughtered in all the sub-regions. The proportion of slaughtered sheep and goats was more as compared to cows, bullocks and buffaloes. This helps the farmers to meet their timely requirement of funds. This is a typical character of drought prone economy. There is scope to increase this activity.

Table 4.1 A : Bullocks & Cows Statistics According to Sub-regions

(Number)

Sr. No.	Particulars	Sub-region I		Sub-region II		Sub-region III		Total	
		1977	1982	1977	1982	1977	1982	1977	1982
1.	Bullocks over 3 years								
i)	Only for breeding	116	128 (10)	201	326 (62)	82	109 (33)	399	563 (41)
ii)	Breeding & draft	885	992 (12)	916	3910 (327)	313	1255 (300)	2114	6157 (191)
iii)	Only for draft	40299	40631 (1)	82210	82184 (1)	57660	58121 (1)	180169	180936 (1)
iv)	Others	335	401 (12)	749	1249	352	568 (61)	1436	2218 (54)
	Total	41635	42152 (1)	84076	87669 (4)	58407	60053 (3)	184118	189874 (3)
2.	Cows over 3 years								
i)	In milk	14945	16123 (7)	31913	35470 (11)	25639	28944 (12)	72497	80537 (11)
ii)	Dry & not calved even once	12449	14357 (15)	35899	41362 (15)	29170	32600 (-12)	77518	88319 (14)
iii)	Working	3	306 (10100)	77	134 (74)	16	79 (393)	96	519 (440)
iv)	Others	16	133 (731)	188	351 (87)	58	188 (212)	262	672 (153)
	Total	27413	30919 (12)	68077	77317 (14)	54883	61811 (13)	150373	170047 (13)
3.	Young stock	26196	25318 (-4)	62899	64688 (-3)	48583	56183 (15)	137678	146189 (6)
4.	Total cattle	95244	98389 (3)	215052	229674 (6)	161873	178047 (9)	472169	506110 (7)

(Figures in parentheses indicate % increase over previous years.)

e 4.1 B : Buffalo Statistics According to Sub-regions

No.	Particulars	Sub-region I		Sub-region II		Sub-region III		Total	
		1977	1982	1977	1982	1977	1982	1977	1982
He buffaloes above 3 years									
i)	Only for breeding	155	190 (22)	204	163 (-21)	87	82 (-6)	446	435 (-3)
ii)	Breeding & draft	180	232 (25)	607	795 (30)	258	315 (22)	1045	1342 (28)
iii)	Only for draft	810	761 (-7)	3852	3765 (-3)	1943	1926 (-1)	6605	6452 (-2)
iv)	Others	36	74 (105)	139	150 (8)	104	58 (-45)	279	282 (01)
Total		1181	1257 (6)	4802	4873 (1)	2392	2381 (-1)	8375	8511 (2)
Buffaloes above 3 years									
i)	Milk	19151	19697 (3)	23816	23967 (01)	12457	13002 (4)	55424	56666 (2)
ii)	Dry and not even calved once	9879	13037 (32)	14694	21849 (49)	8822	11502 (30)	33395	46388 (39)
iii)	Working	25	132 (428)	416	398 (-4)	153	106 (-31)	594	628 (6)
iv)	Others	41	235 (473)	144	211 (47)	53	103 (94)	238	549 (130)
Total		29096	33101 (14)	39070	46417 (19)	21485	24713 (14)	89651	104231 (16)
Young stock		21768	17770 (-18)	35968	33346 (-7)	19247	19650 (2)	76983	70766 (-8)
Total buffaloes		52045	52128 (0.1)	79840	84636 (6)	43124	46744 (8)	175009	183508 (5)

figures in parentheses indicate % increase over previous years.)

e 4.1 B : Buffalo Statistics According to Sub-regions

No.	Particulars	Sub-region I		Sub-region II		Sub-region III		Total	
		1977	1982	1977	1982	1977	1982	1977	1982
He buffaloes above 3 years									
i)	Only for breeding	155	190 (22)	204	163 (-21)	87	82 (-6)	446	435 (-3)
ii)	Breeding & draft	180	232 (25)	607	795 (30)	258	315 (22)	1045	1342 (28)
ii)	Only for draft	810	761 (-7)	3852	3765 (-3)	1943	1926 (-1)	6605	6452 (-2)
iv)	Others	36	74 (105)	139	150 (8)	104	58 (-45)	279	282 (01)
	Total	1181	1257 (6)	4802	4873 (1)	2392	2381 (-1)	8375	8511 (2)
Buffaloes above 3 years									
i)	Milk	19151	19697 (3)	23816	23967 (01)	12457	13002 (4)	55424	56666 (2)
ii)	Dry and not even calved once	9879	13037 (32)	14694	21849 (49)	8822	11502 (30)	33395	46388 (39)
ii)	Working	25	132 (428)	416	398 (-4)	153	106 (-31)	594	628 (6)
iv)	Others	41	235 (473)	144	211 (47)	53	103 (94)	238	549 (130)
	Total	29096	33101 (14)	39070	46417 (19)	21485	24713 (14)	89651	104231 (16)
	Young stock	21768	17770 (-18)	35968	33346 (-7)	19247	19650 (2)	76983	70766 (-8)
	Total buffaloes	52045	52128 (0.1)	79840	84636 (6)	43124	46744 (8)	175009	183508 (5)

figures in parentheses indicate % increase over previous years.)

Table 4.1 C : Other Livestock Statistics According to Sub-Regions (numbers)

Sr. No.	Particulars	Sub-regions			Total
		I	II	III	
1.	Sheep				
	1977	8917	78050	189947	276914
	1982	11584 (30)	76155 (-3)	179790 (-5)	267529 (-4)
2.	Goat				
	1977	109141	270762	153451	533354
	1982	108907 (-1)	280658 (3)	174139 (14)	563704 (+6)
3.	Horses & ponies				
	1977	347	422	363	1132
	1982	280 (-19)	405 (-4)	551 (-51)	1236 (9)
4.	Other livestock				
	1977	4725	8154	6234	19113
	1982	19536 (313)	35838 (339)	35776 (474)	91150 (377)
5.	Total livestock				
	1977	270419	652280	554992	1477691
	1982	290824 (7)	707366 (8)	615047 (12)	1613237 (9)
6.	Poultry birds				
	1977	97189	366985	440399	904573
	1982	87795 (-10)	391294 (7)	544541 (24)	1023630 (13)

(Figures in parentheses indicates % increase over previous period).

Table 4.1 D : Exotic / Hybrid Cows & Bullocks According to Sub-regions

Sr. No.	Particulars	Sub-region I		Sub-region II		Sub-region III		Total	
		1977	1982	1977	1982	1977	1982	1977	1982
1.	Bullocks above 2.5 years								
i)	Castrated	6	315 (5150)	32	257 (703)	30	256 (753)	68	828 (1117)
ii)	Un-castrated	82	125 (52)	281	427 (135)	179	422 (135)	542	974 (80)
	Total	88	440 (400)	313	684 (118)	209	678 (224)	610	1802 (195)
2.	Cows above 2.5 years								
i)	In milk	432	985 (128)	146	868 (495)	1089	2437 (124)	1667	4290 (157)
ii)	Dry and not calved even once	60	409 (581)	88	505 (474)	247	1424 (477)	395	2338 (492)
iii)	Others	56	181 (223)	78	219 (181)	389	54 (-87)	523	454 (-13)
	Total	548	1575 (187)	312	1592 (410)	1725	3915 (126)	2585	7082 (174)
3.	Young stock	400	1354 (239)	435	1933 (344)	1171	4319 (274)	2006	7006 (282)
4.	Total cows & bullocks	1036	3369 (225)	1060	4209 (297)	3105	8972 (189)	5201	16550 (218)

(Figures in parentheses indicate % increase over previous period).

**Table 4.2 : Milk Production According to Sub-Regions
Collected by Agencies. (1989-90)**

Sr. No.	Particulars	Sub-regions			Total
		I	II	III	
1.	Number of societies	56 (9)	345 (55)	229 (36)	630 (100)
2.	Milk (litrs) collected				
	Buffalo	190895 (7)	2533830 (93)	N.A.	2724725
	Cow	4738430 (11)	16717730 (37)	23144285 (52)	44600445
	Total	4929325 (11)	19251560 (41)	23144285 (48)	47325170 (100)
3.	Average milk collected per day				
	Buffalo	523	6942	-	7465
	Cow	12982	45802	63409	122193
	Total	13505	52744	63409	129658
4.	Number of chilling plants	1	3	6	10

(Figures in parentheses indicate % to total)

Note : N. A. - Data Not Available

Table 4.3 : Position of Slaughter Houses According to Sub-Regions

S. Name of Items No.	Sub-Region I		Sub-Region II		Sub-Region III		Total	
	1977	1988	1977	1988	1977	1988	1977	1988
1. No. of Slaughter Houses	5	6 (20)	6	9 (50)	2	2 (00)	13	17 (31)
2. Animals Slaughtered								
a. Cows & bullock	7082	3827 (-46)	658	2297 (246)	-	-	7740	6124 (-13)
b. Buffaloes & he-buffaloes	5297	5425 (2)	1102	1042 (-6)	-	-	6399	6467 (1)
c. Sheep	33896	50416 (49)	2056	2277 (11)	189	335 (77)	36141	53028 (47)
d. Goat	77465	91612 (18)	10197	10502 (3)	2533	2766 (9)	90195	104880 (16)
Total	123740	151280 (22)	14013	16118 (17)	2722	3101 (14)	140475	170499 (21)

(Figures in parantheses indicate % increase over previous period)

The veterinary statistics (Table 4.4) shows that there was increase in dispensaries, primary aid centres and artificial insemination centres in all sub-regions. The increase was more in sub-region II and III over sub-region I, where we find predominant activity.

4.2 Poultry :

Statistics pertaining to poultry is given in Table 4.5. Poultry population has substantially increased during this period in sub-region III followed by sub-region II. The total number of fowls has increased by 23.65 and 6.62 percent in the sub-region III and II respectively. While it has decreased by 9.67 percent in the sub-region I. Though the fowl production has increased in sub-region III, the egg production was more in sub-region II, followed by sub-region III. It was 11, 43, 32 percent increase in the sub-region I, II and III respectively during the five years. Poultry sector provides a large scope in this district.

4.3 Fishery :

The inland fishery data presented in Table 4.6 indicate that the total area favourable for fishery remained more or less the same but the fish production has increased during the last five years in all the sub-regions by 38 and 15 percent respectively in sub-region II and III. The fishery income increased by 21, 90 and 98 percent for the sub-region I, II and III respectively during these five years. Fish production was maximum in the sub-region II (294 M.Tonnes out of 405 M. Tonnes for the district.)

Table 4.3 : Position of Slaughter Houses According to Sub-Regions

S. Name of Items No.	Sub-Region I		Sub-Region II		Sub-Region III		Total	
	1977	1988	1977	1988	1977	1988	1977	1988
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Table 4.4 : Veterinary Statistics According to Sub-Regions

Particulars	Sub-Regions			Total
	I	II	III	
1. Hospitals				
1982 - 83	2	1	-	3
1987 - 88	1	-	-	1
2. Dispensaries				
1982 - 83	8	11	8	27
1987 - 88	7	12	11	30
3. Primary aid Centres				
1982 - 83	11	21	14	46
1987 - 88	20	36	24	80
4. Artificial insemination centres				
1982 - 83	14	25	16	55
1987 - 88	26	59	35	120

Table 4.5 : Poultry Statistics According to Sub-Regions

Sr. No.	Particulars	Sub-region I		Sub-region II		Sub-region III		Total	
		1977	1982	1977	1982	1977	1982	1977	1982
1.	Cocks								
	i) Deshi	7311	10189 (39)	24545	52656 (114)	29670	51017 (71)	61526	113862 (85)
	ii) Improved	178	440 (147)	291	760 (161)	326	948 (190)	795	2148 (170)
	Total	7489	10629 (41)	24836	53416 (115)	29996	51965 (73)	62321	116010 (86)
2.	Hens								
	i) Deshi	39194	44037 (12)	164581	235693 (43)	224020	278691 (24)	427795	558421 (30)
	ii) Improved	1637	1331 (-19)	2486	2949 (18)	40598	66643 (64)	44721	70923 (58)
	Total	40831	45368 (11)	167067	238642 (43)	264618	345334 (30)	472516	629344 (33)
3.	Chickens								
	i) Deshi	44003	27989 (-36)	172384	98750 (-43)	135912	138050 (2)	352299	264789 (-25)
	ii) Improved	4866	2079 (-57)	2698	486 (-82)	9873	9192 (-7)	17437	11757 (-33)
	Total	48869	30068 (38)	175082	99236 (-43)	145785	147242 (1)	369739	276546 (-25)
4.	Total fowls								
	i) Deshi	90508	82215 (-9)	361510	387099 (7)	389602	467758 (20)	841620	937072 (11)
	ii) Improved	681	5580 (-16)	5475	4195 (-23)	50797	76783 (51)	62953	86558 (37)
	Total	97189	87795 (-10)	366985	391294 (7)	440399	544541 (24)	904573	1023630 (13)
5.	Eggs								
	i) Deshi	4703280	5284440 (12)	19749720	28283160 (43)	26882400	33442920 (24)	51335400	67010520 (30)
	ii) Improved	261920	212960 (-19)	397760	471840 (19)	6495980	10662880 (64)	7155360	11347680 (58)
	Total	4965200	5497400 (11)	20147480	28755000 (43)	33378080	44105800 (32)	58490706	79358200 (34)

(Figures in parantheses indicate % increase over previous year)

4.4 Present Status of Livestock Economy :

The economic development through allied activities depends mostly on status of availability of livestock per unit of area. The present status is given in Table 4.7.

As per the 1982 statistics it was observed that number of bullocks in work per 1000 ha was highest in region III and it was on par in region I & II. The number of buffaloes and cows in milk per 1000 population was highest in region III followed by II and I. As regards total milk collection agencies of the State Government or Co-operative Sector, during the year 1989 - 1990, the highest societies were in sub-region II (345) and lowest in sub-region I (56). The maximum milk collection was in the sub-region III followed by II and I. The data on milk collection of buffaloes and cow milk ^{are not} separately ^{available} in region III. The proportion of milk collected was highest in region III even though the number of societies were less than carrying capacity of untapped.

Efficiency of Milk Societies in Sub-Region II can be improved. Number of chilling plants will have to be increased. Similarly the availability of milk collected per 1000 population was highest in region III followed by II and I. This may be due to Solapur city falling in Sub-Region III. Hence, the Silvipastoral systems to support livestock economy can be a supporting economic sector.

Poultry :

Poultry and egg production has been well spread in all the three regions. This can also prove to be an supporting economic activity. But the intensity has to be carefully managed keeping in view the market support. It may at best be a supporting sector in the absence of lack of private investment.

Fishery :

Available resources have not been tapped in fishery in this district. In the sub-region I, 21 percent length of the river basin is available for fishing activity. While 39 percent each river basin is available in Sub-Region II and III. The fish production per unit area was 73 percent in Sub-Region II and 15 percent in Sub-Region III and 12 percent in Sub-Region I. The income received per unit area was highest in Sub-Region III as compared to the other Sub-Regions.

Table 4.6 : Inland Fishery Production.

Particulars	Sub-region I		Sub-region II		Sub-Region III		Total	
	1982-83	1987-88	1982-83	1987-88	1982-83	1987-88	1982-83	1987-88
Length of river bank	164	164	304	304	304	304	772	772
Total area favorable for fishery (lakes, dams, reservoirs)	4005	4063 (1)	33916	34230 (1)	2626	2677 (2)	40547	40970 (1)
Fish productions (Met. Tons)	19	50 (163)	213	294 (38)	4	61 (1425)	236	405 (72)
Income received by producer (Rs. in lakhs)	6.96	8.44 (21)	12.68	24.04 (90)	3.26	6.47 (98)	22.90	38.95 (70)

(Figures in parentheses indicate % increase over previous years.)

Table 4.7 : General Information of Livestock (1982) According to Sub-Regions

Particulars	Sub-Region I	Sub-Region II	Sub-Region III	Total
1. Number of bullocks in work/1000'ha of net area sown	156.87	156.18	179.04	162.89
2. Total number of livestock/ha of pasture land	24.03	35.54	19.52	25.04
3. Number of cows and buffaloes in milk/1000 population	36.43	60.71	66.89	52.99
4. Number of societies	56	345	229	630
5. Milk available lits/1000 of population/year (1989 - 1990)	5014.57	19664.51	36912.73	18279.32
6. Number of eggs available/1000 population/year	5592.47	29371.80	70344.17	30265.81
7. Number of health centres/1 million of livestock	71.30	29.80	35.20	37.50
8. Fish production per unit of area 1987-88 (Qtls)	0.12	0.08	0.23	0.10

Constraints for development :

Livestock development programme suffers from the following constraints :

1. Unawareness of the programme by the rural masses and development of marketing and processing network.
2. Inadequate financial support for purchase of cross-bred animals. Economic non-viability of local breeds.
3. Development of pastures. Green fodder is essential for milk production. Grazing of animals before the grass get established with the onset of rainfall is one of the most important constraints which ultimately results in inadequate grass on road sides and wastelands.
4. Inadequate medical facilities for the livestock as is evident by the fact that there are no veterinary hospitals in Sub-Region II and III.

CHAPTER V

PROFILE OF THE AGRO-INDUSTRY SYSTEM

Prospect of agriculture depends largely on how many agro-based industries are generated. For any industry raw-material should be available in adequate quantity and it should be easily transported. Similarly, the processed material should be sold out in local, state, country and international market. The small scale and large scale industries should support the efficient use of natural resources, raw material produced and gainful employment of excess human labour available in rural areas.

The information on the large scale and medium scale industries shows that number of industries are more in sub-region I (13 numbers) while there are 7 industries each in sub-region II and III respectively. This is due to the fact that Solapur city falls in First sub-region. Besides sugar mills, there are spinning and textile mills distilleries etc. Sugar mills are now coming up for each tahsil. These industries make large capital investment and thus generate employment potentials in the district.

The data in respect of small scale industries since 1983-84 to 1987-88 presented in Table 5.1 would reveal that sub-region I covering North Solapur, South Solapur and Akkalkot tahsils have highest number of industrial units, fixed investment, provided more employment and production value. This region has highest agro-based industry, forest based industry, textile based industry, engineering, chemical, animal husbandry, building material and other industries. The highest investment and production value is in sub-region I. The reasons for the same are the growth of Solapur city in the last decade with very good support from MIDC. Recently the activities are being spread in other rural areas of the district. However, adequate facilities like power supply, water supply, skilled labour, transport, market, etc. are yet to be developed. In sub-region III, small scale industries are least and hence more attention is required to be paid to this region by the concerned departments to bring them at par with sub-region I.

Agro-based, forest based and animal husbandry based small scale industries have good scope in all the sub-regions. Horticultural crops especially ber, pomegranate, mango, grapes, tamarind, etc., have tremendous scope in the district the produce of which needs to be processed. Technologies are available in case of efficient utilization of waste products of mango stone, tamarind seeds. For marketing of fruits packing materials are required. In order to capture the international market, the processing of fruits is very essential. Processing technologies are required to be further developed in case of ber and pomegranate. All these fruits are exported to other countries. Grape can be preserved in cold storage for marketing or converted into resins or wines for which supporting industries are required.

Even though cotton based industries are more in sub-region I and III, the raw material is not available in these Sub-Regions of the district in adequate quantity. Lint is imported from Marathwada, Vidarbha and Karnataka. Hence there is scope to grow cotton under rainfed as well as irrigated conditions. Co-operative spinning mills established in recent past have made a big headway in showing highest efficiency in the rural areas like South Solapur and Sangola tahsils.

There are not many forest based industries in the district. Sub-Region I and II have some industries in this sector but in Sub-Region III have only a few such units. However, there is scope of establishing forest and social forestry programme in this region as light textured very shallow soils do prevail considerably in this sub-region, which are not suitable for crop husbandry. It is interesting to note that there are no textile based industries, chemical, animal husbandry based and building material based industries in sub-region III. The reasons for the same need to be identified and efforts are required to be made to improve the situation.

Table 5.1 : Existing Industrial Status - Small Scale Industrial Units. Since 1983-84 to 1987-88

Sno.	Industry Category	Sub-regions			
		I	II	III	Total
1.	Agro-based				
	No of Registered Units (nos)	67.00	35.00	3.00	105.00
	Fixed investment (Rs in Lakhs)	236.92	67950.15	2.15	68189.22
	Employment	308.00	175.00	15.00	498.00
	Capacity (Rs. in Lakhs)	1359.19	622.94	74.96	2057.09
	Production Value (Rs.in Lakhs)(1987-88)	1012.35	435.45	52.45	1500.25
	% sales within district	250.00	280.00	110.00	640.00
	within Country	50.00	120.00	90.00	260.00
	outside Country	0.00	0.00	0.00	0.00
2.	Forest-based				
	No of Registered Units (nos)	50.00	10.00	2.00	62.00
	Fixed investment (Rs in Lakhs)	128.37	13.14	0.97	142.48
	Employment	250.00	110.00	10.00	370.00
	Capacity (Rs. in Lakhs)	851.01	17.73	0.53	869.27
	Production Value (Rs.in Lakhs)(1987-88)	633.66	9.36	0.37	643.39
	% sales within district	280.00	220.00	160.00	660.00
	within Country	21.00	80.00	40.00	141.00
	outside Country	0.00	0.00	0.00	0.00
3.	Textile-based				
	No of Registered Units (nos)	577.00	22.00	0.00	599.00
	Fixed investment (Rs in Lakhs)	702.45	9.90	0.00	712.35
	Employment	2885.00	150.00	0.00	3035.00
	Capacity (Rs. in Lakhs)	3806.29	35.41	0.00	3841.70
	Production Value (Rs.in Lakhs)(1987-88)	3152.99	24.82	0.00	3177.81
	% sales within district	130.00	100.00	0.00	230.00
	within Country	150.00	100.00	0.00	250.00
	outside Country	20.00	0.00	0.00	20.00
4.	Engineering				
	No of Registered Units (nos)	154.00	28.00	22.00	204.00
	Fixed investment (Rs in Lakhs)	254.27	87.64	15.86	357.77
	Employment	770.00	140.00	110.00	1020.00
	Capacity (Rs. in Lakhs)	949.29	105.79	30.85	1085.93
	Production Value (Rs.in Lakhs)(1987-88)	732.53	74.05	21.60	828.18
	% sales within district	250.00	300.00	300.00	850.00
	within Country	130.00	280.00	0.00	410.00
	outside Country	20.00	20.00	0.00	40.00

Table 5.1 - Contd...

Sno.	Industry Category	Sub-regions			Total
		I	II	III	
5.	Chemicals				
	No of Registered Units (nos)	63.00	9.00	0.00	72.00
	Fixed investment (Rs in Lakhs)	175.31	11.42	0.00	186.73
	Employment	315.00	45.00	0.00	360.00
	Capacity (Rs. in Lakhs)	508.50	28.09	0.00	536.59
	Production Value (Rs.in Lakhs)(1987-88)	380.48	19.60	0.00	400.08
	% sales within district	210.00	0.00	0.00	210.00
	within Country	90.00	200.00	0.00	290.00
	outside Country	0.00	0.00	0.00	0.00
6.	Animal Husbandry				
	No of Registered Units (nos)	12.00	2.00	0.00	14.00
	Fixed investment (Rs in Lakhs)	10.39	0.20	0.00	10.59
	Employment	60.00	10.00	0.00	70.00
	Capacity (Rs. in Lakhs)	41.50	0.50	0.00	42.00
	Production Value (Rs.in Lakhs)(1987-88)	31.03	0.35	0.00	31.38
	% sales within district	100.00	7.00	0.00	107.00
	within Country	100.00	30.00	0.00	130.00
	outside Country	0.00	0.00	0.00	0.00
7.	Building Material				
	No of Registered Units (nos)	37.00	12.00	0.00	49.00
	Fixed investment (Rs in Lakhs)	57.99	7.73	0.00	65.72
	Employment	185.00	60.00	0.00	245.00
	Capacity (Rs. in Lakhs)	497.00	15.63	0.00	512.63
	Production Value (Rs.in Lakhs)(1987-88)	299.82	10.95	0.00	310.77
	% sales within district	100.00	80.00	0.00	180.00
	within Country	100.00	120.00	0.00	220.00
	outside Country	0.00	0.00	0.00	0.00
8.	Others				
	No of Registered Units (nos)	208.00	40.00	17.00	265.00
	Fixed investment (Rs in Lakhs)	1083.31	24.42	22.41	1130.14
	Employment	1040.00	200.00	85.00	1325.00
	Capacity (Rs. in Lakhs)	2175.54	99.20	43.65	2318.39
	Production Value (Rs.in Lakhs)(1987-88)	1630.66	69.43	40.79	1740.88
	% sales within district	200.00	340.00	170.00	710.00
	within Country	120.00	60.00	30.00	210.00
	outside Country	0.00	0.00	0.00	0.00

CHAPTER VI

INFRASTRUCTURAL FACILITIES.

The growth in infrastructure has always gone hand in hand with economic development in general and agricultural development in particular. There is no need to emphasise the catalytic role of infrastructure in development dynamics. It has been accepted as a fundamental part of the structure of rural economy and an essential pre-condition for development. We intend here to sketch a profile of the infrastructure in Solapur District.

6.1 Human Resources :

Population density per square kilometer in rural and urban area has increased from 113 to 125 and 1818 to 2665, respectively. Increase in population is more in sub-region III than in sub-region I and II. Both in urban and rural sectors population per square kilometer is highest in sub-region I and it is practically double than that of sub-region III and II. The data presented in Table 6.2 indicates the occupational distribution of the population. It is quite obvious that the occupational structure is dominated by agricultural sector. However, in case of other two categories viz engaged in household, industries and repairing units and other employed persons it is highest in urban areas of sub-region I. Thus in sub-region II and III, the population is dependent on farming and allied activities while in sub-region I there is some evidence of diversification.

6.2 Agricultural Infrastructure

i) Research

As far as Research is concerned alongwith the Dry Farming Research Station Solapur (Sub-region I) there are three more Agril. Research Stations viz., Mohol and Pandharpur (in Sub-region II) and Jeur, Karmala tahsil (Sub-region III). Jeur is the sub-centre of main centre Solapur. Mohol is exclusively for rabi sorghum improvement while Pandharpur is for pulse and oilseeds research in the command areas of Bhima and Nira River Projects.

ii) Education

At Solapur, there is one Agril. School for students after SSC in which agricultural education is imparted for two years to develop skills and train for field duties. There are a few other schools which offer Agricultural as one of the subject for HSSC Examination.

Table 6.1 : Population According to Sub-Regions (Figures in '000')

Particulars	Sub-Region I		Sub-Region II		Sub-Region III		Total	
	1971	1981	1971	1981	1971	1981	1971	1981
Total Persons								
Rural	385	420 (9)	744	805 (8)	508	595 (17)	1637	1820 (11)
Urban	442	563 (27)	149	174 (17)	26	32 (28)	617	769 (25)
Total	827	983 (19)	893	979 (10)	534	627 (18)	2254	2589 (15)
Male								
Rural	199	216 (8)	383	414 (8)	261	305 (16)	844	935 (11)
Urban	230	290 (26)	78	90 (15)	14	17 (21)	322	397 (23)
Total	429	506 (18)	461	504 (9)	275	322 (17)	1165	1333 (14)
Female								
Rural	186	204 (9)	361	391 (9)	247	291 (17)	794	886 (11)
Urban	212	273 (28)	71	84 (17)	12	15 (25)	295	370 (25)
Total	398	474 (19)	432	475 (10)	259	306 (18)	1089	1256 (15)
No of Families	143	173	155	177	92	110	390	460
Population per Sq. Km.								
Rural	116	128	111	121	111	130	113	125
Urban	13812	17594	123	144	251	323	1818	2265
Total	249	296	130	142	114	134	152	174
% Increase in Decade								
Rural		9.09		8.20		17.38		11.25
Urban		27.37		16.78		28.00		24.84
Total		18.86		9.63		17.86		14.96
No of Village	245	262	469	535	239	308	953	1105
No of cities	4	4	4	4	2	2	10	10

(Figures in parenthesis indicate % increase over previous period)

NOTE : Eight villages from Barshi included in Osmanabad district and one village from Sangola included in Sangli dist. after 1981 census.

Table 6.2 : Occupational Distribution According to Sub-Regions
(Figures in '00')

Particulars	Sub-Region I		Sub-Region II		Sub-Region III		Total	
	1971	1981	1971	1981	1971	1981	1971	1981
1 CULTIVATORS								
Rural	492	554	1279	1568	835	1140	2606	3262
Urban	48	39	31	38	16	15	95	92
Total	540	593	1310	1606	851	1155	2701	3354
2 Agri.Labour								
Rural	665	744	1116	1252	632	774	2403	2770
Urban	44	53	36	38	7	11	87	102
Total	709	797	1152	1290	639	785	2490	2872
3 Household Engaged in Industries & Repairing Units								
Rural	76	28	224	65	97	59	397	152
Urban	623	124	86	23	11	4	720	151
Total	699	152	310	88	108	63	1117	303
4 Others Employed Persons								
Rural	101	318	198	548	138	383	437	1249
Urban	550	1534	221	375	34	61	805	1970
Total	651	1852	419	923	172	444	1242	3219
5 Total Employed Persons								
Rural	1324	1644	2817	3433	1702	2356	5843	7433
Urban	1265	1750	374	474	68	91	1707	2315
Total	2589	3394	3191	3907	1770	2447	7550	9748

Source : District Socio-Economic Abstract, Solapur 1980-81 & 1987-88

NOTE : Eight villages from Barshi included in Osmanabad district and one village from Sangola included in Sangli dist. after 1981 census.

iii) Extension

Agril. extension activities are normally carried out by the Agriculture Department and Zilla Parishad. Soil and water conservation programth is implemented by Divisional Officers while crop production programth is implemented by T&V staff. The Zilla Parishad provides inputs through Block Development Officers located in the tahsil places. Horticulture Dept. also implements programme jointly. Agril. Extension Education activities are carried out by State Agril. department and T&V staff. The training is imparted by the scientists upto District level officials while the further training of lower staff of village level and farmers is carried out by T&V agency. Minikit trials, demonstrations, field visits etc. are conducted on farmers' fields jointly. Field day and farmers rally are also organized at the Research Station for dissemination of improved technology. Various media such as newspapers, all India radio, television etc. are also made use for approaching masses with the basket of new technology.

The various other departments are also actively associated with Agriculture, viz Social Forestry, Animal Husbandry, Fisheries, Commercial and Co-op banks. There is very good co-ordination between various departments due to frequent meetings and exchange of ideas.

iv) Agricultural Implements

The information about farm implements is given in Table 6.3. shows that there is a sudden rise in number of electric pumps and tractors from 1977 to 1982. In sub-region II, the electric pumps are highest closely followed by sub-region I. However, the number of tractors are highest in sub-region III. It is very interesting to note that the number of oil ghanies has decreased in all the sub-regions drastically from 1977 to 1982 by about 80 percent. This might be due to use of expeller for crushing oilseeds for extraction of oil.

6.3 Educational Facilities

The data presented in Table 6.4 gives information about educational facilities excluding Solapur city where good number of Primary and Secondary Schools, Junior and Senior Colleges, Medical College, Engineering College, Pharmacy College, Education Colleges, Poly technics, Post graduate centre of Shivaji University etc. are located. Hence, the data for sub-region I does not include this information. Amongst sub-region II and III, data indicate that educational facilities are more in sub-region III. However, adult educational centres are more in sub-region II. There is a sudden increase in adult education Centre in Sub-region III.

6.4 Medical Facilities

Information on public and grant in aid medical organization for 1982-83 and 1987-88 has been presented sub-regionwise in Table 6.5. Data reveals that there is not much growth in all the sub-regions in respect of hospitals, dispensaries, doctors etc. in public sector.

Table 6.3 : Agricultural Implements In Sub-Regions

Particulars		Sub-Region I	Sub-Region II	Sub-Region III	Total
1 Ploughs					
Wooden	1977	5995	6720	2129	14844
	1982	6744	7113	2271	16128
		(12)	(6)	(7)	(9)
Iron	1977	8172	16977	14652	39801
	1982	8251	19016	16725	43992
		(1)	(12)	(14)	(10)
2 Carts	1977	10046	23986	17017	51049
	1982	10440	25124	18925	54489
		(4)	(5)	(11)	(7)
3 Sugarcane Crusher					
worked on Power	1977	371	452	241	1064
	1982	275	612	269	1156
		(26)	(35)	(12)	(35)
Worked By Bullock	1977	28	7	18	53
	1982	26	35	6	67
		(-7)	(400)	(-66)	(26)
4 Oil Engines with Pumps					
Sets for Irrigation	1977	3952	8422	7307	19681
	1982	3722	8262	8599	20583
		(-6)	(-10)	(18)	(4)
Electric Pumps for Irrigation Purpose	1977	5481	11308	6233	23022
	1982	10124	15026	9007	34157
		(85)	(33)	(44)	(48)
5 Tractors	1977	95	99	235	429
	1982	118	207	389	714
		(24)	(109)	(65)	(66)
6 Oil Ghanies	1977	47	57	117	221
	1982	4	17	23	44
		(-89)	(-70)	(-80)	(-80)

(Figures in parentheses indicate % increase over previous period)

Table 6.4 : Education Facilities as per Sub-Regions

Sno.	Name of The Item	Sub-regions			Total
		I	II	III	
1.	No. of Primary Schools	710	692	916	2318
2.	No. of Students	102721	167840	152202	422763
3.	No. of Teachers	2808	4020	4239	11067
4.	Teachers:Student (Ratio)	1:37	1:42	1:36	1:38
5.	No. of Secondary schools	87	135	141	363
6.	No. of Students	47085	73655	67785	188525
7.	No. of Senior colleges	3	7	8	18
8.	No. of Adult edu. centres (1982-83)	90	180	60	330
9.	No. of Adult edu. centres (1987-88)	190	421	319	930
10.	% increase over previous period	111	134	413	258

6.5 Market Banks and Transport Facilities

Data presented in Table 6.6 shows that the number of regulated markets are highest in sub-region II followed by sub-region III. However, number of banks are highest in sub-region I followed by sub-region II. Number of banks per 1,000 ha geographical area are more or less equal in different sub-regions. Length of road is highest in sub-region II followed by sub-region III but the length of road per square kilometer area is practically same in all sub-regions.

Information regarding market arrivals is presented in Table 6.7. The data indicate that in all sub-regions arrival of sorghum, paddy, groundnut, wheat and jaggery are more as compared to other agricultural commodities. Arrival of sorghum, paddy and wheat is more in the sub-region I, while bajra, groundnuts and Jaggery arrival in the market, is from sub-region III. The other agricultural commodities like pulses i.e., blackgram, greengram, gram and cotton are less in all the sub-regions. Information regarding registered money lenders and loan advanced by them to traders and non-traders is presented in Table 6.8. In sub-region I number of money lenders and loan advanced by them to traders and non-traders is highest. However, in sub-region II, the percent increase in 1987-88 over 1982-83 was highest. Traders get more share of loan from non-traders in all sub-regions.

Table 6.5 : Medical Facilities as per Sub-Regions (1987)

Sno. Name of The Item	Sub-regions			Total
	I	II	III	
1. No. of dispensaries	50	41	25	116
2. No. of health units per lakh population	5	4	4	4
3. No. of Doctors	257	68	44	369
4. No. of Doctors per lakh population	26	7	7	14
5. No. of Nurses	523	183	137	843
6. No. of Nurses per lakh population	53	19	22	32
7. No. of Family Planning centres	18	12	6	36
8. No. of Family Planned Persons	7909	7978	5320	21207
9. Copper T System	8665	6871	5001	20557
10. Productive Couples	81370	173096	107913	362379
11. Ratio of treated persons to productive couples	1:5	1:8	1:10	1:9

6.6 Non-Conventional Energy

The number of Gobar gas plants are highest in sub-region II, it is practically double than that of sub-region I. The number of Gobar gas plants per 1000 human population is least in sub-region I and highest in sub-region II. The number of Gobar gas plants per 1000 livestock is least in sub-region II. There are only three wind mills in the District. (Table 6.9).

Table 6.6 : Market, Banks and Transport Facilities (1987)

Sno.	Name of The Item	Sub-regions			Total
		I	II	III	
1.	No. of Regulated Markets	1	12	7	20
2.	Total Geographical area per market (in hectares)	327900	57775	68543	75050
3.	No. of Banks	144	139	93	376
4.	No. of Banks per 10,000 hectares geographical area	1.46	1.42	1.48	1.45
5.	No. of Banks per lakh population	14.66	13.92	14.76	14.4
6.	Length of Roads (Kms)	2213	4531	2908	9652
7.	Length of Road per sq. Km area (in Km)	0.67	0.66	0.62	0.65

6.7 Agricultural Co-operative Societies

Number of co-operative societies, number of members of co-operative societies, number of share holders of the societies, are highest in sub-region II. However, total society, number of member per society are highest in sub-region III. The total share capital is highest in sub-region II while share capital per society is highest in sub-region III. (Table 6.10)

About Rs 13 crores of loans are pending from various societies. Pending loans per society is equal in sub-region I and III and least in sub-region II. Defaulters total amount pending comes to about Rs 14 cores. The defaulters total amount per society is highest in sub-region I and least in sub-region II. About Rs 28 cores of loan has been distributed by the societies in the district. Total loan distributed per society is highest in sub-region III.

Table 6.7 : Information Regarding Regulated Markets, Market Arrivals and Arrivals/Unit of Market

Name of the Crop	Region I No. of Markets 1				Region II No. of Markets 12				Region III No. of Markets 7			
	Market Arrival (Q)	Cost (Rs.)	Market Arrival/ Unit of Market	Cost/ Unit of Market (Q)	Market Arrival (Q)	Cost (Rs.)	Market Arrival/ Unit of Market	Cost/ Unit of Market (Q)	Market Arrival (Q)	Cost (Rs.)	Market Arrival/ Unit of Market	Cost/ Unit of Market
1. Sorghum	31782	99288	31782	99288	21248	62961	1770	5247	8526	23202	1218	3315
2. Wheat	7675	28772	7675	28772	1195	3732	100	311	6769	28772	967	4110
3. Bajra	2279	4111	2279	4111	1587	3279	132	273	5197	9531	742	1362
4. Paddy	15437	36920	15437	36920	465	883	39	74	2350	5249	336	750
5. Groundnut	1052	7515	1052	7515	2001	14499	167	1208	6540	45242	934	6463
6. Green Gram Peanuts	4	32	4	32	2251	20252	188	1688	418	3532	60	505
7. Green Gram	433	1291	433	1291	186	544	16	45	54	172	8	25
8. Black Gram	975	3548	975	3548	158	528	13	44	--	--	--	--
9. Gram	1064	4701	1064	4701	1248	4902	104	408	237	925	34	132
10. Jaggery	3980	12474	3980	12474	2712	9543	226	795	6456	22600	922	3229
11. Cotton	71	251	71	251	14	45	1	4	26	91	4	13

Table 6.8 : Registered Money Lenders and Loan Advanced by them According to Sub-Regions
(Rs. in '000')

Particulars		Sub-Regions			Total
		I	II	III	
No. of Money Lenders	1982-83	156	27	16	199
	1987-88	181 (16)	37 (37)	17 (6)	235 (18)
Loan Advanced by Traders	1982-83	12303	465		12768
	1987-88	52501 (326)	4201 (803)	1678	58380 (3,479)
Loan Advanced by Non-Traders	1982-83	16153	815	31	16999
	1987-88	27684 (71)	4384 (438)	540 (1,642)	32608 (92)
Total Loan Advanced	1982-83	28456	1280	31	29767
	1987-88	80185 (181)	8585 (571)	2218 (615)	90988 (206)

(Figures in parentheses indicate % increase over previous period)

Table 6.9 : Non Conventional Energy

Sno.	Name of The Item	Sub-regions			Total
		I	II	III	
1.	Human Population ('000' persons)	983	979	627	2589
2.	Livestock Population ('000' numbers)	294	1104	624	2022
3.	No. of gobar gas	3067	6360	4658	14085
4.	No. of gobar gas per 1000 human population	3.12	6.49	7.43	5.44
5.	No. of gobar gas per 1000 livestock population	10.42	5.76	7.47	8.64
6.	Wind mills	0	2	1	3

Table 6.10 : Agriculture Co-operative Societies

(Rs. in '000') (1988)

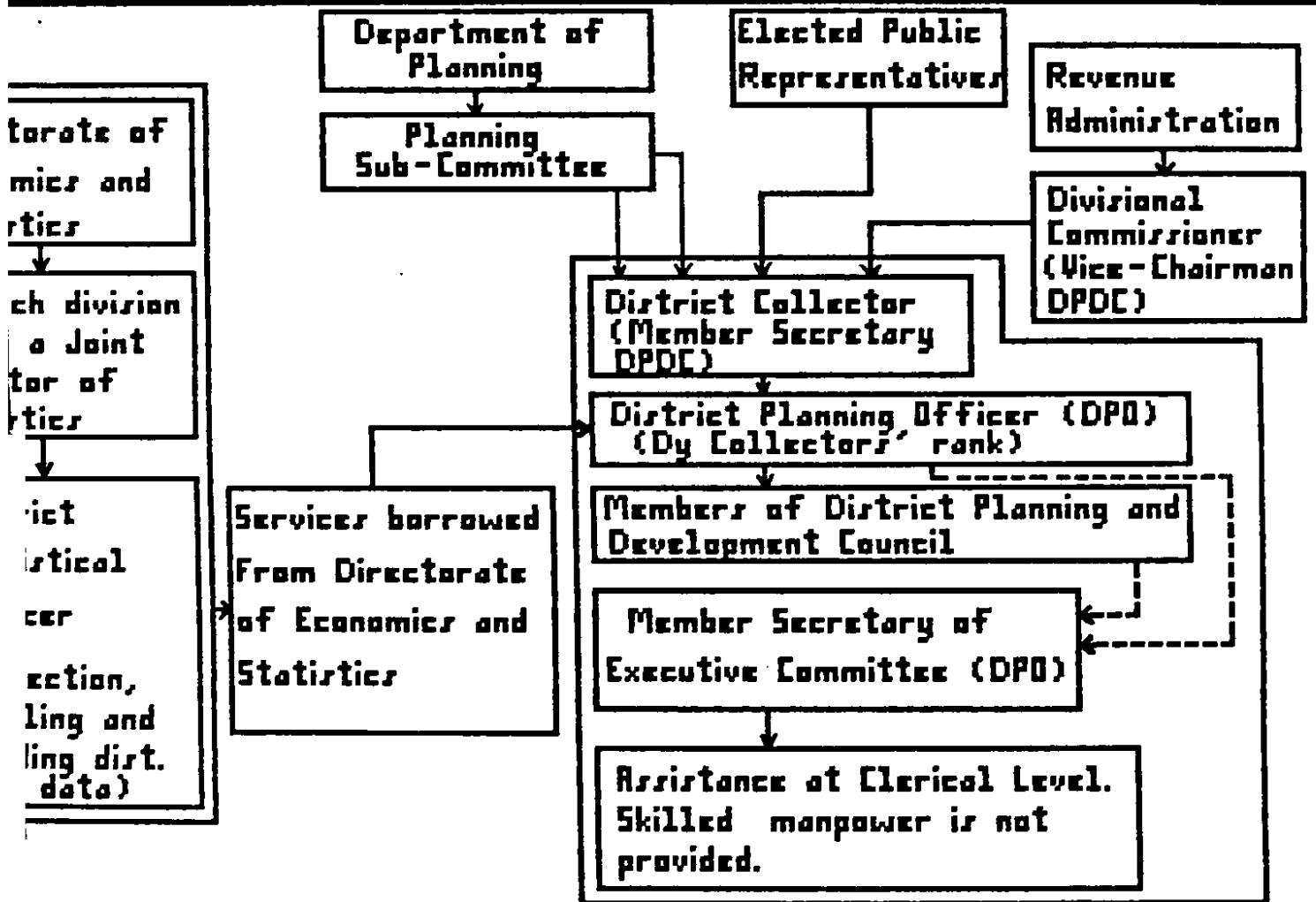
Sno.	Name of The Item	Sub-regions			Total
		I	II	III	
1.	No. of Co-op Societies	191	411	241	843
2.	Area Served by each Co-op society	1717	1687	1991	1781
3.	No. of members in the Society	45223	123477	79870	248570
4.	No. of members per Society	237	300	331	295
5.	Total No. of shareholders of the society	55417	121634	80258	257309
6.	No. of shareholders/Society	290	296	333	305
7.	Total Share capital	23634	49162	39147	111943
8.	Share capital per Society	124	120	162	133
9.	Total Pending loans	36441	49021	46008	131470
10.	Pending loans per Society	191	119	191	156
11.	Total pending dues	51001	45943	44910	141854
12.	Dues per Society	267	112	186	169
13.	Total Loans disbursed	65497	100125	118622	224244
14.	Loans disbursed per Society	343	244	492	432
15.	Amount of loan to be received by society	79290	293723	173436	566449
16.	Amount of loan to be received per society	415	715	720	648

Chapter VII

PLANNING AND IMPLEMENTATION SYSTEM

The district planning policy was adopted by the state of Maharashtra from 1974 - 1975 i.e., the commencement of the Fifth Five year plan with two pronged objectives namely : 1. Securing full development of the natural resource potential of a district. 2. Attaining parity in the matter of socio-economic infrastructural facilities over a period of 15 to 20 years so that inter-district disparities in levels of development were ignored out. Maharashtra was the first state to introduce district level planning machinery as early as 1975. The district planning module works as under.

DISTRICT PLANNING MODULE : MAHARASHTRA



The district planning framework operates at two levels namely state level and district level. At the state level, the planning department with the approval of the planning sub-committee of the cabinet decides the overall plan outlay of the state. In the overall plan outlay, there are three components namely : 1) State level schemes, 2) State pool schemes and 3) District schemes. It was decided that 40 percent of the total outlay be allocated for district level schemes. Out of this the amount required for district schemes which are to be planned and funded from the state level (State pool schemes) is deducted and the remaining amount is distributed among the various districts as per the following criteria.

Criteria	Proportion of total allocation
Total Population	60
Urban Population	5
Backward Class Population	5
Backwardness in Agriculture	5
Backwardness in irrigation	4
Industrial Backwardness	5
Communication Backwardness	5
Special problems of drought prone areas	3
Coastal area problems	1.5
Forest area problems	1.5
Amount retained at state level (contingency) problems	5

Apart from these amounts the district planning bodies also administer the schemes under "Felt Need Programme" popularly known as "MLA Fund". But this does not enter into the overall allocation of the district, since it is treated as special grant. Once the district level outlay is indicated to the district a small committee consisting of Collector, Chief Executive Officer and President of the Zilla Parishad along with 2-3 non-official members prepare a plan proposal for the district keeping in view three important criteria :

- 1) The guidelines issued by the State Government,
- 2) Proposals received by the implementing agencies, and
- 3) Priority sector of the district and the overall ceilings.

The proposal is prepared broadly under eight sectors of development namely :

- 1) Agriculture and allied activities,
- 2) Rural and community development,
- 3) Irrigation and flood control,
- 4) Power development,
- 5) Industries and mining,
- 6) Communication and transport,
- 7) General economic services and
- 8) Social and community services.

The plan proposal is then scrutinized by the senior officer of the planning department keeping in view the policies, priorities and programmes. It is also strictly examined whether the plan proposal adheres to the guidelines issued by the State Government. It, therefore follows that the district planning bodies cannot have full liberty in preparation of their plans. The true sense of planning from below is yet to take shape in the country and possibly we are not ready with the infrastructure to take up such stupendous tasks.

The plan proposal prepared by the executive committee is then submitted to the District Planning and Development Council (DPDC). This committee is constituted under the chairmanship of the Minister incharge of the Divisional Commissioner as Vice-Chairman. The composition of the committee is given in Table 7.1. This committee meets atleast twice in a year. The DPDC is mainly operated through its executive committee (see table for composition). The executive committee has all the powers of the DPDC and it is the body which discusses the district plan proposals of the DPDC with the state level planning officials. The planning department is in continuous touch with the DPDC through its officials. The DPDC has been vested with the authority of reallocation of plan funds as a result of financial monitoring of development programmes so that the allocations to each district under the state annual plans are utilised within the district as far as possible. The DPDC meets for the reallocation of the savings from the allocated budget heads and monitor the financial progress of the implementation. The powers to review, monitor and reallocate thus vest with the DPDC. But neither the DPDC nor the district planning authorities are given any recommendatory powers with respect to the total district plan though their suggestions are considered both by the district and state level authorities.

While reviewing the planning and implementation systems at district level we are more concerned with the present operating system. Hence, our comments would restrict mainly to the district plan proposals and the operating machinery. The present level of organisation is sufficient except for a larger scope of improvement in skills and manpower. A senior officer from the directorate of economics and statistics is placed as District Planning Officer (DPO). The skills obtained during the service in the parent department have hardly any scope in this

position.

The DPO is occasionally trained in the planning process in the Administrative Training Institute but these trainings have the limitation of the present working system of district planning. The training courses dish out only the details about existing machinery and do not give any scope for innovations and ways and means to improve it. Secondly, the manpower involved has hardly any skills developed for planning purpose with the given setup. The powers given to the district planning machinery suggest a conspicuous absence of any recommendatory, decision making and target setting powers. In fact the existing powers under these heads are indirect. The DPDC and also the DPO can only monitor the financial progress and the physical achievements are usually kept out of the perview of the monitoring process.

The time given for preparation of the plan proposals to the DPDC is so insufficient that both the DPDC and its executive committee can hardly apply mind to scrutinize and give final shape to the proposals received. The ceilings of the district annual plan outlay is conveyed in Sept/Oct and it is required that the DPDC finalises its proposals in mid November. With the given manpower, the nature of their skills and the composition of DPDC, it is a tall order to expect from the district machinery.

DPO receives the proposals from the implementing agencies under the overall guidelines received from the state planning department. It is difficult for the DPO to integrate the proposals of the different departments due to heterogeneity and diagnosis, planning, target setting, monitoring and restructuring along with all implementing agencies would be more effective mechanism. This would also provide better opportunities to complement inter-sectorial programmes.

The formula used for allocation of district plan funds is being followed for over the last decade. It would be better to increase the proportion under the last item by reducing it at pro-rata basis on the others. This would offer higher level of flexibility for the planning process. The level of participation of public representatives is quite satisfactory. They take active part in the DPDC discussions and suggest changes. This is supplemented by the direct control of elected representatives on the "Felt Need Programme" funds. But then the total amount at the disposal of DPDC is so meager that it cannot significantly contribute towards a step-up in district development. It is observed that major proportion of the outlays of the district plan goes towards the continuation of existing schemes, their establishments and other inevitable expenditures, leaving hardly any scope for the new schemes. These large spillovers do not allow attendance to pertinent district problems of specific nature. The scientists from agriculture universities are involved indirectly by the implementing agencies but no such effort is made by the DPDC itself. It would be of great benefit that a perpespective plan of each of the district is prepared and the

planning machinery is geared up to work under these guidelines.

Table 7.1 : Composition of District Planning and Development Council and Executive Comitee.

	District planning and Development Committee	Executive Committee
Chairman	Minister In-charge of the District	Minister In-charge of the District
Co-Chairman	Other Ministers from the District	Other Ministers from the District
Vice-Chairman	Divisional Commissioner	Divisional Commissioner
Member Secretary	District Collector	District Planning Officer
Member	Chairman Zilla Parishad (Z.P.) of the District	Chairman, Zilla Parishad (Z.P.)
Member	Chairman of the Construction Committee Z.P. of the District	Chairman, Construction Committee, Z.P.
Member	All MLA's and MLC's of the District	Four MLA's/MLC's Nominated by the Chairman from the District
Member	Mayors of the Corporation of the District	One Nominated Member from among the Mayors of the Corporations of District and the Presidents of Municipalities
Member	One Member each from among the Presidents of the Municipalities of Grade A, B and C Nominated by the Chairman,	
Member	Chairman of the District Central Co-operative Bank	Chairman of the District Central Co-operative Bank
Member	Member of the Board of Directors of Land Development Bank Representatives of the District	District Collector
Member	Regional Manager of the lead Bank of the District	

Contd...

Table 7.1 contd..

	District planning and Development Committee	Executive Committee
Member	Representatives of the Regional Development Board	
Member	Government Nominated Non-Governmental Members. The number should be double of the number of Assembly Constituencies or 20 whichever is less. Of these atleast 1 must belong to the SC / ST category if the population of these castes does not exceed 10% and if it is more than 10% two members must belong to this category	Three Members Nominated by the Chairman from among the Non-Governmental Members, One of which must be from SC / ST or Nava-Boudha Group
	One third of the above Non-Governmental members or maximum 5 should be Lady Representatives. Out of these, atleast one must be from SC / ST Category	Two Lady Representatives Nominated by the Chairman from among the Non-governmental Members
Member	Chairman of the District Committee of Maharashtra State Khadi Village Industry	
Member	Chief Executive Officer of the Zilla Parishad	Chief Executive Officer of Zilla Parishad
Member	Superintendant of Posts from the District	

Table 7.2 : Inventory of Implementing Agencies

Sectors of Development	Implementing officers
1. Agriculture and allied services	1. District Seed Officer
	2. District Assistant Registrar
	3. Divisional Joint Director Sugar
	4. Agricultural Development Officer, Zilla Parishad
	5. District Assistant Director Horticulture
	6. District Assistant Director Animal Husbandary
	7. District Animal Husbandary Officer, Z. P.
	8. District Dairy Development Officer
	9. District Fisheries Development Officer
	10. Assistant Conservator of Forest
	11. Sub-Divisional Forest Officer
2. Rural and Community Development	1. District Project Officer Village Development Scheme
	2. Deputy Collector, Employment Guarantee Scheme
	3. Deputy Engineer, Tenancy Reforms
3. Irrigation and Flood Control	1. Executive Engineer, Minor Irrigation
	2. Geologist, Groundwater Survey and Development Agency
	3. Executive Engineer, Major Irrigation

Contd...

Table 7.2 : Contd...

Sectors of Development	Implementing officers
4. Power Development	<ol style="list-style-type: none"> 1. Chief Engineer, Maharashtra State Electricity Board (Rural & Urban) 2. Executive Engineer, Maharashtra State Electricity Board (Rural)
5. Village and Small Industries	<ol style="list-style-type: none"> 1. General Manager, District Industries Center 2. Sub-divisional Employment Exchange Officer 3. District, Assistant Registrar Co-operative Societies
6. Communication and Transport	<ol style="list-style-type: none"> 1. Executive Engineer, Public Works and Construction 2. Executive Engineer, Building and Communication (for all zones in the district)
7. General Economic Services	<ol style="list-style-type: none"> 1. Executive Engineer, Minor Irrigation Development Zilla Parishad 2. Executive Engineer, Domestic Water Supply Building and Construction 3. Chief Geologist, Land Corporation 4. Assistant Chief Executive Officer Zilla Parishad 5. Chief District Housing Development Board 6. Deputy Collector, Tenancy Reforms 7. Assistant Director, City Planning 8. District Social Welfare Officer Zilla Parishad

Contd...

Table 7.2 : Contd...

Sectors of Development	Implementing officers
	9. District Social Welfare Officer
	10. Sub-Divisional Employment Exchange Officer
	11. Deputy Collector, Sanjay Gandhi Self Help Programme
8. Social and Community Services	1. District Educational Officer (primary education) Zilla Parishad
	2. District Educational Officer (Secondary education) Zilla Parishad
	3. District Sports Officer
	4. Assistant Director, Libraries
	5. District Commercial Education and Training Officer
	6. Chief Medical Officer, Employees State Insurance Scheme
	7. Deputy Director, Health
	8. District Health Officer, Zilla Parishad
	9. District Malaria Officer
	10. District, Assistant Registrar of Co-operative Societies

CHAPTER VIII

DEVELOPMENT PERSPECTIVES

Solapur is one of the chronic droughtprone districts of deccan plateau with severe climatic and natural resource limitations. The agrarian structure is characterised by larger average size of holding, low density - low value crops and extreme poverty in some of the pockets. The district has also large-chunks of surplus man power and seasonal migration for work is prevalent. As regards the sectoral balances, agriculture is more a depressing than boosting sector. It is a stupedous task to convert this into a growth multiplier or a lead sector with the present constraints. Hence, the development perspective has to strike a balance between agriculture, allied agriculture and rural industries. Stepped up growth performance and equity with larger employment generation should be the core of development philosophy.

Land use and irrigation data indicate extremely limited potential for development of a commercialised agricultural system. This is, further constrained by the limited cash flows in the district's economy. The land use pattern need to be transformed through in built economic incentives. For creation of larger employment and income, Silvi-horticultural, Horti-pastoral systems need to be developed on larger patches of uncultivated barren lands. Crop husbandry scenario indicates three major constraints. Firstly, more of the crops are low density-low value crops and hence efforts should be diverted to evolve a cropping system that offers larger net income and optimises resource productivity. This would call for trials on the composite systems like agro-forestry, dry land horticulture and silvi-horti-pastoral. Clues can be obtained from the experiments conducted at the dry farming research station Solapur. Secondly, the seed water fertilizer technology has limited contours because of the low water availability and shallow soils with lower nutritive value. It is necessary to internalise these constraints so as to increase net resource productivity. Irrigation can not be a panecea of development here and hence water conservation should be the hub of developmental philosophy. Thirdly, the limited cash flows in the economy offer very little scope for private investment in agricultural and allied sectors. This is compounded by the risk averse decision makers, who have faced natural calamities for centuries. Hence, larger public investment is required to be injected with economic viability getting slightly lower priority.

Improved technology for crop production not only results in increase in production but also generates more employment for rural population. Similarly, the processing of excess produce will require more labour. Thus increase in agricultural production would generate more employment potential. There are other factors of production which will also generate more employment.

Community participation is a key for development of agriculture in Solapur district. Watershed management is a job of community. Similarly various field operations are required to be carried out collectively and cooperatively. Small farmers are unable to maintain a tractor and hence, joint efforts for purchase and maintenance of tractor and farm implements should be encouraged. Plant protection equipments are also costly and individual farmers are unable to purchase the same and hence it is felt that at village level there should be centres which can cater to the needs of the farmers in giving good services for implements.

Solapur being a drought area semi-skilled manpower and artisans are concentrated in some talukas of the district. In the event of drought these people migrate out temporarily and send portions of their earnings back home. If opportunities are provided within the district - textile, small engineering, ancilliary industries have tremendous potential and this would employ the skills of the local populace.

The land use, crop husbandry and allied agricultural activities have to be taken up on watershed basis with an integrated approach. Presently, Solapur dry farming research station has been concentrating on a few watersheds. The replicability of this approach alongwith proper institutional arrangements is the task before the district development planners. But at the same time, the present district planning and implementation system has severe constraints. Hence, a fresh thinking is needed for such an uphill task.

The increase in production results in need for transport and marketing network. Storage facilities are required to be developed. Warehouse facilities are very limited in the district which needs to be extended. Cold storage facilities are required to be developed for perishable agricultural produce like fruits, vegetables and flowers. At present these facilities are not sufficient. The progressive farmers have become aware of these facts and demand has been placed with the State Government. All these infrastructural development strategies are required to be provided. Agro-base industries like fruit processing, textile industries, sericulture, sugar and allied industries have scope in the district. The capital investment will have to be made through cooperative sector.

Among other allied agricultural activities, animal husbandry with a special emphasis on dairy and small ruminants would increase both income and employment potential in the district. Poultry and other agro-processing industries such as sorghum flakes, resin making, wine/distilleries indicate large potential but then these may not come up on their own due to dearth of private investment. Supportive investment policies, with the help of credit institutions, NABARD and State Government would go a long

way in releasing the embargo.

In gist the district needs a five fold development strategy namely- agriculture, livestock, poultry, land and water conservation, allied agricultural activities and supporting rural industries. This needs to be drafted on the basis of maximum participation from the people and supportive investment policies from public institutions. A careful review of the district's planning and implementation mechanism suggests a possibility of achieving this without much difficulty. We list below some of the pertinent development issues.

i) Diversification of agriculture or Alternate land use

Very shallow soils(and shallow soils to some extent) which are unsuitable for growing any crop successfully should be diverted for alternate land use. Such type of soils do exist in all sub-regions of the district . These soils should be utilized for growing:-

- 1) grasses for fodder
- 2) trees for fuel and timber
- 3) dryland horticulture and fruit processing
- 4) agave for fibre.

An integrated approach of utilization of such soil types by following various systems such as agro-pasture, silvi-pasture, agro-silvi-pasture and agro-silvi-horti-pasture would help in producing more biomass per unit and efficient utilization of natural resources. Further this produce would help in sustaining more cattle population for milk, mutton^{and} meat; requirement of fuel, fruits and fibre for industry. Agave fibre can be utilised as an input for paper industry besides rope making.

- a) In situ moisture conservation by using live bunds with subabul as vegetation which can serve the purpose of fodder for cattle
- b) Safe disposal of runoff water and storage in dug out farm ponds and recycling for giving protective irrigation to donor areas.
- c) Crop planning according to land use.

ii) Crop Husbandry and Agro-based Industries

a) In conventional agriculture rabi sorghum is given priority by the farmers for grain and fodder purposes. Keeping the land fallow during kharif season and growing rabi sorghum under receding soil moisture conditions puts limitations on production and productivity in soils less than 45 cm depth. Even though the recommendations are given to divert such soil for kharif cropping which can give better production of biomass and higher net returns, the adoption is very poor. Efforts are required to popularise intercropping systems such as bajra- red

gram, sunflower- red gram, castor- moth bean, groundnut- red gram etc., for boosting pulse and oilseed production. This would help in increasing cropping intensity and promoting dal and oil industry for providing employment to rural population.

iii) Introduction of cotton, castor and soyabean

In sub-region I dryland cotton is grown during rabi season while in sub-region III, it is grown during summer and kharif season under irrigated conditions. The area under the crop is meager to meet the requirement of Spinning Mills established in the district. At present, more than 90 percent cotton is imported for the mills. There is a scope for growing this crop by extending area and increasing productivity under well irrigation in Sub-region II.

Castor crop has been found to be most useful for mid-season cropping. Keeping in view, the water availability period, it can be sown in late kharif and grown successfully during rabi season. With one or two protective irrigation, the crop can give production of 15 to 20 q/ha. There is very good market in sub-region II at Barshi.

Soyabean, which is a major source of oil and protein and found to be good introduction during kharif and summer season. However, this crop requires protective irrigation during breaks in monsoon. Productivity can be 20 to 25 q/ha under well irrigation fetching good price in the market. This would be very good for intercropping as well as for rotation with sugarcane.

iv) Integrated Watershed Development

Solapur being a chronic droughtprone region, water and soil conservation assume prime importance in its crop husbandry sector. The district has 64 macro watersheds with an average area of 23 thousand hectares. The integrated strategy for treatment of these watersheds should involve three stages spread over five sectors of the agro-economy. The first stage would involve mapping a treatment plan of the watersheds based on the toposheet. In the second stage the entire area of watershed should be divided into different planning regions and the third stage should give the action plan by sub-watersheds along with the required allocations and time frame. The sectors involved in the planning of watersheds should be :- (1) Forestry, (2) Crop-husbandry, (3) Horticulture, (4) Soil Conservation, (5) Agro-economics. A mid term review of the progress of each watershed may help in improving over the existing plan.

v) Sugar Based Industries

Sugar industry of Maharashtra has a key role to play in socio-economic and political fields. Sugar factories have been approved practically for each tahsil of Solapur district. Sugarcane is non-risky crop from the producer's point of view. Sugarcane growers make indiscriminate use of irrigation water and

fertilizer which creates a problem of water logging, salinity and sodicity in low lying position of the watershed and drainage is affected. These soils go out of cultivation, which are otherwise productive even under rainfed condition.

With the introduction of canal water of Bhima river in Mangalvedha tahsil (sub-region II), the productive soils are likely to go out of cultivation in times to come, if the conventional method of irrigation is followed for crops like sugarcane. It is a fact that farmers divert their soil for sugarcane cultivation when irrigation is made available, even though in limited quantity. Hence, efforts are required to be made to educate the farmers for efficient methods of irrigation without affecting soils.

At present, sugar factories in Solapur district utilise sugarcane mostly for producing sugar only, with a few exceptions. Large scope exists for utilisation of bagasse for paper industry, molasses for alcohol and other chemicals, recycling of pressmud cake for crop production. Sugarcane trash which is produced to the tune of 8 to 10 t/ha is burnt at present. Methodology to incorporate this in the soil for recycling has been developed which should be popularised for efficient utilisation of this organic source of nutrient.

vi) Horticulture Based Industries

Solapur district is leading in the State and in the country in respect of fruit crops like ber, pomegranate and grapes. There is also scope for mango, tamarind, and banana. Dryland horticultural crops custard apple, drumstick are coming up very fast. The product is perishable and faces problems of packing, transport and hence facilities are required for cold storage and processing industries. Excess production which brings down the prices in the market and then the farmer is put to loss. Efforts are being made to establish processing industries in co-operative sector. Fortunately, the State Government has also taken up a massive horticulture programme.

The information on number of surface wells, in the district is also useful for planning vegetable programme. At present, onion and chillies are grown on large scale. However, there is scope for other seasonal vegetables, if good marketing facilities are created by providing transport and storage.

Floriculture has not become popular in the district. However, there is some scope under well irrigation in Sub-region I and II.

vii) Sericulture

Solapur district is topping the list of districts with highest area under mulberry and silk worm production in the State. In sub-regions I and II, the farmers have become aware of the production. There is further scope for expansion of this activity in the sub-regions under well irrigation. This would provide subsidiary occupation to rural poor for better monetary

returns. Efforts are required for further processing the product for silk fibre extraction, spinning and weaving industries to benefit the farmers. These industries can serve as complementary units for the present textile and linen making activities.

viii) Animal Based Industries

Increase in fodder production would lead to increase in milk and milk products. Milk produced in the district is at present transported to Bombay to some extent. The facilities are required to be created for cold storage, processing and marketing. This can support leather goods production and marketing. The leather wares produced in the nearby districts have been popular in the domestic and international markets.

Sheep and goat rearing is a subsidiary occupation for farmers. There is more scope in sub-region III, where very shallow and shallow soils are prevalent for grasses.

Poultry keeping has come up very well in sub-region I. The eggs are transported to Bombay. In order to create assurance of marketing, the transport facilities need to be strengthened.

Fisheries has not very well developed in the district. However, there is a scope for fish culture in percolation and irrigation tanks constructed under minor irrigation projects. Surface wells and farm ponds have scope for fish culture. What is required is, training in production technology, cold storage and marketing facilities.