



GOVERNMENT OF MAHARASHTRA

REPORT
OF THE
FACT-FINDING COMMITTEE
FOR SURVEY OF SCARCITY AREAS
IN
BOMBAY STATE
1960

VOLUME I
(GENERAL REPORT)

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VOLUME I
General Report.

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CHAPTER I.

INTRODUCTORY

By Government Resolution No. SCY. 5656/153648-Q, dated 31st December 1958, the Government of Bombay set up a Fact Finding Committee for the economic and administrative survey of the scarcity areas in the State. The object of setting up the Committee and its composition and terms of reference were indicated in that Resolution as follows :—

“The question of carrying out an administrative enquiry into the conditions in scarcity frequented areas with a view to assessing (a) preventive measures that might be possible against famine and scarcity, (b) policy in regard to taking up irrigation and other productive works in those areas, and, (c) relief or other measures that may be required to meet any gradual impoverishment or other injurious consequences of frequent famine or scarcity conditions has been engaging the attention of Government. It has, therefore, been decided that a Fact Finding Committee consisting of Shri N. S. Pardasani, I.A.S., and one representative each to be nominated by the Secretary to the Government of Bombay, the Agriculture and Forests and Public Works Departments, should be constituted immediately. This Fact Finding Committee should work as a study group and for that purpose visit the various districts of the State and collect complete factual and statistical information required for the purposes stated in the terms of reference mentioned below :—

(a) To examine the economic conditions in all the areas in the Bombay State with a view to assessing the effects of recurrent famine and scarcity conditions and collecting full data regarding the visitation of famine and scarcity conditions and other relevant information to enable Government to assess the situation. To name the areas, which should on the basis of the information collected by the Fact Finding Committee be treated as precarious areas deserving of being recommended for purposes of clause (c);

(b) To survey the relief measures undertaken in the precarious areas in the past during the famine and scarcity conditions and to assess their effectiveness in relieving distress and promoting rehabilitation; and

(c) Making recommendations as to future preventive and ameliorative measures to deal with similar threats”.

2. By its subsequent Government Resolution No. SCY. 5659/47650-Q, dated 30th March 1959, issued in amplification of the earlier orders, Government appointed Shri B. S. Apte, Superintending Engineer, Water Resources Investigation Circle and Shri G. K. Phadtare, Professor, College of Agriculture, Poona, as the representatives of the Public Works Department and the Agriculture and Forests Department respectively on the Committee. The Fact Finding Committee was thus constituted as follows :—

Shri N. S. Pardasani, I.A.S., Chairman,
Shri B. S. Apte, B.E., A.M.I.E. (Ind.), Member,
Shri G. K. Phadtare, B.Ag., Member.

Shri Apte served on the Committee in addition to his own duties as Superintending Engineer, Water Resources Investigation Circle and was for this purpose given the assistance of a Deputy Engineer. Shri Phadtare was appointed to the whole time post of the Deputy Director of Agriculture created in the Revenue Department for this purpose.

3. By Government Resolution No. SCY. 5659/47650-Q, dated 30th March 1959, Government also appointed a Committee of Secretaries on Scarcity Inquiry consisting of the following :—

Secretary, Revenue Department,
Secretary, Public Works Department,
Secretary, Agriculture and Forests Department,
Secretary, Planning and Development.

The Fact Finding Committee was required to work as a Study Group under the Committee of Secretaries and Shri N. S. Pardasani was appointed Secretary of the Secretaries' Committee.

4. The scope of the work of the Fact Finding Committee was later reconsidered by Government so that the work could be completed within a reasonable period and the advice of the Committee could be utilised for the formulation of the schemes for the Third Five Year Plan. By Government Resolution No. SCY. 5659/88700-Q, dated 6th July 1959, the Fact Finding Committee was accordingly directed to concentrate on :—

(a) the study of conditions in areas liable to scarcity conditions as distinguished from areas which are economically backward for other reasons; and

(b) the consideration of schemes for the permanent development rather than measures for temporary relief.

5. The preliminary work of the Committee was done by Shri Pardasani, who assumed charge of his duties on the 29th December 1958. He examined the material available in official records to consider the points on which further information might be collected by the Committee and the existing data brought upto date. He also visited scarcity affected areas in the Poona and South Satara districts and had discussions with the local officials about the nature of the problems involved. At Poona he met the Director of Agriculture and various officers of his Department who had met to consider proposals for the preparation of the Third Plan and ascertained their views on the measures for the development of scarcity areas.

6. In order to collect detailed information for determining scarcity areas, classifying them from the point of view of relative intensity and frequency of incidence of scarcity and examining the suitability and urgency of the various measures of development, the Committee has made extensive use of the District Gazetteers, the Settlement Reports, the Crop and such season Reports, the Statistical Atlas of Bombay State, and the Final Reports on Scarcity specially the Final Report on Scarcity of 1952-53. It also issued a questionnaire and sent copies of it to Collectors of all districts with a request that replies to it might be prepared in consultation with the various district officers concerned. Copies of the questionnaire were also sent to prominent non-officials in each district to ascertain their views in the matter. The text of the questionnaire is given in Appendix I.

7. In order to assist the Committee in the analysis and compilation of the data and in the preparation of its report, Government created the post of a Deputy Collector in the Revenue Department and appointed Shri N. V. Desai, Deputy Collector, Ahmedabad, to it. Shri Desai took charge of his post on 1st April 1959. Shri G. M. Kirpekar was appointed Deputy Engineer with effect from 5th May 1959, to assist Shri Apte. The other staff working with the Committee consisted of two Stenographers, two Junior-Assistants and one typist.

8. Pending receipt of replies to the questionnaire, the Committee undertook tours of the various districts affected by scarcity in the past. The detailed programme of the visits of the Committee is given in Appendix II. During its visits the Committee tried to get a first hand knowledge of the local conditions and saw the irrigation and other development works undertaken in those areas. The Committee visited a number of villages in each area and met the local people to ascertain their difficulties and to invite suggestions for development. The Committee held meetings at the district headquarters, with the district officials concerned with development activities and local workers interested in the problems of scarcity areas.

9. In July 1959, Government considered that the recommendations of the Fact Finding Committee would have a more realistic basis, if a liaison was established between the work done by certain Study Groups, mentioned below, which had been set up by Government for the preparation of the Third Five Year Plan of the State and the Fact Finding Committee—

- (1) Irrigation and Power,
- (2) Land Development including Development of Forests,
- (3) Agricultural Production including Development of Agricultural Co-operatives,
- (4) Animal Husbandry and Dairy Development, and
- (5) Industry and Mining including Industrial Co-operatives.

The Chairman and Convenors of these Study Groups were accordingly requested to arrange to forward to the Fact Finding Committee copies of all the notes etc., circulated so far for consideration of the respective Study Groups, proceedings of the meetings held so far by the Study Groups and the Sub-Groups appointed by them and Reports of the Study Groups and Sub-Groups, if and when finalised. They were further requested to ensure that a representative of the Fact Finding Committee was invited to attend all the meetings of the Study Groups and the Sub-Groups appointed by them.

10. In the beginning of November 1959, Shri Pardasani was given additional duties in connection with the work of the Finance Committee appointed by the Government of Bombay to determine the assets and liabilities of the State of Bombay and to consider the likely financial position of the two new States to be formed as a result of the reorganisation of the Bombay State. Later, he was formally appointed Secretary of the Committee and continued to be engaged in that work until the end of January 1960. The Committee was not, therefore, able to tour some of the districts it had originally intended to visit.

11. The Report of the Committee is brought out in two volumes. Volume I contains the General Report of the Committee and Volume II contains detailed reports pertaining to each district. A summary of these latter is, however, given in Volume I.

CHAPTER II,

PHYSICAL FEATURES, RAINFALL AND CROPPING PATTERNS IN THE BOMBAY STATE

I. Topography.

The present Bombay State forms part of western India, comprising the areas of Kutch, Saurashtra, Gujerat, Konkan and the Deccan Plateau including Marathwada and Vidarbha. A narrow coastal plain alongside the Sahyadri Ghats and an undulating large plateau beyond, make up the physical configuration of the Deccan region. Geologically, the basic complex of the whole state consists of volcanic rocks, except the alluvial plains of North Gujerat and margins of the Saurashtra peninsula.

2. The soils of North Gujerat and the northern and eastern borders of Saurashtra are alluvial. There is a cover of the Deccan trap in the northern and central parts of Saurashtra and in the interior parts of Kutch. The marginal belts of Saurashtra peninsula and Kutch are, however, marked by rocks of sedimentary origin. The Saurashtra Peninsula has a radial drainage due to the hilly area in the central and southern parts. This peninsula is linked to the fertile plain of Gujerat by the low-lying regions of the Bhal and the Nalkantha area which resembles the Gujerat plain in many ways. In Saurashtra and Kutch there are several isolated peaks and cliffs which form geologically a continuation of the Aravali hills. The Rann of Kutch is peculiar in its natural features from the surrounding areas. It was probably an arm of the sea from which water has now receded, giving rise to a saline, sandy and barren plain, incapable of supporting any vegetation.

3. The north-eastern highland regions of North Gujerat consist of portions of the Satpuda, Vindhya and the Gujerat Malva hill ranges. The arc of this highland territory from Palanpur to the Narmada river has a uniform regional significance in spite of the fact that the vegetation cover is richer in the south than in the north. This belt consists of irregularly shaped hills including valleys which form the upper drainage area of the major rivers flowing towards the Gulf of Cambay. The rivers Tapti and Narmada flow through valleys formed by rifts along the two flanks of the Satpuda hill range.

4. The Satpuda range starting from the north-eastern corner of Vidarbha to its termination in the east of south Gujerat, forms a watershed between the Tapti and Narmada rivers and has separated Gujerat from the Khandesh tract in the west and Vidarbha from Madhya Pradesh in the east. The Tapti valley bears a large dissected appearance due to the intensive erosion of the alluvial banks, while the Narmada has a well-marked valley. The rivers Mahi and Sabarmati which drain huge areas of Madhya Pradesh and Rajasthan have formed alluvial valleys in their lower reaches and have built up the alluvial plain of north Gujerat. This plain however turns into saline sandy waste towards the Rann of Kutch.

5. The Maharashtra tract can be divided into two unequal parts viz., the coastal strip of Konkan and the Deccan plateau or Desh. The Sahyadri mountain range which runs almost parallel to the Arabian sea coast at a distance varying from 15 to 25 miles from one end of Maharashtra to the other is separated from the huge Satpuda range by the Tapti valley. The crest of this main range has an altitude varying from 2,000 to 4,500 ft. above sea level. The western seaward face of this range is steep and broken by a succession of terraces. A number of low off-shoots of this range have made the Konkan coastal plain a hilly area with a number of valleys drained by short and gushing streams, running to the Arabian sea. The topography of this Konkan strip is generally undulating giving at places scope for severe soil erosion.

6. The Deccan plateau is situated on the eastern side of the Sahyadri range sloping gradually from west to east, with an elevation of 2,000 feet near the ghats, and 1,400 feet in the central parts of Marathwada and Sholapur districts and 900 feet near the south-east corner of Vidarbha. From the eastern flank of the Sahyadri range, several spurs of varying lengths stretch out in the eastern direction, the most important of which are the Satmala, the Balaghat and the Mahadeo ranges. These spurs which have a height of 1,000 to 1,500 feet above the surrounding territory, have demarcated the river basins or valleys of the Godavari, the Bhima and the Krishna. The several smaller spurs have also formed basins of local streams, serving as tributaries of the major rivers. The Satmala range which stretches along the borders of East Khandesh and Aurangabad districts separating the valleys of the Girna and the Godavari, actually enters the Vidarbha region.

forming a broad highland plateau in the southern parts of this tract having an elevation of 1,700 to 2,000 feet. It also acts as a watershed between the valleys of the Penganga flowing to the east and the Purna in the north flowing west to join the Tapi. On entering Vidarbha, this Satmala range of the Sahyadris goes by the name Ajantha and Balaghat plateau. The Balaghat range of the Sahyadris starting from the south of Bhandardara dam in Ahmednagar is different from the Balaghat of Vidarbha. It stretches east-wards till it reaches the Marathwada region, where it turns towards the south separating the valleys of the Godavari and the Bhima rivers. The Mahadeo range which has stretched out in the easterly direction from the north Mahabaleshwar hills, suddenly takes a south-ward turn separating the Bhima from Krishna valley, going in the south-eastern direction.

7. The north-eastern strip of the Deccan plateau forms the rich alluvial Tapti valley between the Satpuda range along the north and the Satmala range along the south. Due to the Narmada and Tapti rifts, the north-eastern portion of this plateau has a tilt towards the Arabian sea, as against the southern portion which gradually slopes towards the Bay of Bengal. This valley extends east-west from Amraoti district of Vidarbha to West Khandesh district and finally enters the south Gujarat plain. The rivers Girna, Bori and Panjra which emerge from the northern end of Sahyadri range flow towards the east but suddenly turn to the north feeding the Tapti river due to the peculiar topography of this tract. This upland basin of Khandesh has an elevation of 700' above sea level. In the Vidarbha area, the river Purna which takes its birth in the Awilgarh hills to the north of Amraoti District flows in the westerly direction and forms a main tributary of the Tapti. The valley formed by the river Tapti and its main tributary Purna, is quite extensive having strips of alluvial land about ten miles on either side of these rivers. It is formed of heavy, black and deep soil deposits, capable of growing excellent crops of cotton, jowar and wheat. Barring the Purna valley of Vidarbha area which is popularly known as Payanghat area, the whole Vidarbha territory drains towards the south or south-east feeding the river Godavari. Thus it can be seen that the whole of Maharashtra region is an undulating plateau with a number of river valleys. The most fertile valleys are however situated along the rivers Purna, Tapti, Godavari, Bhima and Krishna. The rest of the area is hilly with thin muram soils and is marked by undulating topography.

II. Geological Formations and Soils.

8. The geological formation of the whole state with the exception of North Gujarat which is akin to the Indo-Gangetic plain of North India, is of volcanic origin. There are a few coastal strips which have oceanic rock formations. The out-crops of granite are seen in parts of Saurashtra, Panchmahals and the eastern districts of Vidarbha. The districts of Nagpur and Chanda present a natural museum of different rock formations older than the trap, such as Granites, Guinesses, Dharwards, Vindhyan, Trap and Laterites.

9. The formation of the Deccan trap was probably the last major rock building episode in the history of this state. Since then this landmass has remained undisturbed, except in Gujarat and the coastal regions where changes in the level have taken place due to a long period of denudation which has altered the face of those lands. The climate influences have also played their part in creating the lateritic formations in heavy rainfall areas. The Deccan trap occupies the largest area of the State extending from the southern flanks of the Nerbada in the north, the Arabian sea on the west and the present boundaries of the State in the east and the south. The trap rock also occupies the central and southern parts of Saurashtra and the major central portion of Kutch. The trap rocks show varied colours and textures giving rise to a variety of soils and changes in topography.

10. The Tapti valley and the south Gujarat plains are formed as a result of recent alluviums of trap rock origin. Similarly, the black cotton soils along many river banks in the Deccan and in Vidarbha are also recent deposits carried by the rivers from the hills of volcanic origin. The North Gujarat plain consists of very deep alluvial deposits brought down by the rivers Sabarmati, Mahi, Saraswati and Banas, from central India. This silt is of the Indo-Gangetic type. In Saurashtra, the original rock formation was of granite type but the volcanic effusions and spread of lava followed by a long process of denudation, have created a basaltic topography in the central parts of the peninsula. The Gir and other hill ranges have a granite complex. The basaltic cover in many places has actually eroded and formed the river basins. The coastal regions of Saurashtra are underlain by a variety of rocks like the Porbunder rock and lime stone of Dwarka. Kutch is surrounded by saline sandy alluviums but has volcanic rocks in the hilly interior. The Saurashtra peninsula, as also Kutch, is undulating due to the formation of hills in the central parts. As a result, the black cotton soils which are not very deep become vulnerable to erosion under torrential showers which is a special feature of the tract.

11. The Sahyadri range forms the western edge of the Deccan plateau separating the low-lying coastal strip of Konkan on the west. The Sahyadris formed as a result of volcanic upheavals, have a longitudinal range of about 350 miles in the State, running parallel to the Arabian Sea from the Tapti valley in the north to the southern end of the State in the south. The Deccan plateau, consisting of the major river basins, separated by the residual hills emerging from the Sahyadris is situated to the eastern side of this range. Since both the Konkan strip as well as the Deccan plateau are hilly and undulating, the soil cover has been rendered thin due to constant erosion. On the lower hill slopes the soil depth increases gradually and the basins of the Godavari, the Bhima and the Krishna, situated in this trap rock region, offer a contrast to the residual hills bordering them. These river basins have widened in their lower reaches and have developed fertile black soil zones. The same thing holds true regarding the Tapti and the Purna basins in Khandesh and Vidarbha with the exception that these soils are very deep with heavy clay content and do not favour heavy irrigation.

12. It will be seen that the soils in the Deccan, Konkan, Marathwada, Vidarbha, Saurashtra, Kutch and South Gujerat are basically derived from trap rock. The composition of trap rock is such that it disintegrates into muram and further into black soil very rapidly. The soils formed along the steeper hill slopes have been subjected to greater erosion and have, therefore, become unfit to support good vegetation. The soils formed along the lower slopes, are fairly fertile but are also subjected to erosion. They support short season kharif crops, giving good yields under optimum rainfall conditions. The soils in the valleys are deeper with higher clay content and have negligible gradients. These soils are, therefore, more retentive and support kharif as well as rabi crops but do not stand well under continuous irrigation unless drainage is provided. The residual hills of the Deccan and Vidarbha plateau, the wide basins of rivers as they flow down, and the highly dissected appearance of western parts of the Sahyadri range, are a direct result of erosional influences. Standing in contrast to these are the alluvial plains of Gujerat and the coastal region.

III. Rainfall and Cropping Seasons.

13. The seasonal distribution of rainfall is primarily determined by topography and the direction of winds. In the Bombay State, where the area under irrigation is hardly 5 per cent. the importance of adequate and well distributed rainfall is evident. This distribution has been extremely uneven and irregular in several areas of the State, causing partial or complete failure of crops at intervals.

14. The south-western monsoon is the main rainy season during which various districts of the State get the major part of their precipitation in varying degrees. The winter months of the year are not usually associated with any precipitation except in the eastern districts of the Deccan, Vidarbha and Marathwada. This rainfall in the months of September and October is the effect of the retreating monsoon. The areas of the Deccan which are indifferently and inadequately fed by south-western monsoon, take advantage of these showers in September and October for growing rabi crops to a fairly large extent. The western parts of the State comprising the districts of Saurashtra, Kutch, Gujerat and Konkan do not get any benefit of the returning monsoon. In the hot season, a few spring storms do occur on the plateau but are significantly absent in the western parts of the State.

15. The south-west monsoon rainfall is heavy in Konkan and on the western ghats, but decreases as it proceeds eastwards. This monsoon becomes extremely weak in the eastern districts of the Deccan and again gains strength in the eastern parts of Marathwada and in Vidarbha. A similar phenomenon occurs in respect of the north-western parts of the State, where the monsoon weakens as it progresses from south Gujerat to north Gujerat and Saurashtra. Parts of North Gujerat, Saurashtra and Kutch not only get inadequate precipitation but the rainfall is also erratic and uneven with long breaks and occasionally torrential showers. Due to uneven and precarious distribution of rainfall there are two distinct scarcity belts in the State; one in the Deccan and the other in parts of North Gujerat, Saurashtra and Kutch. The crops in these two zones meet with partial or complete failure off and on. The study of rainfall data by certain experts like Dr. Mann has suggested the existence of cyclic changes in the quantity of rainfall but these cycles are neither simple nor regular to be a basis for forecasting.

16. The rainfall and the soils determine the cropping seasons in different parts of the State. There are areas which are predominantly kharif while there are others which are both kharif and rabi. In precarious rainfall tracts, farmers

can usually go in for one crop only—either kharif or rabi. The choice of the people is restricted to a very few crops like bajri, mung and groundnut in the kharif season and jowar and safflower in the rabi season. Probably, it has been found by experience that these crops stand precarious rainfall conditions better than others.

17. From the point of view of rainfall, the State can be divided into four regions, namely :—

(1) The districts of Konkan and Maval getting assured kharif heavy rains and suitable for growing purely kharif crops like paddy in the low-lying areas and inferior millets along the hill slopes.

(2) The districts of south Gujerat, Vidarbha, eastern districts of Marathwada and East Khandesh district getting adequate rainfall during the period of June to September and growing fairly long season crops like jowar and cotton in heavier soils and groundnut and pulses in lighter soils.

(3) The districts of Saurashtra, North Gujerat and Kutch getting inadequate and ill-distributed kharif rains, with no hope of getting the benefit of the returning monsoon and growing crops of bajri and groundnut in lighter soils in Saurashtra and Kutch and kharif jowar and cotton in the deep sandy loam soils of North Gujerat.

(4) The eastern areas of the Bombay Deccan, namely, the districts of Ahmednagar, Sholapur, eastern parts of North Satara, South Satara, Poona, Nasik, southern portion of West Khandesh and western parts of Marathwada receive precipitation from the regular south-west monsoon as well as the returning monsoon but the rainfall is rarely assured or adequate. The soils of this tract are undulating and shallow with a few patches of better soils in the river valleys. The crops grown in this tract are both kharif and rabi, depending mainly upon the type of soils and the timing of the monsoon. The lighter soils grow short season kharif crops like bajri, groundnut and pulses, while better soils are put under rabi crops mainly jowar, safflower and linseed.

18. Scarcity areas are found in the regions referred to at (3) and (4) above. The crops grown in the third zone consisting of Saurashtra, Kutch and North Gujerat are necessarily kharif, while those grown in the fourth zone consisting of eastern areas of the Deccan and parts of Marathwada are both kharif and rabi. Amongst the kharif crops grown in the third region, the short season crops like bajri, groundnut, pulses and fodder jowar are necessarily restricted to shallow soils while the crops like cotton and kharif jowar find a place in heavier soils of North Gujerat and North-east Saurashtra. The acreage under cotton in North Gujerat and groundnut in Saurashtra is very high. These money crops give higher incomes to farmers, though these areas frequently experience shortage of food and fodder. In the fourth region, though the farmers can choose between kharif and rabi crops, none of these harvests is assured. The soils are most undulating rocky and non-retentive of moisture, with the exception of a few patches along the river valleys. The rainfall in the kharif season, i.e., June to August, is most inadequate and is marked by long breaks. The precipitation in the month of September and October, on account of the returning monsoon, is fairly good and somewhat assured but with poor shallow and undulating soils, the farmers are left with no option except to go in for kharif crops in the major portion of the area and these often fail due to lack of timely or adequate rain. It is the rabi jowar crops in the limited low-lying better soils that give some sort of security to the farmers, but the occasional failures of September rains, with the consequent failures of rabi crops are also not uncommon.

19. All the areas of the State get their major share of precipitation from the south-west monsoon currents from June to September. The surcharged monsoon winds get relieved of their load of moisture after they strike the Western Ghats with the result that the monsoon currents become weaker as they move eastwards over the Deccan plateau or northward over the Gujerat plain. The rainfall in the coastal districts of Ratnagiri, Kolaba and Thana is over 100". This figure jumps up to over 200" in the Western Ghats. The rainfall in Kolhapur and the Maval belt touching the eastern flank of the Ghats, varies from 50" to 100", but declining sharply towards the east. The rainfall in parts of Sholapur, Ahmednagar and eastern parts of Poona and Satara districts scarcely exceeds 20". As the monsoon currents approach the high-lying plateau of Vidarbha, they start precipitating in the eastern parts of Marathwada and in Vidarbha, where the rainfall varies from 30" to 60" annually.

20. The southwest monsoon current which branches off in the direction of Gujerat and Saurashtra is comparatively weak but benefits the districts of Surat, Broach, Baroda, Kaira and Panch Mahals, all of which get an average rainfall varying

from 30" to 60". The currents become weaker as they pass northwards, and the districts of North Gujerat, Saurashtra and Kutch are generally in an unhappy position, except for the areas surrounding the Gir hill range. The rainfall in the district of Junagadh, parts of Amreli, Bhavnagar and Rajkot is somewhat better than in the northern and eastern areas of the Peninsula. The rainfall in Saurashtra ranges from 20" to 30", while in Kutch the average is much less. Map I presents the average Annual Rainfall in different parts of the State.

21. The retreating monsoon is a special phenomenon experienced in the districts of the Deccan and Marathwada. The thunder storms occur in the months of September and October. These showers, though few, are quite heavy and are more assured than the drizzles of the south-west monsoon in the eastern districts. Since the rainfall in the months of June to August in these districts of the Deccan is inadequate, farmers prefer to wait for these showers in September and take rabi jowar in better soils. In shallow soils, they can grow only bajri and hulga during the monsoon season. The areas where kharif rains are adequate, as is the case in Vidarbha and South Gujerat, farmers go in whole-sale for kharif crops even in heavier soils, without taking chances. In case of North Gujerat, Saurashtra and Kutch, late rains are practically absent and hence people have no choice but to go in for kharif crops like bajri, groundnut, jowar and cotton.

22. Maps Nos. 2 and 3 show the normal monsoon onset dates and withdrawal dates respectively. The outbreak of monsoon in the south-west districts of Bombay State is round about the 10th of June. The monsoon hits most parts of the State between the 10th and 15th June. In Mehsana, Banaskantha, Sabarkantha and the Kutch districts, the monsoon sets in late between the 15th June and 1st July. The south-west monsoon generally ends between 15th of September and 1st of October in most parts of Gujerat, Kutch and Saurashtra, Greater Bombay and also Nasik, Thana, Dangs, East Khandesh, West Khandesh, Kolaba and part of Ahmednagar and Aurangabad districts. In the remaining parts of the State, the south-west monsoon ends between 1st of October and 15th October. Because of the short monsoon season throughout the State, there are no possibilities of double cropping except through irrigation.

23. Map No. 4 shows the percentage of rainfall to the total annual rainfall in different areas during the monsoon season which is considered as June to September. This chart is prepared on the basis of the data available for 27 years and it will be interesting to see that all the western coastal districts of the State, viz., Ratnagiri, Kolaba, Bombay, Thana and Surat get about 93 per cent. of the total annual rainfall from June to September. Similar is the situation in the case of Gujerat districts, Saurashtra, and Kutch where the rainfall during June to September is about 93 to 95 per cent. of the annual rainfall.

24. It will be seen from the charts that the scanty rainfall areas like North Gujerat, Saurashtra, and Kutch, where 90 to 95 per cent. of the rainfall occurs during the months of June to September, have to depend entirely on this rainfall. The rainfall after 15th September is practically absent in this area, which puts off the possibility of rabi cropping. On the contrary, any incidence of such late rains spoils the kharif harvests of bajri and groundnut. This late rainfall is however important in other parts of the State. It will be seen from the chart that in the Deccan plateau, in Vidarbha and in some of the Marathwada districts about 80 to 90 per cent. of the rainfall is received from June to September and the rest in October and November giving scope for rabi crops or late varieties of kharif crops.

25. It will be seen from the figures of rainfall given in appendix III showing the distribution of average rainfall, that the districts of Saurashtra and North Gujerat get the major portion of the total rainfall i.e., 80 to 90 per cent. of the total annual precipitation of 18"—25" in the months of June to August and the remaining in the months of September and October. These areas therefore must necessarily depend upon their kharif harvests. In the normal seasons the precipitation of about 16" to 18" in the months of June to August is quite adequate to give a fairly good crop of either bajri or groundnut in lighter soils and jowar and cotton in heavier soils. These areas, however, get abnormal seasons when the rainfall during the months of June to August is less than 10" or is received in heavy showers and is lost by run-off when a total failure of crops ensues.

26. In the eastern districts of the Deccan, rainfall is spread over a longer period from June to October but the average annual rainfall is not more than 20" to 25". If this rainfall was high, farmers would have been able to get two crops in the year from the same land; but unfortunately this rainfall is most inadequate and its spread over a longer span of five months, makes it still further

difficult for the farmers to go in either for kharif or for rabi crops, as none of them is assured. Hardly 60 per cent. of the total annual rainfall is received in the months of June to August. The remaining 40 per cent. is received in the months of September and October. Crops in both the seasons, therefore, stand in an unfavourable situation. This phenomenon of inadequate rainfall, together with the comparatively small holdings is an evident cause of the very low economic condition of the people in the Deccan.

27. Besides the total rainfall, the number of rainy days and humidity, play an important role in respect of crop growth. Showers of adequate intensity to saturate the root zone with moisture at particular intervals are essential. Even a large number of rainy days with ineffective showers may not seem much for the growth of the crops. Heavy winds especially from the drier parts in winter months also cause evaporation of moisture which harm the rabi crops to a great extent. The formulation of dew in the winter months distinctly helps the growth of rabi crops like jowar, wheat and gram. The farmers in the eastern areas of the Deccan prefer to go in for rabi jowar in heavier soils, though the total rainfall in September and October does not exceed 10". This is done because, these showers are more assured than those in the earlier months. They add substantially to the moisture already conserved in the soil and the dew drops in colder months of November and December contribute their share for the successful growth of jowar. In lighter soils which are non-retentive of moisture, farmers prefer to grow short season crops like bajri, hulga and groundnut, with whatever drizzling showers they get in earlier months, as the rabi crops on such poor soils, inspite of late rains and dew, do not fare well.

CHAPTER III.

CRITERIA FOR DETERMINATION OF PRECARIOUS AREAS.

1. By its terms of reference, the Committee was directed "to examine the economic conditions in all the areas in the Bombay State with a view to assessing the effect of recurrent famine and scarcity conditions and collecting full data regarding the visitation of famine and scarcity conditions and other relevant information to enable Government to assess the situation". The Committee was also directed "to name the areas which should, on the basis of the information collected by the Fact Finding Committee, be treated as precarious areas" deserving of being recommended for the "future preventive and ameliorative measures to deal with similar threats".

2. An important point which the Committee had to consider was the setting up of certain objective tests by reference to which different areas could be distinguished as having been affected by scarcity in different degrees. Mere references to certain districts or parts of districts having been affected in certain years did not give a sufficiently close or clear picture. The Committee considered that once such objective tests were available, the collection and interpretation of data would be facilitated and it would be possible to grade different areas as free, occasionally affected or frequently affected and also to indicate the degree of severity of the conditions created by scarcity from time to time.

3. The main characteristics of scarcity as commonly understood is the recurrence of a failure of crops or severe damage to them accompanied by varying degrees of shortages of fodder and drinking water. Areas inundated by sea water or economically backward due to hilly and barren terrain, desert conditions or inaccessibility, as in the case of forest areas, or areas which suffer on account of excessive rainfall are not considered as affected by scarcity as their problems are basically different from those of areas liable to periodic fluctuations due to failure of rainfall. A certain degree of recurrent insecurity arising out of inadequate rainfall, throughout the season or at critical points exposing the crops to grave risks of failure would be the characteristics of chronic scarcity. The Committee accordingly decided to make a close study of the following factors pertaining to each district and, wherever necessary, of each taluka of the district :—

(1) Rainfall.

(2) Annavari and Land Revenue Suspension data:

(3) Declaration of scarcity in the past.

For this purpose all available data for the last 30 years was called for talukawise in the case of rainfall and village or circlewise, as was practicable, in case of annavari, land revenue suspension and official declaration of scarcity. The significance of each of these factors in providing a guide for the determination of scarcity areas is brought out in the following paragraphs.

RAINFALL.

4. Agricultural production is principally a function of the nature of the soil, the water supply available and the methods of production. The methods of production do not change from season to season; the main factors which therefore require consideration are soils and water supply. As the existing facilities for irrigation cover only a small percentage of the total cultivated area, agricultural production in most parts of the State depends almost entirely on rainfall which is received in the State principally in the summer monsoon, known for its vagaries. A certain degree of uncertainty is thus inherent in our rural economy in all parts of the State. In trying to determine the areas liable to recurrent scarcity the Committee considered it necessary to identify tracts which had practically no major irrigation facilities and which, because of their conditions of soil and distribution of rainfall, were liable to experience serious failure once in every few years. The extent of damage caused by uncertainties of rainfall and the frequency of such occurrence had to be ascertained. Where the soil was deep and retentive, normal productivity was generally high and shortages in rainfall would not constitute as serious a threat as in the case of light and non-retentive soils where the problem of adequate and well-distributed water supply was crucial. In the latter soils delay in the commencement of rains, recurrence of dry spells over a long period or absence of rainfall at certain critical points in the growth of the plant were of special significance. The Committee accordingly made a careful study of the rainfall pattern over a sufficiently long period to see whether it was adequate, timely and well distributed.

ANNAVARI AND LAND REVENUE SUSPENSION.

5. In judging the prevalence of scarcity conditions reliance has generally been placed in the past on the valuation of seasonal crop conditions by reference to annavari. As Annavari represents an attempt at an overall estimation of the crops, changes in annavari over a period could be regarded as an index of the liability of the area to marked fluctuations. Areas liable to chronic scarcity could then be distinguished by the number of times the annavari in these areas fell below a prescribed limit, over a given number of years. Closely connected with the system of annavari is the suspension of land revenue. When the annavari is 4 annas and less, full suspension of land revenue is granted; when annavari is less than 6 annas but more than 4 annas, suspension of half the land revenue is granted. This rule has been in existence for a long time over most part of the State. The number of such suspensions would, therefore, provide a convenient index of the incidence of scarcity in the area. As information regarding annavari and land revenue suspension was available on a village basis, it provided the Committee with a close view of each tract as part of a district or taluka.

DECLARATION OF SCARCITY IN THE PAST.

6. In declaring scarcity, Government has relied to a large extent on annavari figures and has also taken into account certain additional factors like the general economic conditions of the people and the demand for employment on Government works. The standards adopted in the past for declaration of scarcity have not been uniform in different regions which now form part of the Bombay State. Even so, data regarding the previous history of scarcity in each area was of value to the Committee in identifying the areas which required closer consideration.

7. The Committee would like to invite attention to certain features of the data relating to rainfall, annavari, land revenue suspension and declaration of scarcity which presented the Committee with practical difficulties.

(1) *Rainfall*.—The rainfall data was collected for the Committee by the Bureau of Economics and Statistics from various sources including the Revenue Department, the Department of Agriculture and the Meteorological Department. In spite of efforts made to obtain as complete a coverage as possible, it was found that for areas which were formerly under the control of princely States, rainfall data prior to 1948 could not be obtained. In certain cases, it was not possible to obtain monthwise data and the Committee had only figures of annual rainfall. Also, on account of certain changes in boundaries of districts and talukas, particularly the establishment of new taluka headquarters which did not have rainfall recording stations in the past, the data available for different areas was incomplete. Subject to these limiting factors, the available data was compiled so as to indicate for each of the last 30 years the distribution of rainfall in each of the important months of the year in all taluka places. Information was also obtained about the number of rainy days in each year. In order to ascertain the degree of uncertainty of the rainfall, the Bureau of Economics worked out the co-efficient of variation for each station, either the taluka headquarters or any other place in the taluka having a rain gauge station, for each of the important months or pairs of months, taking the average of about 30 years as a normal and calculating the number of years in which the rainfall in the particular month was less than the normal. This figure would broadly indicate the degree of uncertainty of rainfall in the area. Where the normal itself is just above the minimum required, a higher co-efficient of variation would indicate that the position was precarious. In order to estimate the shortages in the rainfall leading to crop failures only the figures for the years of lower rainfall were taken into account. The co-efficient of variation is defined as :—

$$\frac{\text{Standard Deviation}}{\text{Arithmetic Average}} \times 100$$

(2) *Annavari and Land Revenue Suspension Data*.—The data on annavari and land revenue suspension made available to the Committee was not complete, nor was it uniform in nature as the present Bombay State comprises areas which belonged to a large number of ex-princely states and part of Madhya Pradesh, which had different system of land revenue and different practices of grant of relief in areas affected by drought. For several of these areas, the only information available dates from 1948 with the result that the Committee had to base its conclusions on what was evidently very meagre data. Even the annavari and land revenue suspension data available from the former Bombay areas were not free from defects. In some cases, it was not easy to reconcile the divergent trends indicated by these data.

(3) *Past History of Declaration of Scarcity*.—Before the Fact Finding Committee was appointed, Government had collected information from District Collectors regarding the areas affected by scarcity during the past 30 years. This information was collected creating the Revenue Circle in a Taluka as a unit. An attempt was

made to grade the areas on the basis of this information. Revenue circles in each taluka in which not less than 1/3rd number of villages were affected by scarcity (i.e., scarcity was actually declared) or in which annavari was 4 annas and less were sorted out and graded in accordance with the number of times they were affected in the past. Though this information provided the Committee with a broad picture which was useful, it was evident that for the reasons mentioned below such information would necessarily have to be supplemented by other facts to get a fairer and closer picture of the scarcity areas. In this connection, the following considerations appeared to be relevant :—

(1) The basis for gradation was imperfect as a revenue circle was not a standard unit for purposes of agricultural conditions. Villages and sometimes tracts lying on the borders of talukas got included or excluded simply because of the fact of grouping. Besides, the boundaries of revenue circles changed frequently in the past and the size of each circle varied from 20 to over 100 villages.

(2) Certain areas had suffered from near scarcity conditions, i.e., annavari 4 annas or more but less than 6 annas. If such near scarcity conditions were also taken into account as 1/2 and full scarcity conditions as 1, a fairer balance between the frequency and intensity of scarcity would be obtained.

(3) The information regarding prevalence of scarcity or near scarcity conditions was based on annavaries which normally reflected the combined influence of all factors affecting agricultural production but an independent study of some of the specific factors affecting agricultural production was considered desirable to correct any mistakes which might have crept into annavari fixation due to local pressures or faulty techniques.

(4) Due to recent availability of irrigation in some areas, the nature of scarcity might have been significantly modified though this fact might not be brought out in the figures of annavari compiled for the earlier years. Conversely, certain areas might have become more liable to scarcity in recent years than in the earlier period due to certain ascertainable causes like changes in rainfall, silting of irrigation tank or rapid erosion of soil.

(5) Due to variations in normal yields and difference in the system of assessment in different regions, the information regarding annavari and official declaration of scarcity does not give a comparable picture for all parts of the State.*

* The basis of annavari is the standard normal yield which is compared with the actual yield of a given year for which annavari is to be made. The standard normal yield is a 12-anna crop in a normal season which means the yield per acre in a season of rainfall fairly favourable, in quantity and distribution with proper cultivation of land of known classification. The standard yields for different crops were fixed by the Agricultural Department several years ago for different districts in the former Bombay State areas. These standard normal yields are supposed to have been related to an average soil of the District as a whole growing that particular crop. It is not however known as to what was the average soil of each district for which the standard yield was fixed by the Agricultural Department in the past as no exact data on that point is available. The Collectors are required to fix now in respect of each crop an average soil classification for the district as a whole. The standard normal yield fixed by the Agriculture Department in the past are therefore deemed to be in respect of land of the average classification as now determined by the Collector. The cropping pattern has also undergone a great change in several parts in recent years, e.g., the area under cotton and groundnut has considerably increased in certain tracts with corresponding decrease in the area under other crops. The average soil classification of land growing a particular crop now may not, therefore, be the same as it was several years ago. Moreover a crop is grown in the district on land having classification varying from less than 4 annas to more than 16 annas. When the area is extensive, it is difficult to work out an average correctly. For the same reasons, it is difficult to work out correctly the standard normal yield of a village having soil classification either very high or very low from the standard normal yield of the district which represents the yield on an average soil of the District particularly because the yield does not vary in the same proportion according to the soil classification (annas). Any inaccuracy in the standard normal yield of a village is, therefore, likely to make a substantial difference in the annavari.

In respect of the areas like Saurashtra or Marathwada or those formerly belonging to princely States where the Annavari System according to the present Bombay Land Revenue Rules was not in force, Standard Normal yields have been fixed on an *ad hoc* basis and not on the basis of crop cutting experiments performed according to scientific methods. In Saurashtra, for example, the Standard Normal yields have been fixed for each village instead of for the district as a whole as in the case of old Bombay State. This has been done by subordinate revenue officials in consultation with the village committees. These standard normal yields vary to a great extent from village to village and the soil classification does not come in the picture. There is no record to check their accuracy.

In certain areas under ex-Princely States, Land Revenue was being collected in kind. Soon after the merger of these States with regular areas of the Indian Union, for the purpose of the recovery of the Government share as Land Revenue, a liberal estimation of crop yield appears to have been made to give relief to the cultivators in the payment of their share in the form of land revenue. A similar attitude seems to have been shown for the purpose of compulsory procurement of grain according to levy system in the merged areas. As the same figures were utilised for the purpose of annavari, they would not give a correct picture of crop yields.

8. The Committee, therefore, came to the conclusion that while applying the objective tests of rainfall, annavari and land revenue suspension data and declaration of scarcity in the past, due regard should be had to the nature of the soil, the irrigation facilities, the cropping pattern and other factors which have a bearing on the stability and yield of agricultural production. Basic information on these point was therefore collected for areas which deserved close study.

9. The Committee has, on the basis of the study of the factors referred to in the foregoing paragraphs, demarcated areas which suffer from chronic scarcity. The Committee considered it necessary to grade scarcity areas so that those which suffered intensely due to failures of rainfall at frequent intervals and had, therefore, little power of resistance could be distinguished from others where the failures were less frequent or less severe. The Committee has concentrated its attention on identifying scarcity tracts rather than villages or groups of villages. The Committee has recommended a gradation of scarcity areas after taking into account the intensity and the frequency of the scarcity conditions experienced in different areas. Scarcity areas are divided into three categories A, B and C, according as there has been a total or almost total failure of crops in the area once every three years, six years or ten years. Areas in which the frequency is less than once in ten years are considered as practically free. In assigning grades to different areas, the Committee has generally taken the taluka as a unit. Where adjoining talukas have nearly the same conditions, a larger tract of the same category has been identified and in a few cases where different parts of a taluka have shown marked variations, classification has been made on the basis of circles or other identifiable portions according to physical conditions.

10. An examination of the conditions in different districts is given in the District Reports. For districts which have heavy or assured rainfall and whose previous record is practically free from scarcity conditions, the reports are general and brief. For the other districts, the reports contain an analysis of the various factors affecting the different talukas so as to demarcate the areas according to the severity with which they are affected.

CHAPTER IV.

SCARCITY AREAS IN THE BOMBAY STATE AND THEIR CLASSIFICATION.

On the basis of the criteria indicated in Chapter III, the Committee has surveyed the conditions in each district and examined all available data to demarcate areas which could be considered as precarious from the point of view of scarcity. The findings of the Committee are contained in District Reports which are included in Volume II of the Report of the Committee. A summary of these conclusions is given in the following paragraphs :—

Nagpur Division.

2. Nagpur Division is mostly a kharif tract. Cotton and Jowar are the principal crops of the greater part of this region. In Bhandara and Chanda Districts where the rainfall is higher and there are greater facilities of irrigation, rice is the principal crop. The rainfall increases as one proceeds from west to east. The average rainfall in the talukas of Buldhana is from 30"-33" while it varies from 44" to 72" in the talukas of Bhandara and Chanda districts. This is an assured rainfall area. The minimum recorded during the last several years was 15" to 28" in the talukas of the western part and above 20" to 50" in the eastern talukas. The lower rainfall years are hardly one or two and that too during the 1950 to 1953 period. There has been failure of crops occasionally in a few villages here and there, but this has happened more due to damage by excessive rainfall or hailstorm. There is no sizeable tract as such which suffers frequently from deficiency of rains. For these reasons no part of any of the districts of Nagpur Division is considered to be scarcity affected.

Aurangabad Division.

3. In Aurangabad Division the districts of Aurangabad, Bhir and Osmanabad adjoin the Deccan scarcity zone comprising the districts of Ahmednagar and Sholapur of Poona Division. These three districts have slightly lower rainfall than the eastern part of this Division comprising the districts of Parbhani, Nanded and East Khandesh which adjoin the Nagpur Division and are considered free from scarcity. Even in the three districts of Aurangabad, Bhir and Osmanabad only a few talukas adjoining the districts of Ahmednagar and Sholapur are scarcity affected. The major parts of these districts in Marathwada grow mainly kharif crops, like jowar, bajri, cotton and groundnut. Some talukas of Osmanabad and Aurangabad also grow wheat and rabi jowar in large areas. The average rainfall in the three eastern districts which are considered free, varies from 25 to 42 inches, while the average in different parts of the remaining three districts of Bhir, Osmanabad and Aurangabad varies from 23 to 37 inches. However, in the latter three districts, the talukas adjoining the Ahmednagar and Sholapur districts had deficient and ill-distributed rainfall during certain period in the past. These talukas which were affected occasionally are Ashti, Patoda and Manjalgaon and part of Bhir (Pimpalner and Bhir circles) in Bhir District, Vaijapur and Gangapur in Aurangabad District and Bhoom and part of Paranda (Paranda and Anal circles) in Osmanabad District. Except for these areas, which are regarded as scarcity areas of Class C, the rest of the Division is free from scarcity.

Poona Division.

4. The western part of the Deccan plateau of which Poona Division is a part gets the greatest advantage of the south-west monsoon current. The rainfall in the western parts along the Sahyadris in Kolhapur, South and North Satara and Poona is very heavy (60" to 200"). There is an abrupt fall in the rainfall on the other side of the high Sahyadri ranges towards the east. The eastern parts of Poona, North Satara, Ahmednagar and Sholapur get only 18 to 25 inches of rainfall and it is these areas which form the scarcity zone. There are, however, pockets in this zone which are protected by irrigation facilities from major or medium irrigation works or which have good sub-soil water. The Kolhapur District, parts of Baramati and Indapur in Poona District, Kopargaon, Shrirampur and Rahuri in Ahmednagar District, part of Malsiras in Sholapur, part of Phaltan, Karad and Satara Talukas in North Satara and Miraj taluka in South Satara are some of the protected parts. The remaining parts of the eastern Poona Division have been frequently affected by scarcity in the past and are therefore considered as scarcity areas. The classification of these areas has been made as under :—

District.	Taluka.	Class.
Poona	Shirur	A
	Dhond	A
	Indapur (northern part)	B
	Baramati (part)	B
	Purandhar (part)	B
	(east of Railway line)	B
	Haveli (17 villages on eastern border)..	B

District.	Taluka.	Class.
Ahmednagar	Shrigonda	A
	Karjat (Rashin circle)	A
	Karjat (remaining part)	B
	Parner	B
	Ahmednagar	B
	Sangamner	C
	Pathardi	C
	Jamkhed	C
Sholapur	Karmala	A
	Sangola	A
	Madha	B
	Pandharpur	B
	Malshiras (Southern part)	B
	Mohol	C
	Mangalvedha	C
	Akkalkot	C
	North Sholapur	C
	South Sholapur	C
Barsi (17 villages in north east)	C	
North Satara	Khandala (Lonad Circle)	B
	Man	B
	Khatav (part)	C
	Phaltan (Southern part)	C
South Satara	Jath	B
	Khanapur (part)	B

Bombay Division.

5. Thana, Kolaba and Ratnagiri Districts which form the Konkan are heavy and assured rainfall areas. The western parts of Nasik and West Khandesh Districts and Dangs District are covered by the western ghats which also get heavy rainfall. The eastern parts of Nasik and West Khandesh, however, have lower rainfall. The average rainfall in Konkan districts varies from 60" to 142". In Dangs it is 65" to 100". These areas are therefore considered as clearly free from scarcity. Nasik and West Khandesh Districts grow kharif crops, like Bajri, Jowar, Cotton and Groundnut. The western parts of these two districts along the western Ghats such as Peint, Surgana, Kalvan, Navapur, Taloda and Akkalkuva are higher rainfall areas. The rainfall in these areas varies from 50 to 96 inches. The rainfall in the remaining eastern parts of these two districts varies from 21 to 30 inches. Some of the parts of Nasik and West Khandesh having lower rainfall have also poor and unretentive soil and therefore, have suffered failure of crops occasionally in the past. The data available to the Committee, however, showed that there were no large tracts as such which have frequently suffered by scarcity in the past and therefore no part of any of these districts could be considered as precarious. The entire Bombay Division is, therefore, considered as free from scarcity.

Ahmedabad Division.

6. The nine districts of Gujerat, viz., Banaskantha, Mehsana, Ahmedabad, Sabarkantha, Kaira, Panch Mahals, Baroda, Broach and Surat may be divided into two regions, viz., South and North Gujerat. Except a narrow strip along the eastern boundary, the whole area is a plain. The soil in the western part is generally more fertile than in the eastern part, except for small patches along the western coast and near the Rann of Kutch which have effects of salinity. The whole of Gujerat is a kharif area. Except the parts of the South Gujerat and parts of Ahmedabad, Kaira and Panch Mahals which grow paddy, the main crops are jowar, cotton and bajri in this tract. Some of the North Gujerat districts also grow groundnut. South Gujerat gets heavy to moderate rainfall, while the rainfall in the northern parts of this Division is precarious. In South Gujerat, there are small areas along the coast in which the rainfall is not well distributed and which causes occasional failure of crops. The northern districts in which

the rainfall is precarious have suffered frequently in the past. These districts are Banaskantha, Mehsana and Ahmedabad. Parts of Kaira and Broach districts along the Arabian Sea coast have also suffered occasionally in the past and have been considered as scarcity area. A list of the areas considered as scarcity affected in this division is given below—

Name of the district.	Taluka.	Classification.
Banaskantha	Santhalpur	A
	Radhanpur	A
	Waq	A
	Tharad	A
	Dhanera (part of the taluka to the west of railway line).	B
	Deodar (part of the taluka west of Deodar Town and north of Deesa-Kandla line).	B
Mehsana	Harij Mahal	A
	Sami	A
	Chanasma-part (Becharji circle).	
	Part of Chanasma other than Becharji Circle.	
	Patan-part	B
	Sidhpur-part	B
	Kadi-part	B
Kalol-part	B	
Ahmedabad	Viramgam	A
	Dhandhuka	B
	Dholka-southern part	B
	Dholka-northern part	C
	Sanand-western part adjoining Viramgam.	
	Sanand-eastern part	C
Kaira	Cambay	B
	Matar	B
	Mehmedabad	C
Broach	Jambusar-western part	B
	Jambusar-eastern part	C
	Wagra	C
Panch Mahals	Hansot (part)	C
	Dohad	C

The remaining parts of the districts other than those referred to are treated as scarcity free.

Rajkot Division.

7. This is the northern-most part of the Bombay State with the Arabian Sea forming the western boundary. The Runn of Kutch, a vast desert area, adjoins the districts of Surendranagar and Kutch. The latter is practically surrounded by the desert. On account of the existence of the desert conditions prevailing in the northern part of this area and precarious nature of rainfall, the greater part of this area is barren and suffers from scarcity very frequently. The average rainfall in the northern parts vary from 12 to 20 inches while in the southern parts it varies from 20 to 30 inches. More than the average low rainfall, its erratic nature and ill-distribution is responsible for the failure of crops. The irrigation facilities in the northern districts of Surendranagar and Jamnagar are meagre. The data available regarding annawari and Land revenue suspensions was available for all the areas only for the period 1948 onwards. Even the rainfall data for the period prior to 1948 was not available in respect of many talukas. The demarcation of scarcity areas has had, therefore, to be made on the basis of very limited data.

Junagadh District has good soil, higher rainfall and better irrigation facilities. This district is, therefore, considered free from scarcity. As regards other districts the classification of scarcity areas is as under :—

District.	Names of talukas considered as scarcity areas.		Classification.
Kutch		Anjar	A
		Nakhtrana	A
		Abdasa	A
		Lakhpat	A
		Rahpar	A
		Khavda	A
		Khadir	A
		Mundra	B
		Bhachav	B
		Mandvi	C
Surendranagar		Bhuj	C
		Dasada	A
		Wadhvan	B
		Muli	B
		Dhrangadhra	B
		Halvad	B
		Limbdi	B
		Lakhpat	B
Jamnagar		Sayala	B
		Okhamandal	A
		Kalyanpur	B
		Jodia	C
Rajkot		Kalavad	C
		Malia	C
		Morvi	C
Bhavnagar		Vankaner	C
		Bhavnagar (Bhal area)	B
		(Rest of the taluka)	C
		Gadhada	B
		Vallabhipur (part to the east of Vallabhipur Dhan-dhuka Road).	B
		Remaining Part	C
		Botad	C
		Gariadhar	C
		Mahuva (Bhadrad and Mahuva circles).	C
		Kundla	C
Amreli		Amreli	C
		Khambha	C
		Jafrabad	C
		Rajula	C
		Babra	C
		Lilia	C
	Lathi	B	

A statement showing talukawise area and population of different scarcity areas is given in Appendix IV. The total area and population in each Division under Class "A", "B" and "C" scarcity areas is given below. The scarcity areas of each class are shown in separate colours in Map No. 5 appended to this Report.

Division.	Areas in square miles.						Total.	
	A		B		C		Area	Population
Nagpur ..	..	..	..	..	..	..	..	..
Bombay ..	..	..	..	..	..	..	..	..
Aurangabad ..	..	..	..	..	..	..	..	..
Poona ..	3,205	5,09,770	5,741	11,04,042	4,250	11,39,225	18,202	27,53,037
Ahmedabad ..	3,020	4,95,360	3,628	9,16,993	1,534	4,44,059	8,182	18,56,412
Rajkot ..	5,801	3,75,240	5,200	7,50,375	5,974	12,02,141	16,975	23,27,745
Total ..	12,026	13,80,379	14,569	27,71,410	15,568	34,48,627	42,163	76,0,116

CHAPTER V.

APPROACH TO DEVELOPMENT OF SCARCITY AREAS.

The Committee was required by its terms of reference to make recommendations regarding preventive and ameliorative measures to deal with recurrent threats of famine or scarcity and to concentrate on the consideration of schemes for the permanent development of the areas which are considered precarious. It was, therefore, necessary to consider first the general approach to the formulation of development measures and to indicate the broad pattern of priorities kept in view before working out the detailed programmes for these areas. This question was considered previously in the Final Report on Scarcity of 1952-53 in Bombay State by Shri M. R. Yardi, I.C.S., Director of Famine Relief and the Committee has benefitted a great deal from the illuminating comments contained in it.

2. It was evident that the development programme for each area would have to be framed in the light of its physical resources. The character and size of the measures included in the programme would have to be related to the specific requirements of the area and the potentialities of development available in or near it, taking into account the severity with which the area was affected by scarcity and the development work already completed or under way.

3. The Committee considers that the primary aim of the development programmes for scarcity areas should be to provide certain basic conditions which would remove the present uncertainty in their economic life and initiate a process of assured and steady improvement. The policy of adopting scarcity measures when scarcity is already in sight has to be substituted by a strategy of development based on an appraisal of the basic deficiencies in the economy of the area. As the problem is deep-rooted, a phased programme which aims at removing the underlying causes has to be implemented until the area is made reasonably free from the spectre of scarcity. The distinguishing characteristic of areas which are precarious or affected by chronic scarcity is the absence of irrigation facilities and the consequent dependence on rainfall whose inadequacy or defective distribution renders the production of crops entirely uncertain. When the rainfall is insufficient or fails to arrive in time, the farmer is deprived of his only source of livelihood, and the entire rural community suffers. The position often gets aggravated by shortage of fodder and drinking water.

4. The development measures for scarcity areas should, therefore, aim at security of employment and income to the people in these areas. This would generally be obtained by enabling the people in these areas to have at least one assured crop in the year and at maximising its yield by developing the land and water resources of the areas. Schemes for ensuring reasonable supplies of fodder in or near the areas and certain minimum facilities of drinking water should also be taken up. Where the possibilities of agricultural improvement are limited, and the land is so poor that there is no prospect of the farmer raising a satisfactory crop, conversion into a grazing or forest land and extension of power to facilitate the development of industries, if such a development is possible, have to be considered. In short, it is necessary to explore alternative measures to increase and diversify production so as to build up a scarcity resistant economy. The distress caused in these areas due to vagaries of nature shows that even the maintenance of a bare human existence becomes difficult. Such conditions should not be permitted to continue. Their removal by adoption of appropriate development measures should, in the opinion of the Committee, receive a high priority in our national programmes.

5. The Committee considers that the present position cannot be expected to improve unless the urgency of the problem is recognised and a phased programme worked out and fitted into our National and State Plans to rid these areas of the threat of scarcity within a reasonable time. The pursuit of broad objectives of national economic policy embodied in our Plans would not automatically solve the problem of scarcity areas. As a result of the adoption of a planned programme of development during the last ten years or so, a certain measure of development has no doubt been achieved, thereby affording some direct or indirect protection to scarcity areas. But, scarcity areas cannot get any significant benefits from the general measures of agricultural and rural development applicable to all areas, as they often lack the necessary conditions to avail themselves of the general facilities. The objectives embodied in our Plans like increasing per capita income, making the country self-sufficient in food and rapid industrialization can, in many cases, be achieved quickly or at less cost by a more rapid development of areas which already have some advantages or facilities for development. Unless, therefore, certain basic conditions are deliberately provided in the

scarcity areas in a co-ordinated manner and on a priority basis, the future development of these areas will continue to remain handicapped and the gap between these areas and others would only widen.

6. The development measures suggested by the Committee do not aim at anything like a full development of the areas affected, but at the attainment of a reasonable minimum which would enable the areas to be free from the threat of chronic scarcity. The problem of rural economic development is a general one and is by no means confined to scarcity areas. There are other areas which are in some respect as much in need of development as the scarcity areas, though their problems are of a different type. It is necessary, however, to distinguish the requirements of scarcity areas from those of other areas as the former relate to the provision of certain elementary needs like one assured crop and reasonable supplies of fodder and drinking water. They should, therefore, get a definite priority so that the areas affected by chronic scarcity are brought to a reasonable level with the adjacent areas, as early as possible.

7. The development measures for scarcity areas should, therefore, be taken as an integral part of the Third and subsequent Plans, identified separately and implemented in accordance with a phased programme. Most of the schemes suggested by the Committee can be started in the Third Plan period but their completion would take time. In particular, irrigation works require time in survey, preparation and execution, and schemes relating to land improvement or afforestation have to be extended over different areas by stages. The specific programmes suggested for different areas have, therefore, been phased with due regard to the overall limitations of finance and trained personnel in the immediate future.

8. In addition to the specific measures of development suggested for scarcity areas, there are several activities which would be useful in these areas but which form part of general policies pursued all over the State. In the implementation of these policies, the requirements of scarcity areas which deserve special consideration have been pointed out.

9. Until the development measures suggested by the Committee are implemented in full, some measures of temporary relief will be necessary, including the starting of relief works to give employment in periods of scarcity. It is, therefore, essential that relief measures should aim at a more intensive implementation of the development programme of the area, and, if necessary, anticipate works which are due to be taken up later in the areas as a part of its development programme. Thus, work like contour-bunding and construction of irrigation tanks or canals in anticipation of head work should be kept ready for implementation at short notice.

10. The Committee considered whether any general pattern of priorities as between different lines of development could be established for all scarcity areas, as a basis for the preparation of specific programmes. For this purpose it examined the existing policies and programmes of development in the light of local experience and came to certain conclusions which are indicated here under the following heads :—

- A. Irrigation Policy.
- B. Soil Conservation and Land Improvement.
- C. Animal Husbandry.
- D. Fodder Resources.
- E. Drinking Water Facilities.
- F. Development of Industries

A. Irrigation Policy

11. As the problems of scarcity areas arise from the inadequacy, uncertainty or uneven distribution of rainfall, the provision of irrigation facilities would generally be the most important measure in any development programme of these areas. Where such irrigation facilities have been provided on an assured basis and on a sufficient scale, the economy of the area has been completely protected against the incidence of scarcity. The consideration of future irrigation policy is divided here in two parts. The first part deals with the scarcity areas in Maharashtra and the second part deals with the scarcity areas of Gujerat.

PART I.—MAHARASHTRA

12. Irrigation works consist principally of the following :—
- (1) Wells.
 - (2) Tube Wells.
 - (3) Wells fed by percolation tanks.

- (4) Minor irrigation tanks.
- (5) Major irrigation works providing flow supply.
- (6) Major irrigation works combining flow and lift irrigation from wells within the command.

(1) Wells.

13. Unlike the alluvial plains in the country, such as those in the Punjab and Uttar Pradesh, the Deccan conditions present altogether a different and complicated problem in so far as ground water and its flow is concerned. In the Indo-Gangetic plains striking water in wells is not at all an uncertain factor as it is related to a water table which spreads all over the area and its level fluctuates from season to season. Accordingly, any well sunk in this area positively strikes water at some level or the other. In certain cases, brackish water is met with, which cannot be utilized for irrigation of crops. In the Deccan, however, there is no such thing as a water table. The wells derive their supply from water seams the exact location of which cannot be predicted. Any well sunk in the Deccan has to be excavated in rock to some extent except in certain regions where the rock level happens to be very low and excavation is limited to the upper layers consisting of 'MAN' or 'CHOPAN'. The cost of sinking wells in the Deccan varies from about Rs. 3,000 to Rs. 5,000. A normal well in the Deccan plateau is about 40 to 50 feet deep and water is struck at a depth of about 25 to 40 feet. The capacity for irrigation of a normal well in the Deccan (not within the commands of irrigation canals) is noticed to be between three to five acres. The supplies of these wells are adequate for irrigation upto about the middle of March and then dwindle rapidly, giving barely sufficient water for drinking purposes at the end of the hot weather. As a matter of fact, a number of wells are known to get dry by the end of April. This virtually means that at a national capital outlay of about Rs. 3,000 to Rs. 5,000, an irrigation potential for purely seasonal irrigation with an unreliable supply of water is created for irrigation of about three to five acres. The cost per acre which can be irrigated from these wells thus works out to about Rs. 1,000 to Rs. 1,600 per acre. In addition to the capital outlay on the construction of the well the irrigator has to incur recurring expenditure on providing pumping equipment and the power required to lift the water either by oil engine or his own bullocks. Well irrigation is, therefore, a costly mode of irrigation particularly in view of the fact that certain wells are found to be incapable of striking water. Well irrigation should, therefore, be resorted to where the other more economic modes of providing irrigation are not available or where an adequate and copious supply of underground water with a low lift can be guaranteed as, for example, in the areas under command of major irrigation works.

(2) Tube Wells.

14. In the Deccan area there are hardly any zones where tube well irrigation is possible. This is particularly so in view of the fact that there does not exist a continuous or real water table as such in the entire Deccan Plateau. This form of irrigation is therefore only practicable on a large scale in alluvial plains and is not considered in detail in so far as the Deccan area is concerned.

(3) Wells fed by Percolation Tanks.

15. Since a real water table does not exist in the Deccan area, with a view to feed wells for underground water, percolation tanks are constructed in the upper reaches of a stream to store water which would directly enrich the sub-soil water resources through water-bearing strata intercepted in the tank bed. The water from such a percolation tank finds its way in the seams in the underground rock and sometimes fills the "Porous Strata" such as "Murum" or "Geru" of a very small thickness opening out into a tank and through such strata conveys underground waters to the wells. The benefits derived by such percolation tanks cannot be measured because the actual quantum of water stored in such a percolation tank and the actual quantum which reappears into the wells cannot be correlated with any degree of accuracy.

In case of a regular irrigation tank the water stored in a tank is drawn for irrigation of crops and spreads naturally over the fields during the irrigation seasons. A large quantum of this water spread on the ground for irrigation of the fields goes underground and like percolation tanks also enriches the underground supplies. The advantages of an irrigation tank over a percolation tank are as follows :—

- (1) Whereas a large quantum of water from an irrigation tank is utilised directly for irrigation of crops which does not involve any additional cost on lifting machinery etc., such a tank drains out water from the tank comparatively quickly and is empty before the end of rabi. There are, therefore, no

evaporation losses in this tank during the hot weather, during which period such losses are known to be maximum. Even during the monsoon and the rabi periods the quantum of water left in the tank after regular utilisation for irrigation being small, the evaporation losses are also proportionately small compared to those on a percolation tank.

(2) The water let out from an irrigation tank for irrigation is positively and completely utilised for irrigation of crops at least to the extent to which it is let out for irrigation. In the case of a percolation tank the water which goes underground passes through unknown seams and is spread over any unknown area and is, therefore, only partially tapped by wells at isolated places. The entire quantum of water thus going underground cannot possibly be tapped by wells. An irrigation tank, no matter how small it is, is therefore much more preferable to a percolation tank in so far as its function as providing water for irrigation either directly or through wells and as a moisture conservation device is concerned.

In order to assess the precise benefits derived from percolation tanks, the Committee requested the Bureau of Statistics and Economics to carry out a sample survey. The data collected are given in a note in Appendix V. For the reasons explained in the note, the Committee was unable to get any further guidance from those data.

(4) *Minor Irrigation Tanks.*

16. As minor irrigation tanks being small works can be completed in a short time and can start giving irrigation benefits much more quickly than a major irrigation work, emphasis is generally laid on taking up minor irrigation works wherever possible in preference to a major irrigation work. The Deccan area can be divided into two distinct parts, one having assured and copious rainfall such as the western ghats and the other having precarious rainfall with a very large fluctuation in its incidence and its distribution. The latter area is affected by scarcity and needs assured irrigation facilities as a protective measure. Minor irrigation works may be considered as desirable in areas where the rainfall is assured. In areas where the rainfall is not assured such works serve no useful purpose in the real sense. The catchment area of a minor irrigation tank lies in the same tract as the area proposed to be irrigated under it. In a year of scarcity and famine when the water requirements for irrigation of crops on account of failure of rains are maximum, the rainfall in the catchment itself having failed, the minor irrigation tank hardly gets any replenishment. Consequently, in such a year when the demand is maximum the supply available in the tank is negligible. Such a tank, therefore, fails to function as a protective irrigation work and an insurance against famine since the work itself fails to supply water when it is badly needed. In years of good rainfall the tank no doubt fills but in such years there is hardly any demand for water for irrigation as the rainfall happens to be satisfactory for normal seasonal crops. This, therefore, virtually means that although a minor irrigation tank may have water in it in a good year, there is no demand for it in such a year and consequently the work practically gives no advantage of irrigation to the area under its command in such years. In scarcity years when there is a real need for irrigation, such a tank fails to provide any appreciable quantum of water as the tank does not get appreciable replenishment on account of failure of rains in such a scarcity or famine year. Sometimes these minor irrigation tanks are designed as kharif and rabi irrigation tanks. The common experience on such tanks is that hardly any kharif irrigation is done on them. This is particularly so since the tank gets its replenishment and water becomes available for irrigation sometime at the end of July or by the middle of August by which time almost half the kharif period is over. Such tanks can, therefore, only function as rabi tanks giving water supply for rabi crops or kharif-cum-rabi crops in years of adequate rainfall i.e., in years of rainfall not so low as to result in scarcity. Such minor irrigation tanks are not, therefore, very effective in providing relief to the scarcity and famine areas. The cost per million cubic feet of water stored on such tanks is generally very high being of the order of Rs. 10,000 to Rs. 18,000 per million cubic feet as against the cost in major reservoirs at Rs. 3,000 to Rs. 4,000 per million cubic feet. The cost per acre irrigated in such cases works out to Rs. 600 per acre of seasonal crops for which water hardly becomes available in two years out of every four. Even out of these two years the irrigation needs in one year are almost negligible and the water stored in such years is wasted. In other words cost per acre irrigated considering three failures in every four, two on account of shortage of water and one on account of no demand for water, virtually works out to Rs. 1,800 per acre on a 75 per cent. dependability basis. Even assuming that the tank waters are utilised for 50 per cent. of the year the cost is as high as Rs. 900 per acre for seasonal crops with 75 per cent. dependability and is, therefore, quite high.

(5) *Major Irrigation Works providing Flow Supply.*

17. The precipitation in the heavy rainfall zone of the western parts and the other hilly tracts in Vidarbha and Marathwada is generally assured. Even in scarcity and famine years the rainfall in these zones is generally adequate. Storages fed by catchments in such areas of assured rainfall can, therefore, be counted upon as reliable storages which could make water available almost in all years. If, therefore, waters from such catchments stored in reservoirs located at suitable sites, are carried by canals for irrigation in scarcity areas such works can positively give relief to the scarcity areas in years of scarcity and famine. The cost per acre irrigated (on seasonal basis with 75 per cent dependability) for such works is about Rs. 300 to Rs. 600 per acre and such works are accordingly considered to be the cheapest and the most reliable of all the possible irrigation works. Such works have the great advantage of assuring water supply even during scarcity and famine years. Such works are, therefore, the most appropriate as protective measures for the famine areas.

18. It is necessary here to stress that major irrigation not only secures the protection of a crop and thus stabilises the economy of the area against scarcity in the cheapest and the most reliable manner, but it also provides the basis for a diversified and more remunerative cropping pattern including the cultivation of cash crops like sugar-cane and cotton, which constitute the raw materials of large scale industry. Land is more intensively cultivated and the available manpower and cattle are more fully utilised. Due to the direct and indirect effects of irrigated farming the entire economy of the tract is radically changed by the new opportunities of investment and employment made available. In scarcity areas, major irrigation has, therefore, a special significance and must receive the highest priority.

(6) *Major Irrigation Works combining Flow and Lift Irrigation from Wells within the command.*

19. Consequent on providing major irrigation work in a scarcity area, the underground water resources in the irrigation commands of such works get enriched. Experience gained in the commands of existing major irrigation works has shown that copious amount of underground water becomes available in wells in such command. On the Pravara canals alone 10,000 acres of sugar-cane are grown in the irrigation command on wells. It should therefore be possible to tap these underground water resources for extension of irrigation in the commands of the canals. The combining of flow and lift irrigation in the scarcity areas will bring a large area (actually about 30 to 40 per cent. extra area) under irrigation in the famine zones. In the scarcity and famine areas, therefore, major irrigation schemes with combined flow and lift irrigation should be provided so as to cover large an area as possible.

20. There is yet one more mode of giving relief to famine and scarcity affected areas. The Department of Agriculture has already developed the technique of contour-bunding in shallow and medium soils and the dry farming methods of cultivation. These measures will go a long way in the conservation of moisture. The actual water required for irrigation of crops in lands which are banded and on which seasonal crops are raised by the dry farming method is expected to be less than that required at present. Accordingly, certain areas with shallow and medium soils where contour bunding and dry farming methods are practised in the scarcity areas may be provided irrigation waters by flow with a smaller water dose in scarcity and famine years to enable the cultivators to bring their crops to maturity with a very light irrigation. About 20 per cent. area in the irrigation commands may be reserved for such treatment.

21. In consideration of various factors already discussed, following recommendations are made in fixing the priority of irrigation works in scarcity areas in Maharashtra :—

(1) Top priority should be given to major irrigation projects serving scarcity and famine areas. In such major irrigation projects a combined lift and flow irrigation should be introduced and construction of wells in the irrigation commands should be encouraged. Cheap power should be made available in such irrigation command for lift irrigation.

(2) A contour-bunding and dry farming drive should be made in the scarcity and famine areas including the commands of major irrigation canals on which about 20 per cent. area should be left for dry farming on shallow and medium soils.

(3) Well irrigation may be taken up in banded areas so as to utilise the subsoil moisture conserved by contour bunding.

(4) Minor irrigation works may be taken up outside the irrigation command of major projects specially where the sub-soil water is not adequate for a large wells programme.

PART II—GUJERAT.

22. The conditions obtaining in the scarcity areas of Gujerat including Saurashtra and Cutch are in several respects different from those obtaining in Maharashtra. The merits of various irrigation works as permanent measures of protection to scarcity areas in this area have, therefore, to be based on local conditions. The rainfall in the districts of Kaira, Panchmahals, Baroda, Broach and Surat is more or less assured except in a narrow belt parallel to the sea face in the districts of Kaira, Baroda and Broach. These areas known as 'BARA' are similar to 'BHAL' areas of Saurashtra and Ahmedabad. Except in Matar taluka of Kaira district, wheat is the main crop in this area and suffers either on account of failure of September rains or on account of heavy rains which the soils cannot stand. A large quantum of rains renders these areas water-logged and consequently kharif crops, if sown, are lost. These areas are plain and consequently no minor irrigation works providing surface irrigation are possible. The wells dug in this area strike saline water. Accordingly, the only way of protecting these areas is to provide dependable flow irrigation from a major irrigation work. All the scarcity areas on the west coast will be served by the Mahi and Narmada canals and can grow paddy without difficulty. The Panchmahals districts has assured rainfall but its distribution is very erratic. Minor irrigation tanks can take care of the uneven distribution and assure the crops in this district. As development measures, the minor irrigation works rank first in this district and soil conservation works and well irrigation would come thereafter. Similar conditions of rainfall prevail in southern parts of Saurashtra and the whole of Gujerat, except the northern parts. In most of the cases the rainfall is either inadequate or badly distributed. The sub-soil in the scarcity areas of North Gujerat is generally saline and consequently, except in certain parts, the wells yield brackish water unfit for drinking or irrigation.

(1) Wells.

23. Unlike the Deccan Plateau, the northern plains of Gujerat such as those of Tharad and Wav of Banaskantha District, Harij, Sami, Chanasma and Patan talukas of Mehsana District and the plains of Saurashtra and Cutch are overlaid with alluvium. There is, therefore, a regular water table and in certain areas artisan and sub-artisan conditions are obtained. Besides, wells excavated in these areas do not strike rock as is the case in the Deccan. The wells are of smaller depth and are excavated in soil. They are, therefore, comparatively cheap. Well irrigation can, therefore, be regarded as reasonably economic in the plains of North Gujerat, Saurashtra and Cutch provided the water struck is not saline. Unfortunately the sub-soil water in most of these areas is brackish and unfit for irrigation and in majority of cases also unfit as potable water for human consumption. Taking of trial bores by a post-hole auger to determine the quality of underground water is both simple and inexpensive. In areas where subsoil water is free from salinity well irrigation in these tracts would be economic, since the cost of a well in such tracts is of the order of about Rs. 1,500 or so. Each well can easily irrigate three to four acres and accordingly the capital outlay on each acre irrigated would be of the order of about Rs. 450 to Rs. 600. It may therefore be considered quite economic to go in for well irrigation where it is possible to do so in alluvial areas.

In non-alluvial scarcity areas well irrigation continues to be as expensive and uncertain as in the Deccan. There is only one case which should be considered as an exception. In Cutch where the rainfall is not only uncertain but is very low the only source of insurance against a famine or scarcity is well irrigation. In the talukas of Bhuj, Anjar, Mandvi and Bhachau, particularly in Bhuj and Mandvi, well irrigation is practised on a large scale. In this area the subsoil water table is rich and the water potable due to peculiar geological conditions. The underground water resources of the talukas of Anjar and Bhachau are, however, required to be entirely reserved for use as drinking water for the port of Kandla.

(2) Tube Wells.

24. Unlike Maharashtra, some of the scarcity areas of Gujerat, Saurashtra and Cutch have underground subsoil water resources which can be tapped by tube wells. A considerable amount of study of these water resources has been made by Dr. Kulkarni of the Geological Survey of India, who worked in this area for over two years and carried out an intensive survey of underground water resources. His report is printed and is available. Consequent to his studies which revealed possibilities of artisan and sub-artisan conditions of supply in certain areas a number of wells have been sunk in areas where surface wells yield brackish water and are doing irrigation. Tube well irrigation is comparatively costly but may be resorted to in the absence of any other kind of irrigation particularly in areas such as Becharaj, Harij and Kadi where water is required for growing fodder which cannot be had over long distances.

(3) *Wells fed by Percolation Tanks.*

25. Percolation tanks are not effective as feeders to wells in an alluvial tract as they are in the Deccan area. In an alluvial tract there is a regular water table and as soon as water is put on to the land it seeps into the soil and joins the water table. The water table is generally parallel to land surface and no matter in what part the water is put on the surface it reaches the table and joins the one big mass of water at one and the same level. Consequently, the location of a tank has hardly any meaning in an alluvial tract in enriching the subsoil water table because in the first instance the area itself is very flat, and consequently the water retained in the tank if it does find way into the subsoil at an appreciable rate reaches and joins the vast water table without specifically giving any special benefit to the adjoining areas. In the alluvial tracts affected by scarcity in Gujerat area open wells dug show marked salinity in a vast majority of cases. Accordingly, the effect of a surface tank as a feeder to wells only means making more saline water available and nothing beyond that. It therefore follows that a percolation tank in an alluvial area with salinity in the soil serves no purpose either as a source of drinking water supply or as a means for irrigation. The surface tanks can, therefore, serve the purpose of providing drinking water supply which is reasonably potable at least for a period of about eight months or so after which it starts getting more and more saline towards the hot weather period. Even in that period, however, it continues to serve as a useful source for drinking water for cattle for sometime and for domestic use such as cleaning of utensils etc. The utility of such surface tanks may, therefore, be considered as strictly limited to drinking water purpose only. The conditions obtaining in areas other than alluvial plain are identical with those obtaining in the Deccan. Accordingly, as a matter of policy such tanks should not be constructed as they are costlier and fail to serve adequately the purpose for which they are meant. If any surface tanks are at all to be constructed in alluvial areas they may be constructed as a double purpose bund storing water behind the bund for periods varying from two to three months for irrigation of areas below it and after emptying them for growing of wheat crop in the tank bed. These double purpose bunds have proved a success in the Viramgam taluka of Ahmedabad District where irrigation by such bunds forming a shallow tank has been practised for over forty years. The principle in utilising the water resources trapped in these shallow bunds is to take full advantage of the flooding of the tank bed which gets sufficiently soaked in a period of two to three months for taking a wheat crop after emptying the tank and making use of the water which still remains on the surface for irrigation of the area below the bund which is generally sown with paddy during the monsoon period. The duration for which the water stands behind the bund is kept to a minimum in order to avoid the heavy evaporation losses which the area cannot afford being a scarcity area with inadequate water supply. One word of caution in practising irrigation with the double purpose bunds is however necessary. Such bunds should not be constructed indiscriminately. They should only be constructed after finding out the percentage of salts in the soil and subsoil where water is to be stored and if such areas are found to be suitable to store water without adversely affecting the water spread area for growing of wheat crop during rabi. In all the flat areas of Gujerat these double purpose bunds take the place of small minor irrigation tanks. The differences between such tanks in the Deccan and those in Gujerat are :—

(1) The incidence of rainfall in the Deccan is erratic and in the scarcity areas heavy showers occur at the end of September only while the rainfall in earlier months is less. The incidence of rainfall in certain parts of Gujerat is comparatively more even making it possible to store water in such works right from the beginning of monsoon thus ensuring water supply for irrigation in areas below such works throughout the kharif period.

(2) The rainfall in the Deccan which is useful and effective is the September rainfall and when this fails, the tanks hardly get any appreciable replenishment. Consequently, they fail to serve the very purpose for which they are constructed. In certain parts of Gujerat, however, the total precipitation even in scarcity years being adequate such works get appreciable replenishment ensuring appreciable irrigation either during kharif or in rabi seasons.

(4) *Minor Irrigation Tanks.*

26. As indicated already, minor irrigation tanks in the scarcity areas in Gujerat are more effective than those in the scarcity areas of the Deccan. In Panchmahals District, for example, in the scarcity area of the Dohad Taluka, the average annual rainfall is of the order of 29.41 inches. The taluka however suffers from occasional scarcities due to bad distribution of rainfall. The minor irrigation tanks located in such an area evens out the effects of bad distribution of rainfall making water available at appropriate time for irrigation of crops which would ordinarily suffer on account of a drought. In the alternative

if the showers be heavy and unwanted these tanks serve to store water making it available for irrigation during the rabi period. This effect is equally marked in Saurashtra and Cutch which are frequented by cyclonic rains with as heavy a rainfall as 12 to 14 inches in one single day. In such case these tanks store the water which would ordinarily go waste and make it available for irrigation in the dry periods when water is needed most. In Saurashtra in a number of areas although the average rainfall appears to be more than adequate for bringing the kharif crops to maturity the distribution is not so good and rains are received in very heavy showers. In the case of a year in which the total precipitation in monsoon may be more than adequate to bring the kharif crops to maturity, in actual practice the kharif crops suffer on account of heavy downpours of rains on a single day and the minor irrigated tanks in such areas come in handy by making water available for raising a rabi crop. These tanks become more important in Saurashtra and Cutch since major irrigation works in both these regions are not generally feasible. They are of course as costly as they are in the Deccan but being the only source of protection in these parts of Cutch and Saurashtra, they are necessary as an insurance against scarcity and famine.

(5) *Major and Medium Irrigation Works providing Flow Supply.*

27. Wherever major or medium irrigation is technically feasible it is desirable to go in for such works as they give an assured water supply at a reasonably low cost of irrigation per acre. The peculiarity of the scarcity and famine areas of Gujerat, however, is that such works are not feasible in Cutch and Saurashtra which are affected most by scarcity. Medium irrigation projects which are already well on their way during the Second Five Year Plan period in Saurashtra are the only projects which are feasible. The projects in South Gujerat fed from Tapi, Narmada and Mahi are capable of serving the scarcity areas of the districts of Broach and Kaira. The high level Narmada canal which is in the stage of investigation at present is expected to serve the worst affected scarcity area of the Ahmedabad District in Viramgam, Sanand, Dholka and Dhandhuka Talukas, the southern talukas of Mehsana District, the Mehmedabad and Matar Talukas of Kaira District, the Dasada, Lakhtar and Limbdi Talukas of Surendranagar District and about 3 lakhs of acres in the little Runn of Kutch. The other projects in the north Gujerat with dependable water resources such as DANTIWADA project on Banas and the SIPU in Banaskantha District cannot reach the scarcity and famine areas of north Gujerat.

(6) *Major Irrigation Works combining Flow and Lift Irrigation from Wells within the command.*

28. In Gujerat sub-soils are generally saline and therefore no advantage can perhaps be taken of the enriched sub-soil water table on account of the surface irrigated for its reuse by pumping. Accordingly, combined flow and lift irrigation from wells within the command does not appear to be a practical proposition there.

29. In consideration of the various factors already discussed the following recommendations are made in fixing the priority of irrigation works in the scarcity areas of Gujerat :—

(1) Top priority should be given to major and medium irrigation works serving scarcity and famine areas.

(2) In areas where minor irrigation tanks are feasible with adequate depth of water stored in them they may be considered in preference to shallow double purpose bunds.

(3) Wherever possible, double purpose irrigation bunds may be constructed after careful study of the surface and subsoil salinity in the tract.

(4) In alluvial areas where subsoil salinity is not marked, excavation of wells for irrigation may be encouraged.

(5) Tube wells should be provided in areas where no other mode of irrigation is available and which being away from forests have considerable difficulty in obtaining fodder during scarcity and famine years.

(6) Percolation tanks should not be taken up as an irrigation work or as a work for feeding wells. They can only be thought of as village water supply tanks.

B. Soil Conservation and Land Improvement.

30. In view of the limited water resources of the State, the scope for major irrigation in scarcity areas is by no means large. It is, therefore, necessary to consider other protective measures for areas which have no source of major irrigation or in which major irrigation is likely to protect only a small portion of the

area affected by scarcity. In such cases, reliance has to be placed primarily on measures of land improvement which aim at preventing erosion of the soil conserving moisture for utilization in the growth of crops and adopting improved agronomic practices like dry farming and strip cropping to obtain optimum yields. Soil erosion has been a serious problem facing many parts of the country and is of special significance in this State where large areas continue to lose valuable surface soil, getting less and less productive year after year. The erosion of soil removes the absorptive top soil, making it difficult for the rain water to penetrate the less permeable layers; this tells adversely on crop growth. Soil erosion also causes problems like silting of water reservoirs and increasing damage by high floods. Under natural conditions, the top soil is protected by vegetation. It checks erosion and moisture evaporation but when the surface soil is devoid of vegetation, it succumbs to the abrasive forces of nature. Water and wind in moving across the ground surface exert such abrasive force and carry soil particles with them. The degree of erosion by water depends on the slope of the land, the amount and intensity of rainfall and the type of vegetation cover. Erosion of soil assumes different forms known as sheet erosion, rill erosion or gully erosion. Sheet erosion is the removal of these layers off the entire upper surface soil. The soil changes its colour to lighter shades as it becomes thin and goes down in fertility. This erosion is dangerous, as it is not easily noticed by farmers. Rill erosion occurs when water running along the ploughed furrows cuts deeper. Gully erosion takes place when rain water forms water courses along the fields. These water courses go on widening, scouring away the top soil and sometimes the subsoil also, making the fields unfit for cultivation. Among the important causes of erosion may be mentioned the destruction of forests and other vegetation from sloping lands, desert margins and other areas susceptible to erosion, unregulated grazing, intensive felling to obtain supplies of fuel or timber, clearance of forests for extension of cultivation under the pressure of demand for agricultural land and faulty land use practices.

31. The arid zone of the Deccan has three main types of soil—

(i) *Barod or mal land*.—30 to 40 per cent. of the total cultivated area, situated along the ridges and slopes of low hills.

(ii) *Medium soils*.—40 to 50 per cent. of the total cultivated area, situated along gentle lower slopes.

(iii) *Deep black soils*.—10 to 20 per cent. of the total cultivated area, situated in valleys of rivers.

About 80 per cent. of the cultivable lands in this zone are undulating and are subjected to erosion and run-off of rain water. Similar conditions exist in Saurashtra and Kutch, the total rainfall in these areas, however, varies from 15" to 25" and the occasional torrential rains which are a known feature there, cause violent run-off of rain water and considerable loss of soil by erosion. The undulating topography and the torrential rains cause depletion of the surface soil, due to erosion of silt, plant food and humus which are necessary for proper crop growth. It is the moisture retained in the soil which is used for the plant growth that decides the prospects of the crop. The immediate problem for the success of the crops in these areas is the conservation of moisture which is intimately linked with soil conservation.

32. A comprehensive programme of measures for controlling erosion and for improving the efficiency of the natural resources would include the following measures :—

(i) Construction of contour bunds, contour terraces, contour trenching, nalla bunding, drainage, gully plugging, etc.,

(ii) Improved cultivation practices, i.e. proper tillage, contour cultivation, judicious rotations, strip cropping, application of manures, etc.,

(iii) Afforestation and preservation of existing forests and pastures;

(iv) Regulation of land use, so that where the lands are highly eroded and practically exhausted, land may be converted from cultivation into forests, or pasture land, and restrictions put on over-grazing and shifting cultivation in hilly areas.

The nature and benefits of the more important of the methods of land improvement appropriate to scarcity areas are indicated below.

(1) *Contour Bunding.*

33. Bunding of fields for preventing soil erosion and for conserving moisture and silt has been an age-old practice adopted by Indian farmers. Sloping and undulating fields, especially for growing paddy and irrigated crops were often levelled, and big embankments were put across nalas for impounding rain water

and slit flowing down from the upper reaches. The sight of terraced hill slopes in the Konkan and Maval tracts has long been familiar. In the eastern parts of the Deccan, huge bunds known as "Tale" were generally constructed across low lying sloping land or across nalas. The technique of contour bunding is, however, recent. As the run-off from any soil surface is along the direction of the greatest slope and the velocity of running water increases with the increase of vertical distance, the contour bund is the best means of damping the run-off from the catchment as a whole at any particular level. The vertical level between two successive bunds has to be such that the velocity of run-off, and therefore the erosive power of water in its movement to the lower bund, should not have reached such proportions as to be capable of loosening up and moving the soil. The type of soil and gradient go to determine the distance between the two bunds.

(2) Nala Bunding.

34. On account of the undulating topography, small gullies and water courses are formed cutting the fields along the slopes. The nalas serve as drains in the rainy season and scour the fields by accelerating gully erosion. These gullies are naturally deeper than the surrounding fields; as a result they not only drain away the excess rain water from the fields but also deplete the fields of the underground moisture. A combined programme of bunding fields and field gullies and nalas is, therefore, necessary to conserve soil and moisture in the area. The technique of controlling erosion in areas of higher gradient is somewhat different. There contour trenches have to be combined with contour bunds to secure adequate protection.

(3) Afforestation.

35. Vegetation acts as a protective cover against the forces of wind and rain, and protects the soil particles from being swept away. Forests provide effective protection against erosion along steep slopes in hilly and mountainous area. Vegetation breaks the force of run-off water by obstructing the flow and facilitating more absorption of rain water into the lower layers of land, with consequent lessening of soil erosion. The absorbed water finds its way to the streams through the sub-soil, thus feeding the springs and streams. Afforestation of the catchment areas of large irrigation Dams helps in reducing the silting up of such reservoirs. They help in regulating the flow of water in the springs and serve as flood controls. Trees act as wind breaks and grasses bind the soil particles and hence the importance of forest shelter belts along deserts like the Runn of Kutch. Forests afford a good check on soil erosion by arresting the abrasive force of water and wind. Besides these advantages, they provide timber, fuel and grazing to local cattle. They also provide seasonable labour to the villagers and also serve as fodder reserves in emergency. The scope for afforestation in scarcity areas is, however, limited as the necessary soil and rainfall conditions for tree growth are not generally available and the cost of afforestation schemes is, therefore, high. Conditions in certain areas, however, may necessitate afforestation as there may be no other effective measure for improving the land and water resources of the area.

(4) Dry Farming and Strip Cropping.

36. The earliest attempts in evolving a technique of crop cultivation in the drier parts of the State commenced in 1933 at Manjri near Poona. The research work was intensified from 1933 onwards at the Dry Farming Research Station at Sholapur. As a result, a schedule of operations, as shown below, has been worked out on the basis of well tested research, which is described briefly as "The Bombay Dry Farming Method."

(1) Preventing run-off and erosion by developing an entire water-shed from a ridge to a valley by constructing a series of low contour bunds provided with suitable surplusng weirs.

(2) Deep preparatory tillage along contour of one-third the area every year or all the area once in three years for removal of perennial weeds and for achieving better absorption of rain waters etc.

(3) Surface tillage during monsoon for removal of weeds, conserving moisture and building up a good seed bed.

(4) Addition of small doses of organic manure to improve the physical and chemical character of the soil.

(5) Broader sowing with lesser seed rate of improved strains if possible in order to regulate the plant population for the economic utilisation of soil moisture.

(6) Interculturings for conserving moisture by mulching and stirring the surface layer.

(7) Rotations and mixed croppings to help in minimising the risk of total crop failures and in maintaining soil fertility.

(8) Contour cultivation and contour cropping.

Though the above schedule of operations and soil management is developed primarily for the cultivation of rabi jowar in the Deccan, it is also applicable to cultivation of kharif crops with slight modifications, especially in regard to items 3 and 6 above. This method of dry land crop production has been sufficiently tested and standardized for its further extension for the benefit of the farmers in the scarcity and arid zones.

37. Strip cropping is a method of cultivation which aims at a judicious combination of a cereal and pulse crops so as to economise soil and rain water and enrich the land in nitrogen. The object is achieved mainly through better cover or canopy to prevent erosion, and by a higher seed rate of the pulse crops. The strip cropping method is recommended for areas which are kharif or kharif-cum-rabi. It can also be adopted in areas which may not be suitable for bunding. Its benefits in banded areas in scarcity regions are, however, of special significance. Besides the main elements of dry farming, this method involves the commencement of sowing from the lower-most bund upwards in strips of at least 24' of cover-legume crop and 72' of erect-cereal crop, and spacing between rows of at least 12 inches in case of legumes and 18 inches in case of cereal crops. In succeeding years, strips of legume crops are shifted up so as to bring all land under legume crops once in three years.

(5) Saline Soils.

38. The saline and alkaline soils in the arid and semi-arid zone of the State present a special problem. There are large areas in North Gujarat, Saurashtra and Kutch and to some extent in the Deccan which suffer from salinity due to one or more of the following causes :—

- (1) Arid climate with greater soil depth ;
- (2) High sub-soil water table ;
- (3) Impervious sub-soil conditions ;
- (4) Irrigation water with higher proportion of soluble salts ;
- (5) Inundation of soil by sea water ; and
- (6) Saline nature of parent material.

The first case occurs on flat topography combined with heavy texture of soil. Salts accumulate in lower horizons, there is gradual preponderance of sodium salts and finally both A and B horizons get highly sodiumised and thus become compact and impervious. The instances of the second type are common in tracts of perennial irrigation where the dissolved salts rise to the upper layer and get deposited due to evaporation of moisture. The cases of third type are met with in stray patches in the Deccan. The instances of the fourth type are sometimes noticed in Khandesh and Sholapur, where well water is brackish. These are, however, very common in Gujarat and Saurashtra. The fifth case occurs in lands subjected to submergence by high tides along the sea coast. The extent of such damaged soils is great. The sixth type of saline soils are common in parts of North Gujarat, Saurashtra and Kutch. These lands were probably under the sea, some thousands of years ago. With the undulating topography especially in the Deccan and Saurashtra, the soluble products of weathering are washed away to low lying areas. These soluble products are negligible in quantity but assume significant proportions over a long period and rise upto the upper layers; during hotter months they get deposited as salts in the upper zone. In the arid region the rate of evaporation is greater than percolation of soil moisture. The decomposition processes are also more rapid due to higher temperatures. The soluble salts do not, therefore, leach out but come up to the upper zone. The soils, therefore, become base, saturated and mildly alkaline in reaction. In the event of impervious subsoil and high water table the process of salinity is accelerated. The compaction of the lower horizons takes place very easily in clayey soils.

39. Measures to deal with saline soils relate to desalinisation and adoption of agronomic practices to minimise the adverse effects of salinity. The measures must be related, in each case, to the type of salinity affecting the area. In general, desalinisation may be secured by constructing suitable embankments to prevent the encroachment of sea water, by leaching out salts through flood irrigation, by providing specially constructed drainage, by addition of gypsum to the soil and by plantation of trees like *Prosopis Juliflora*, popularly known as "Villaiti Babul". Such measures would also reduce the salinity of sub-soil water and thereby make it fit for drinking and irrigation purposes. Alongside these measures, it is necessary to evolve a suitable cropping pattern for each specific area so that crops of higher economic value and of greater resistance to salinity are deliberately fostered and the economic position of the farmers thereby improved.

40. In a programme of soil conservation and land improvement for different areas the relative importance of the foregoing measures would depend upon the soil conditions of the areas. In most of the scarcity areas which have no source of major irrigation, contour bunding is the most appropriate and the basic method of land improvement and requires to be supplemented by nala bunding and the adoption of dry farming and strip cropping methods of cultivation. The scope for afforestation is not so general and the problem of Saline Soils is confined to certain tracts. The programme of land improvement for each region has, therefore, to be prepared on a consideration of its soil and climatic conditions including rainfall.

41. As contour bunding has been done in this State for some years, its benefits are now generally recognised and in recent years a drive to cover a large area has been initiated. As this programme is of great importance to scarcity areas, the Committee has examined in some detail the data relating to the increase in yield on account of contour bunding and found the economic aspects of that programme favourable.

C. Animal Husbandry.

42. Animal Husbandry is interlinked with Agriculture all over the world and more so in India where cultivation is mainly dependent on bullock power. It is interesting to note that the best cattle in the State are to be found in the scarcity areas as shown below :—

- (1) The "Thari" breed of cattle in Kutch.
- (2) The "Gir" breed of cattle in Saurashtra.
- (3) The "Kankrej" breed of cattle in North Gujarat.
- (4) The "Khillar" breed of cattle in Sholapur.
- (5) The "Jafrabad" buffaloes in Saurashtra.
- (6) The "Mehsana" buffaloes in North Gujarat.
- (7) The "Pandharpuri" buffaloes in Sholapur.

43. The condition of cattle in the scarcity areas is, however, far from satisfactory. Apart from the fact that the farmers lack the scientific know-how of cattle breeding, there has been deterioration of existing breeds due to shrinkage and neglect of grazing areas, defective crop-planting and adverse effects of recurrent famines and scarcities. Increasing cattle population has further aggravated the problem. Cattle breeders are often compelled to migrate during scarcity years thereby causing great damage to cattle.

44. Rearing of livestock, as a means of livelihood has a special significance in scarcity areas, since crop failures are more recurrent. Cattle and poultry rearing can, therefore, be valuable subsidiary occupations. Specific measures to foster improved breeding practices and provide adequate veterinary services have, however, to be adopted along with those for increasing fodder resources.

D. Fodder Resources.

45. The production of grazing grass is largely determined by the topography, climate and rainfall of the tract. Along the Sahyadri and Satpuda hill ranges, where the rainfall is abundant, there is ample grass for grazing but this grass is not always stored by the local people with the result that there is shortage of fodder in summer months. In the scarcity areas natural grazing is scarce and hence the main source of fodder is from the stalk of cultivated cereals and pulses. Accordingly, during lean years, when crops fail or lands remain unsown, the fodder supply dwindles resulting in great hardship and loss of cattle. The transition tract is in a somewhat better position, since it has ample grass for grazing and fodders from cultivated crops and also raise succulent green fodder crops because of irrigational facilities. In the scarcity areas of Saurashtra large areas known as 'vidies' are reserved for cutting and grazing areas.

46. Our cattle population is much larger than could be adequately supported on the available land and fodder resources. Whatever fodder is available is not only inadequate but is poor in quality. The grass lands under the control of the Revenue Department and the Gochars allotted to the villages are generally in a deplorable state. These lands have become mere exercise grounds for cattle. As a result, cattle have deteriorated and become less useful for work or for milk. In the scarcity areas, the so called forest and grazing lands are devoid of good natural vegetation; and being subject to continuous erosion, produce inferior quality of fodder. It is, therefore, necessary to take specific measures for extension of cultivation of fodders, augmenting their supplies by providing storage and transport facilities and securing a rational grazing system and improvement of village grass lands.

E. Drinking Water Facilities.

47. In several scarcity areas there is lack of adequate drinking water facilities. In some of these areas conditions are specially unfavourable and sub-human conditions prevail even in normal years. This is due either to salinity of subsoil water or to inadequacy of supplies especially the hot season just before the monsoon. In spite of some efforts made in recent years to extend drinking water facilities in such areas, there are many villages which do not have a single dependable source of supply within easy reach. The condition of the people living in these villages in the scarcity areas become distressing and Government has often to supply to them limited quantities of water in tankers. It is necessary to deal with this problem immediately so that no village is left without an assured supply of drinking water. This would mean extension of the present programme of village water supply so as to cover these areas in a specified period, construction of surface tanks where subsoil water is not suitable, exploration of tube wells where potentialities for getting potable water from lower strata exist and introduction of piped water supply where subsoil water is entirely unsuitable or inadequate and no other arrangements appear to be feasible.

F. Development of Industries.

48. In several scarcity areas, even after the measures suggested for development of land and water resources are implemented, income from land is not likely to be sufficient to maintain the population at a reasonable standard of living. It is, therefore, necessary to consider how the economy of such areas could be broad-based so that a section of the population is able to earn its livelihood from industry. In most of the scarcity areas there is little or no power; the means of communication are bad; the staple crops do not offer any scope for processing; there is no forest for supply of fuel or timber; water required by industry is not easily available. It is not, therefore, easy to establish industries in such circumstances. There may, however, be some advantages also like good climate and the availability of surplus labour, but these are not likely to go far specially as labour is not skilled and normally these areas have no training facilities available. The problem of scarcity areas is related to the development of its primary resources in land and water, while industrial development generally represents a secondary stage after the primary measures have been taken. Only where some specific factors favourable for the growth of industries exist, e.g. proximity to minerals or nearness to large urban centres or cultivation of agricultural produce like cotton or groundnut which require further processing, would it be possible to expect any significant development of industry. Even if these favourable factors are found in adjoining areas, people in scarcity areas may be benefitted by opportunities of employment created nearby.

49. In considering the lines of industrial development it is necessary to distinguish between the following types of industries.—

(1) Large scale and highly modernised Plants to be located because of the availability of certain basic facilities like power and raw material.

(2) Small scale industries run on power.

(3) Industries connected with processing of agricultural produce, e.g. Sugar factory, Cotton Ginning and Pressing, Spinning and Weaving of Cotton or Wool and Oil Mills.

(4) Cottage industries including hand-spinning, hand-loom and rope making.

The Committee considers that though it is possible to make some suggestions for the development of specific industries in certain areas, it is necessary, at this stage, to stress the need for creating the necessary general conditions which will facilitate industrial development in these areas at a later stage. The role of major irrigation which leads to diversification of the cropping pattern and in particular to the growth of commercial crops which provide the industrial raw materials is most important. The other necessary measure is the extension of electric power to these areas in advance of the development of demand. In all such areas, it will take some time before an adequate commercial load can be built up and it will be necessary as a matter of development policy to lay on this essential facility so as to influence the location of industry in such areas without the exercise of any discrimination in favour of particular industries. In certain centres in or adjoining scarcity areas, there is need for rural industrial estates providing basic facilities like land, water, simple building structures etc., to any industry which is housed in such an estate.

Conclusion.

50. From the foregoing consideration of different types of development measures required for scarcity areas it is clear that the conditions in which such measures will be called for are determined by the physical resources of each region.

The broad picture that emerges is that wherever major irrigation is technically feasible, it should be given the highest priority. In the areas which have no such potentialities, soil conservation supplemented by a programme of well digging has to be undertaken, except where the nature of the soil and quality of sub-soil water are unfavourable. In the areas under irrigation there is need for wells to pump the sub-soil water and thus extend irrigation facilities to larger areas and reduce the possible damage on account of inadequate drainage. In nearly all the un-irrigated areas there is scope for extension of dry farming and strip cropping methods of cultivation, after contour bunding has been completed. The scope for afforestation as a measure of soil conservation has to be investigated by reference to detailed surveys and no general propositions regarding its relative importance need be made. The role of minor irrigation is generally less significant in the scarcity areas because of the inadequacy of rainfall. In some areas, however, where the total rainfall is adequate but the distribution is bad, there is scope for minor irrigation tanks. The irrigation tanks would, however, generally have a lower priority than the measures of soil conservation and wells. Contour bunding supplemented by a judicious wells programme offers, on the whole, a more dependable, economical and universally applicable methods of developing scarcity areas. The Committee has, however, suggested surveys of minor irrigation possibilities for areas outside the command of major irrigation projects, so that wherever suitable sites can be located and the rainfall conditions are favourable, the construction of tanks could be considered by reference to the cost involved. It appears to the Committee that the benefits of minor irrigation tanks have to be assessed by reference to the probable cost involved so that works in which cost per acre is more than the gross increase in production are not taken as development measures but only as relief measures in times of scarcity. Minor irrigation tanks are not likely to offer a large scale solution for scarcity areas and have to be taken as supplementary to the basic approach of contour bunding and irrigation wells. While these latter have to be adopted on a systematic basis so as to cover the entire scarcity areas within a specified time, the minor irrigation tanks should be regarded as a welcome addition wherever they are found practicable. The provision of adequate drinking water facilities and fodder for cattle have to be regarded as obligatory and the development of animal husbandry as an important occupation normally subsidiary to agriculture but in certain areas even more important than cultivation of land. The extension of power facilities and other measures for securing the development of industries including growth of transport have to be included in the programme to diversify the economy and give it a proper balance for ensuring a steady growth of employment and income.

51. Considering the low productivity of agriculture at present, the addition to the farmers' income to be made by any single measure of development like contour bunding, well construction and minor irrigation, though significant if seen as a percentage increase, is not likely to be very large. It is, therefore, necessary, in framing a long term programme for scarcity areas, except those which are to be served by major irrigation, to include all measures which are feasible and to arrange them in order of priority for purposes of implementation, the size of the programme being determined by the general aim of making these areas free from the recurrence of scarcity conditions. The programme has then to be phased by reference to the availability of resources in the successive. Plan periods. In areas which can be irrigated, measures have to be planned in advance so that as soon as water becomes available, the necessary conditions for its optimum utilisation are also ready. If this approach is adopted in the formulation and implementation of development programmes for scarcity areas, it would be possible to bring these areas to a stage where they could be freed from their present insecurity and enabled to share in the general programmes of development.

CHAPTER VI.

DEVELOPMENT PROGRAMMES AND POLICIES—GENERAL.

The study of the scarcity conditions prevailing in the Bombay State has shown that of the 43 districts of the present Bombay State, 20 are affected by chronic scarcity. The total number of talukas affected, including 15 affected only in part, is 103; of these 20 talukas are scarcity areas of class 'A' and suffer a failure of crops about once in three years; 40 talukas are considered scarcity areas of class 'B'; these are seriously affected about once in six years. The remaining talukas of class 'C' are affected about once in ten years. Of the 20 districts affected, 5 in the Poona Division, and 3 in the Aurangabad Division, are in Maharashtra and 6 in Rajkot Division and 6 in Ahmedabad Division, are in Gujerat. The scarcity areas consist mainly of two large blocks of territory. The one in the south is a fairly contiguous tract covering almost the entire Ahmednagar and Sholapur districts, the eastern parts of Poona, North Satara and South Satara districts, and the western parts of Aurangabad, Bhir and Osmanabad districts. The other is in the north and includes the western parts of Banaskantha, Mehsana, and Ahmedabad districts, the entire Kutch district and several areas, not completely contiguous, in Saurashtra lying mainly on the north and eastern sides of the Peninsula.

2. The total area which in the opinion of the Committee is affected by chronic scarcity in the Bombay State is 42,163 square miles. Of this, 12,026 square miles are classified as 'A', 14,568 square miles as 'B' and 15,569 square miles as 'C'. The total population of these areas is estimated at about 76 lakhs, of which about 14 lakhs are in areas classified as 'A', about 28 lakhs in areas classified as 'B' and the remaining 34 lakhs in areas of class 'C'. The scarcity areas thus cover an area which is about 22 per cent. of the area of the whole State and include about 15 per cent. of the total population of the State.

3. The development programmes suitable for scarcity areas are indicated under the following broad heads :—

- (1) Major and Medium Irrigation.
- (2) Soil Conservation and Land Improvement.
- (3) Wells and Minor Irrigation Works.
- (4) Animal Husbandry and Fodder Development.
- (5) Drinking Water Facilities.
- (6) Extension of Power and Development of Industries and Transport.

I. Major and Medium Irrigation.

4. The Committee has considered the various possibilities of protecting scarcity areas by major irrigation and assessed the water resources available for the purpose. The importance of major irrigation as a protective measure for scarcity areas was first recognised in the State during the sixties of the last century and works were constructed to serve the scarcity areas in the Deccan. When the Irrigation Enquiry Committee appointed by the Government of Bombay reported in 1938, it referred to six major works in the State, consisting of canals on the Nira Right Bank, the Nira Left Bank, the Mutha, the Pravara, the Godavari and the Girna. Of these, the Nira Right Bank Canal, completed in 1926, was the last major work till the beginning of the First Five Year Plan in 1951. In the words of the Committee, "The canal systems of the Deccan were primarily designed to protect the country against famine and they have succeeded in doing so in the areas served by the canals. The very great fall in the expenditure on famine relief since the opening of the canals can very reasonably be attributed to their existence and to the protection which they have afforded to those parts of the country against famine. It has also been ascertained that in 1933-34 on the Pravara and Godavari canals alone nearly 44,000 acres were cultivated and, thanks to the existence of irrigation they produced crops worth approximately Rs. 36 lakhs. But for irrigation these crops would not have been worth more than about Rs. 8 lakhs. Such data prove conclusively the protective value of these irrigation systems."* That Committee also examined the financial position of these works and came to the conclusion that the Nira Right Bank Canal had been a serious handicap to the financial success of irrigation in this province and that the remaining five had functioned fairly satisfactorily.

* Report of the Irrigation Inquiry Committee appointed by the Government of Bombay—1938, page 5.

5. In recent years the value of irrigation works in the Deccan has been enhanced due to the suitability of most of the areas benefitted by such irrigation for the growth of sugarcane and consequent development of the sugar industry. The high yields of sugarcane after irrigation compared to the very low productivity of the soil before irrigation has emphasised the productive value of these works. In the Report on the survey of the Direct and Indirect Benefits of the Godavari and Pravara Canals conducted by Professor D. R. Gadgil, Director, Gokhale Institute of Politics and Economics, Poona, for the Government of Bombay in 1939 and 1940, it is observed, "Broadly our survey shows that the construction of the canal system made possible an increase in the size of agricultural business from the neighbourhood of an average of Rs. 650 in a typical dry unit to roundabout Rs. 1,500 under second class irrigation and to Rs. 4,000 in intensive irrigation dominated by sugarcane."* Prof. Gadgil has further analysed the various benefits accruing to the economy as a result of the change over from dry to irrigated farming and reached the following conclusions regarding increase in revenue returns, investment and employment; "The private investor can employ no test of financial success other than the rate of net return on his investment. The State is differently circumstanced. The investment policy of the State could be determined from a point of view broader than that of the direct net return on investment. It is possible for the State to obtain financial benefits which would not be counted in as investment income. Apart from the income from direct water charges from an irrigation project, the various State authorities may derive an income through other sources of revenue which is related to the irrigation work almost as directly or only a little less directly. Thus, as we have seen in Part II, the carrying of the larger traffic consequent on irrigation or the income from income and other taxes derived from the expansion of outlay and income after irrigation, are returns to State which should be counted in as returns on the public investment. In this connection it would also not be correct to treat the amount of tax income derived by any one organ of Government as alone constituting the whole return. The division of the sources of revenue is a matter of constitutional or administrative convenience. From the point of view of the community at large the tax incomes of all state authorities are on an equal footing and must all be included in the calculation."†

"It is permissible to adopt an even more comprehensive point of view when talking of the State as a whole or of economic society in general. After the depression of the thirties it was urged in many countries of the world that an investment by the State which had an expansionary effect, even temporarily, was to be welcomed. We are here concerned not with a temporary phenomenon but with one which has continuing and long term effects; and it is legitimate to take account of considerations relating to the dynamics of economic society in judging of the long term effect of the investment policy of a State analogous to short term considerations during depression. Thus investment which results in correcting certain fundamental defects, as that of a lack of balance in economic society, may be worth-while even though its direct financial return is deemed inadequate."‡

"The measure of success of an irrigation work has also to be judged in relation to the opportunities created for employment of capital and labour resources. The expansion caused by public investment may lead to a diversion of resources and labour from one employment to another or to the employment of unemployed or under-employed resources and labour. The measure of communal benefit will thus depend on the degree to which labour and capital resources were previously under-employed or employed in a manner distinctly less remunerative than those available after the public investment. In an economy like that of the Bombay Deccan where under-employment of labour, livestock and other resources is notoriously chronic, the effects of such investment must act in a specially beneficial manner, much more so than they would in a richer tract with less part-time idle labour."§

6. In demarcating the chronic scarcity areas in the Deccan, the Committee found that wherever major irrigation had been introduced the areas were completely protected from scarcity and offered valuable opportunities of seasonal employment to the population of adjoining districts as well.

7. Outside the Deccan, major irrigation received attention only after the attainment of Independence and particularly after the advent of the First Five Year Plan. In Gujerat a start was made by the irrigation scheme on the Mahi

* Report of a Survey of the Direct and Indirect Benefits of the Godavari and Pravara Canals, page 54.

† Ibid., Pages 173-174.

‡ Ibid., Page 174.

§ Ibid., Pages 174-175.

Right Bank Canal. This was followed by the Kakrapar Scheme on the Tapi. Besides, a programme of medium irrigation works for scarcity areas was taken up in the last two years of the First Plan on the recommendations of a team of Government of India officers headed by Shri S. V. Ramamurthy, Adviser, Planning Commission. In the Second Plan, provision was made for the completion of these schemes and for taking up the Ukai Project on the Tapi and starting the projects relating to Narbada and Sabarmati. Though these schemes were not meant for scarcity areas, they are expected to benefit scarcity areas as well. In Kutch and Saurashtra a number of medium and minor irrigation works were started during the First and the Second Plan periods, as there was no scope for major schemes. There was no major irrigation work in Marathwada, except the Purna included in the Second Five-Year Plan which is in progress. It is, however, expected to serve the eastern districts which have not been considered as chronic scarcity areas.

8. Surveys of the possibilities of major irrigation in the Deccan had been made in the past. There was a general survey of irrigation schemes in 1905 by Col. Beale. Later, Mr. C. O. Lowsley, Special Engineer, made a survey in some districts. As a result of the special programme of works for scarcity areas recommended by the team of Government of India officers already referred to, certain medium and minor irrigation schemes of which the most important was Ghod, were started. In the Second Plan a larger programme was included to provide for the schemes relating to completion of Ghod and new projects like Mula, Khadakvasla and Vir. There was, however, no comprehensive survey of the total water resources available in the basins of the four main systems which serve these areas—the Girna, the Godavari, the Bhima and the Krishna. This gap has been filled by the studies recently undertaken by the Water Resources Investigation Circle established by the P. W. D. in 1957. The data collected by this Circle is being utilised by Government in the preparation of the Third Plan and has also been of considerable assistance to the Committee in preparing a long term programme of development. According to this, the following major and medium schemes would benefit the scarcity areas in the various regions indicated below:—

Name of the Scheme.	Total water resources which could be utilised. Mcft.	Total estimated cost. in lakh Rs.	Total acreage to be irrigated.	Scarcity areas to be served.	Acreage to be irrigated in the scarcity areas.	Remarks.
1	2	3	4	6	6	7
(1) POONA DIVISION.						
<i>Bhima Valley.</i>						
1. Tank at Nazare on Karha river.	770	49.0	7,700	District Poona— Baramati	.. 7,700	
2. Tank at Burhanpur on Karha river.	1,415	80.4	14,150	Do.	14,150	
3. Natanbi Storage on Nira river.				District Sholapur—		
	69,000			Malsiras	.. 49,050	
Mohori storage on Gunjavani river.	—47,500	2109.0	2,04,538	Sangola	.. 35,188	
	21,500			Pandharpur	.. 78,300	
Utilization ex-Vir. Deduct existing utilization of Bhataghar and Vir storages.				Mangalwedha	.. 42,000	
					2,04,538	
4. Warasgaon storage on Ambi and extension of Mutha Canal. Deduct for existing storages Khadakvasla and Panset.	37,370 —21,600 15,670	753.0	1,18,800	District Poona— Haveli Baramati Indapur N. L. B. C	.. 2,600 .. 8,250 .. 75,150 .. 32,800	1,18,800
5. Storage on Bhima at Chaskaman.	13,850	628.0	76,200	District Poona— Sirur Dhond Haveli	.. 38,100 .. 16,260 .. 10,900	65,260

Name of the Scheme.	Total water resources which could be utilised. Mcft.	Total estimated cost. in lakh Ra.	Total acreage to be irrigated.	Scarcity areas to be served.	Acreage to be irrigated in the scarcity areas.	Remarks.
1	2	3	4	5	6	7
6. Paragson Lift Irrigation Scheme on Bhima River.	6,260	222.8	35,000	District Poona— Dhond ..	35,000	
7. Ujjani Lift Irrigation Scheme on Bhima River Stage I	24,360	697.12	1,36,200	District Sholapur— Madha .. Pandharpur .. Mohol .. South Sholapur ..	11,600 76,050 23,050 28,250	
					1,36,200	
8. Ujjani Lift Irrigation Scheme Stage II.	15,030	548.9	84,000	District Sholapur— Madha .. Mohol ..	11,200 72,800	
9. Kukadi Project— (a) Kukadi at Manikdol.				District Poona— Sirur ..	16,600	
10. (b) Mina at Wadgaon (c) Ghod at Mahalunge. (d) Kukadi at Kandli near Pimpalwandi.	42,422	3,116	2,87,100	District Ahmednagar— Parner .. Shrigonda .. Karjat .. District Sholapur— Karmala ..	32,300 74,000 62,500 76,800	
					2,62,200	
11. Sina at Nimbgaon Gangurde.	2,033	139	19,000	District Ahmednagar— Karjat ..	19,000	
12. Sina at Kolegaon.	4,500	229.5	45,000	District Sholapur— Karmala .. Madha .. Barshi .. District Osmanabad— Parenda ..	6,150 7,500 4,000 27,350	
					45,000	
13. Khatagaon storage on Karmi river.	481	40.01	5,800	District Sholapur— South Sholapur ..	4,550	
14. Dahitna Storage on Bori river:	2,450	152.20	10,000	District Sholapur— Akkalkot .. South Sholapur ..	7,000 1,000	
					8,000	
15. Storage on Vel at Kendur.	400	28.00	4,000	District Poona— Sirur ..	4,000	
16. Irrigation Tank at Bhalwani.	110	7.40	1,100	Taluka— Ahmednagar ..	1,100	
17. Irrigation Tank at Akola	198	9.67	2,220	District Sholapur— Madha ..	2,220	
18. Irrigation Tank at Padwalkarwadi.	122	6.50	1,760	District Sholapur— Mangalwedha ..	1,760	
<i>Krishna Valley.</i>						
19. Yeralwadi Project.	1,600	125.00	14,000	District North Satara— Khatav .. District South Satara— Khanapur ..	5,000 9,000	
					14,000	
20. Ramapur Project.	3,000	200.00 Appr.	48,280	District South Satara— Khanapur ..	2,300	
<i>Godavari Valley.</i>						
21. Adhala Mahalungi Scheme.	1,590	118.00	7,150	District Ahmednagar— Sangamner ..	6,650	
Total for Poona Division.	1,57,761	9,259.49	11,21,998		10,36,228	

Name of the Scheme.	Total water resources which could be utilised. Mft.	Total estimated cost. in lakh Rs.	Total acreage to be irrigated.	Scarcity areas to be served.	Acreage to be irrigated in the scarcity areas.	Remarks.
1	2	3	4	5	6	7
(2) AURANGABAD DIVISION.						
1. Upper Godavari Project Part II Stage I. (extension of G. L. B. C.).	30,000	791.16	2,11,000	District Aurangabad— Vaijapur .. Gangapur ..	44,500 1,06,900	
					1,51,400	
2. Jayakwadi Project, Stage I (Sindphana Project).	9,000	371.71	44,550	District Bhir— Manjalgaon ..	44,550	
Total for Aurangabad Division.	39,000	1,162.87	2,55,550		1,95,950	
(3) AHMEDABAD DIVISION.						
1. Barrage on Sabarmati at Fatewadi.	10,000	112.0	9,200	District Ahmedabad— Sanand .. Dholka .. Virangam ..	15,000 29,500 7,000	This is to stabilize irrigation on Moti Phatewadi.
					51,500	
2. Sabarmati Project. (Dharoi Storage).	36,800	1,312.3	2,71,000	District Mehsana— Kalol .. Kadi ..	74,500 20,000	Appr.
				District Ahmedabad— Sanand ..	10,000	
3. High Level Narbada Canal Project Stage I.	2,70,000 Appro.	3,286.86	9,97,500	The following talukas which are affected by scarcity will be commanded and the area excluding the existing command can be benefitted under this Scheme.		
				District Kaira—		
				Mehmedabad ..	....
				Matar ..	....
				District Ahmedabad—		
				Dholka ..	....
				Sanand ..	....
				Virangam ..	....
				District Mehsana—		
				Kalol ..	....	This canal can further be extended to Sa urashtra where Part of Lakhtar taluka, almost the whole of Da s a d a taluka and a small portion of L i m b d i taluka of S u r e n d r a n a g a r District can be commanded. The canal can further be extended to the little Rann of Kutch where about 3 lakhs of acres can be irrigated. The details are however yet to be studied.
Total for Ahmedabad Division	3,16,800	4,711.16	13,60,500		1,56,000	

Name of the Scheme.	Total water resources which could be utilised. Mcft.	Total estimated cost in lakh Rs.	Total acreage to be irrigated.	Scarcity areas to be served.	Acreage to be irrigated in the scarcity areas.	Remarks.
1	2	3	4	5	6	7
(4) RAJKOT DIVISION.						
1. Dhond Irrigation Scheme.	163	12.5	1,800	District Jamnagar— Kalyanpur ..	1,800	
2. Bagad Irrigation Scheme.	540	38.00	5,200	District Bhavnagar— Mahuva ..	3,400	
3. Khari Irrigation Scheme.	220	19.51	3,500	District Surendranagar— Halvad ..	3,500	
4. Chandrabhaga Irrigation Scheme.	200	15.00	2,250	District Surendranagar— Dhrangadhra ..	2,250	
5. Sukh Bhadar Irrigation Scheme.	1,750	100.00	15,000	Sayla Limbdii ..	1,000 3,700	
				District Bhavnagar— Botad ..	1,400	
				District Ahmedabad— Dhandhuka ..	8,900	
					<u>15,000</u>	
6. Tapar Irrigation Dam and Canal Project.	600	25.00	9,240	District Kutch— Anjar ..	9,240	
7. Kalaghoda Irrigation Dam and Canal Project.	260	16.00	3,885	Mundhra ..	3,885	
8. Jagandia Do.	570	30.00	8,557	Abadasa ..	8,557	
9. Nara Irrigation dam.	609	30	9,135	Lakhpat ..	9,135	
10. Juna Do.	160	12	2,200	Khavda ..	2,200	
11. Mathal Do.	180	12	2,730	Nakhtrana ..	2,730	
12. Adhoi Do.	190	12.35	2,900	Bhachhu ..	2,900	
13. Khedoi Do.	..	....	..	Anjar ..	2,573	
14. Chhawad Do.	..	....	....	Nakhtrana ..	13,335	
15. Bhujinath ..	..	....	....	Do. ..	6,720	
16. Aral ..	..	....	....	Do. ..	1,470	
17. Kharadia Scheme	..	....	....	Do. ..	1,470	
18. Godaputad Scheme	..	....	..	Do. ..	1,155	
19. Chok Scheme ..	..	....	....	Abdasa ..	1,200	
20. Ghodhtad Scheme	..	....	....	Lakhpat ..	7,665	
21. Ber Scheme ..	..	....	....	Do. ..	1,512	
22. Karuda Dabunda Scheme.	..	....	....	Rahapar ..	1,155	
23. Kaswati Scheme	..	....	....	Bhuj ..	1,595	
Total ..	5,442	322.36	66,397		1,06,800	

9. As the schemes shown in the foregoing tables would serve scarcity areas, the Committee considers that these schemes should be accorded high priority and started as early as possible. A special mention may also be made here of the scope for tube wells in North Gujerat. In the First Plan a programme for construction of 400 tube wells was included and 339 wells were completed. A further programme has been undertaken in the Second Plan. Unfortunately, the problem of scarcity areas in Gujerat which have possibilities of underground water is complicated by the salinity of the water. There may, however, be some possibilities of striking sweet water which should be fully explored. The Committee has, however, no data to prepare a specific programme for these areas.

10. The Committee has considered how the programme of major and medium irrigation should be phased. As the scarcity areas have been exposed to repeated failures of crops for a long time their economy today is precarious and it is necessary to make up for lost time by starting major irrigation works as early as possible. Several years would be spent on the construction of these schemes and for securing the full utilisation of their waters. Considering, however, the schemes already in progress which are required to be completed in the Third Plan period and the need for phasing the programme regarding the new schemes in view of the financial and technical resources likely to be available, it recommends that the schemes intended to benefit scarcity areas which have been completely investigated should be taken up in the Third Plan period. Preparatory work on schemes which have not yet been completely investigated and which have, therefore, to be postponed to the Fourth Plan should be started early.

11. In connection with the programme of irrigation, the Committee would like to invite attention to one important aspect. In accordance with the 1951 Inter-State Agreement, the Bombay State is entitled to a total utilisation of 284 TMC of Krishna Water on the existing works in 1951 and works under construction and undertaken thereafter. The State has already operated on the allotted quota to the extent of 228 TMC leaving a balance of only 56 TMC for utilization on all new projects to be undertaken in the Third and subsequent Five Year Plans. Of these 56 TMC, 41 TMC are essentially required for utilization on the Koyna Irrigation for which storage is already being built, leaving a meagre balance of only 15 TMC for utilization in the scarcity areas of Krishna valley. For proper development of the scarcity areas in the Krishna (including Bhima) valley, the State requires about 200 TMC including about 40 TMC for minor irrigation, for which investigations have been made and projects are ready. Against this requirement of 200 TMC, the balance available is only 15 TMC, which means that a vast area affected by scarcity and famine will remain unserved unless steps are taken to revise the 1951 Agreement and make more supplies available for giving relief to the chronic scarcity and famine areas in the Krishna valley.

12. Along with the construction of irrigation works it is necessary to adopt measures to ensure that the benefits of irrigation are utilised in the scarcity areas without unnecessary loss of time. Past experience in this respect shows that it might take as long as 25 to 30 years for major irrigation to develop. In scarcity areas where the demand for water is expected to be most pressing, the transition from dry to irrigated farming would take long unless the preparatory stages involved in effecting such a transition were adequately anticipated and planned in advance.

13. The problem of water utilisation on minor irrigation works was recently investigated by Shri D. A. Gadkari, then Additional Development Commissioner and now Director of Minor Irrigation. The suggestions made in his report would cover the problems of scarcity areas as well, so far as minor irrigation is concerned. The irrigation potential created by the construction of minor irrigation tanks in scarcity areas is not at present utilised fully. The main difficulty in utilisation is said to be the short-sightedness of the farmers in the irrigated commands. These farmers generally prefer to gamble for rains and demand water for irrigation when the rains actually fail but refuse to derive the benefit of irrigation in years of normal rainfall. In order to ensure full utilisation of water potential, the Committee recommends that a consolidated assessment on lands which can derive irrigation benefits in normal years be levied. The Committee would also like to invite attention to the following measures which appear to be necessary for securing speedy utilisation of water from major irrigation projects. Some of these have already received attention but would have to be borne in mind in future :—

- (1) It should be ensured that the projects are planned in such a way as to synchronise the construction on the storage, pick-up-weir and the irrigation distribution system. The distribution systems should be completed block-wise from head to tail so that canal water could be supplied as construction proceeds.

(2) The difficulties of agriculturists having to construct water courses of considerable length should be eliminated. It is understood that Government has already laid down the design criteria of water courses to be constructed by the irrigators, in accordance with which no field would normally be more than half to one mile distant from the Government outlet supplying water to the field and the capacity of individual water courses is to be limited to one to one and a half cusecs.

(3) Areas in canal commands have to be levelled so that they could receive irrigation. This work needs both finance and mechanical equipment for which adequate provision should be made.

(4) Irrigated farming will necessitate a radical change in the cropping pattern. As conditions vary considerably from area to area, research is required to be undertaken in advance to evolve a suitable cropping pattern for each area. It is also necessary to conduct experiments on irrigated crops for finding the water requirements, intervals of watering, periods of sowing, doses of manures, etc. For this purpose, experimental farms followed by demonstration farms have to be planned for different areas.

(5) Altogether much larger investment of labour and capital per acre is involved in irrigated farming, it is, therefore, necessary to make special provision for credit facilities in these areas. The necessary supplies of improved seeds and fertilizers should also be ensured.

(6) As the benefits of irrigation are not firmly established in the initial years, it is necessary to provide for concessional water rates in the first few years. Government has recognised the need for it and fixed the following concessional rates.

Food Grains and Fodder Crops.

1st year	...	No water rates.
2nd year	-	.. 1/3 of the normal water rates.
3rd year	...	... 2/3 of the normal water rates.
4th year	..	Full normal rate.

Other crops.

1st year	..	1/2 of the normal rate.
2nd year	...	Full normal rate.

These concessional rates have been made applicable both for canal irrigation and tube well irrigation, on all works or sections of works opened for irrigation, on or after 15th June 1955 or in the case of extensions to old irrigation works on all new areas where water became available for the first time on or after 15th June 1955.

(7) In some areas major irrigation is likely to raise problems of water-logging and salinity which would adversely affect the economy of these areas. A programme of irrigation wells to lift sub-soil water has already been recommended. Other measures to provide adequate drainage would have to be ascertained by reference to local surveys.

II. Soil conservation and Land Improvements.

14. The development measures under this head include the following :—

- (a) Contour bunding,
- (b) Nala bunding,
- (c) Dry Farming and Strip Cropping,
- (d) Afforestation, and
- (e) Saline Soils.

(a) Contour Bunding.

15. In the absence of any systematic soil survey, the Committee has been able to make only a broad estimate of the areas suitable for contour bunding in the talukas affected by scarcity. A statement indicating the area bundable in each district and taluka, the area already banded by about March 1959, and the area likely to be banded by the end of the Second Plan period is given in Appendix VII. Taking into account the area likely to be covered by major irrigation projects, etc., the scope for bunding in the Third and subsequent Plan periods in the scarcity areas is estimated by the Committee at about 60 lakhs acres.

16. Though the contour bunding programme in this State has been under way for a number of years, it is only recently that the programme has been expanded. This will be seen from the following figures :—

Year.	Acres contour bunded.
1942-43	1,476
1943-44	5,103
1944-45	41,116
1945-46	54,136
1946-47	43,250
1947-48	2,487
1948-49	1,112
1949-50	1,644
1950-51	22,593
1951-52	54,173
1952-53	94,423
1953-54	2,38,312
1954-55	59,909
1955-56	99,107
1956-57	85,994
1957-58	1,26,847
1958-59	2,55,428
Total	12,61,994

17. As this is a programme which is intended for dry areas, the Committee considers that it should be concentrated in areas which are precarious from the point of view of scarcity. The size of the programme in the Third and subsequent Plans should be stepped up. This should be possible as a result of the additional facilities for training of staff already initiated. The bunding programme for scarcity areas should be spread over the next two Plan periods; of this, an area of 30 lakh acres should be completed in the Third Plan. A detailed programme for each district and taluka should also be drawn up. The Committee considers that in talukas which are expected to have about 20 per cent. of the area under major irrigation, it should not be necessary to provide for contour bunding in the unirrigated portion of these talukas in the Third and Fourth Plans, as these areas will get adequate security from major irrigation. The talukas which have no prospect of receiving major irrigation even in part, should, however, be given priority after taking into account the scope for bunding available in each taluka, its gradation as a scarcity area and the severity of the problem of soil erosion in and around the area. Though most of the scarcity areas would benefit by a programme of contour bunding, no data on basic items like soil characteristics and type and severity of erosion are available. It is, therefore, necessary to have a rapid survey of the areas liable to erosion so that areas which show a higher rate of erosion or where erosion has already caused considerable damage are given priority. In such a survey, which will have to be of a reconnaissance type, soils which have the same liability to erosion should also be distinguished from the point of view of their depth and quality so that the better soils are protected first. In the talukas affected by scarcity where irrigation per well is low, contour bunding should be given priority as it would bring more area under irrigation even from existing wells.

18. The Committee would also like to invite attention to the following aspects of this programme :—

(1) There should be a close liaison between the soil conservation and irrigation authorities to see that areas which are likely to receive benefits of major irrigation in the future are clearly demarcated and not taken up for contour bunding.

(2) There is need for a more intensive study of local conditions in different areas and for adoption of suitable variations in bunding methods to meet their requirements. If the extension of contour bunding to large areas with varied soils and climate conditions is to succeed, the need for research in techniques, etc., at a Central Institute like the Central Engineering Research Institute at Nasik must be immediately recognised.

(3) Looking to the size and importance of the programme, it is necessary to build up specialised personnel trained in different aspects of soils and soil conservation methods so that a higher degree of technical attainment becomes available. For this purpose, necessary changes should be carried out in the curricula of University courses in Agriculture and Engineering.

(4) As large areas get contour bunded, there will be need for a follow-up programme to ensure the maintenance of the bunds in proper condition and the supply of technical information and advice to meet the requirements of the farmers.

(5) The programme of contour bunding should be accompanied by the plantation of castor or agave on major bunds on a systematic basis. This could be achieved by supply of necessary seedlings at the appropriate time, if necessary, on a subsidy basis.

(b) *Nala Bunding.*

19. The Committee has examined the need for a nala bunding programme in the scarcity areas, but has not been able to estimate the size of the programme which could be undertaken and the precise manner of its implementation. This is due to the fact that so far nala bunding has been done only on a small scale at a high cost by well-to-do farmers on their own lands for which Government has given them tagai advances. It has been suggested that it would not be possible to secure full benefit from the programme of contour bunding unless the nalas separating different parts of a catchment are also bunded. Such bunding, it is claimed, would benefit adjacent lands by conservation of moisture and also reclaim the land in the nala bed. The Committee considers that the cost of such nala bunding would be much higher than that of contour bunding. It is, therefore, necessary to make a close study of the benefits of such bunds on the soil and moisture conservation in adjoining fields and on the reclamation of land in the bed of the nalas, to determine the approximate ratio of cost to benefit. The technical aspects of the construction of such bunds also require investigation as putting up ordinary bunds may not be suitable in all cases. The Committee would, therefore, suggest that such investigation should be undertaken and the benefits of nala bunding should be compared with the cost in a few selected areas before a general programme is framed.

(c) *Dry Farming and Strip Cropping.*

20. The dry farming and strip cropping methods of cultivation have been developed for the special needs of areas which suffer from lack of adequate moisture and are subject to erosion, and should, therefore, be extended to all scarcity areas. The progress so far made in the adoption of these methods has been negligible in comparison with the total area to be covered. Up to 1957-58, an area of 13,180 acres only was under large scale demonstration trials. No data regarding the area covered under this method outside the demonstration plots is available. The adoption of these methods is primarily a problem in extension supplemented by suitable research to solve local difficulties. In order to get quicker results, the Committee would recommend that one taluka, preferably contour bunded, in each district affected by scarcity be selected for an intensive campaign and the entire area therein covered within a specified time limit of about five years. This will necessitate strengthening of staff, provision of dry farming implements at concessional rate in the initial period and supply of phosphetic manures for legume crops at reasonable rates.

(d) *Afforestation.*

21. The measures necessary to secure afforestation in scarcity areas vary considerably from area to area and may be grouped as follows :—

(1) In the areas adjoining the Runn of Kutch and the desert of Rajasthan, the problem of afforestation is primarily one of having a protective belt of vegetation, to act as a wind break, to stop erosion of interior areas and to assist in reducing the salinity of the soil. Such a belt is being established along the border of Rajasthan in the districts of Rajkot, Surendranagar, Mehsana and Banaskantha. A similar problem also exists along the sea shore of Kathiawar, Kutch and Gujerat. The existing scheme of immobilisation of the Rajasthan desert and Kutch should be completed early. The question of having a similar forest belt along the sea coast of Saurashtra to protect the interior areas from erosion with velocity and inundation by sea water should be investigated.

(2) In large areas in North Gujerat, Saurashtra and Kutch, there is the problem of saline soils. Afforestation would help in reducing salinity of the soil besides improving its physical properties. A regular programme of planting these barren lands with Vilaiti Babul (*Prosopis Juliflora*) should be undertaken on a planned basis. It is suggested that sizeable blocks varying between 200 to 500 acres in Government waste lands should be planted with these trees. In the Third Plan, the aim should be to have one such block in each of the scarcity talukas affected by salinity. Similar programmes should be prepared for the next two plan periods in the light of experience.

(3) In North Gujerat and Saurashtra where the hills have been denuded of forests due to excessive felling, over-grazing, etc. afforestation of hill sides appears to be necessary to conserve soils and moisture in the catchment areas and to protect cultivated areas in the plains. Afforestation is perhaps the only permanent measure applicable to steep slopes where low lying fields have to be protected against torrential rains bringing debris from the steep slopes as in the case of certain parts in Saurashtra. The extent which such a programme would be feasible, would depend on a survey of the soil and the rainfall conditions in each area so as to estimate the cost of such measures. It is evident that all such areas cannot be re-forested as some of these cannot support any forest and in some the cost would be prohibitive. Forests do not occur naturally where annual rainfall is less than 15". The annual rainfall in several parts of North Gujerat, Kutch and Saurashtra is inadequate. The Committee considers that surveys of these areas should be initiated and afforestation schemes, which are considered feasible as a result of these surveys, taken up.

(4) In the Deccan the problem of soil erosion is especially acute in the hill sides and the river valleys. Such areas form the upper ridges of catchment of irrigation tanks or form parts of catchments which are proposed to be contour-bunded. These hills require protection either by plantation of suitable trees or other measures of soil conservation. Detailed surveys would, however, be required before the nature and size of the programme could be estimated. A valuable survey has recently been made by a non-official agency in regard to a part of the Ghod valley in the Deccan. This is contained in the Report of the Technical Sub-Committee of the Maharashtra Central Famine Relief Committee entitled "Report of the Survey of Ghod Valley" (A Pilot Plan for preventing scarcities and famines and for maximum utilisation and development of land and water resources of river valleys in the Bombay Deccan.) The findings of this Survey should be utilised by the Forest authorities to prepare concrete schemes of afforestation in this area. The Forest Department should also be asked to carry out similar surveys for valleys of other rivers which serve the scarcity areas. Provision should be made in the Third Five-Year Plan for such surveys and for starting afforestation in the areas for which surveys are completed.

(5) In all scarcity areas there are large tracts which are blank and arid and where afforestation would be desirable from the point of view of conservation of soil and moisture and the provision of fodder and fuel. The cost of afforestation in such areas would, however, normally be very high. The Committee would recommend the afforestation of a few selected areas where conditions appear to be favourable and the preparation of programme of subsequent plans in the light of the experience acquired.

(6) In most scarcity areas the plantation of agave could be undertaken on a large scale. It is well-known that agave grows very well under arid conditions. It does not need any protection from cattle and can stand well even on partly rocky and murum lands. Its usefulness as a source of raw material for rope-making is also considerable. In order to protect the area against erosion thick belts of agave along contour bunds have already been suggested. Where large blocks of arid land are lying waste they could be cultivated with agave.

(7) There are large areas which are included in the category of Revenue Forests and un-classified forests. The areas have lost their original form and are no longer forests in any real sense. It is necessary to improve these areas and develop them according to their potentialities into regular forests, shrub forests or as grass lands. For this purpose, such revenue forests would have to be transferred to the care of the Forest Department, except for areas which are less than 100 acres and which are near the village sites and could, therefore, be transferred to Gram Panchayats. The development of these areas according to their potentialities should be fostered in line with a general programme for all areas.

(e) *Saline Soils.*

22. Measures to deal with the problem of saline soils in scarcity areas have to be devised for three distinct types of soils in the State—

- (1) The saline and alkaline soils of North Gujerat and Saurashtra bordering the Rann of Kutch ;
- (2) The saline soils in the arid zone of the Deccan ; and
- (3) The areas under major irrigation in the Deccan in which the problem of salinity arises after the area is irrigated.

23. The desalination measures appropriate for each of these areas are indicated below :—

(1) *North Gujerat and Saurashtra.*—The saline and alkaline soils in North Gujerat and Saurashtra constitute a serious problem, specially as not only is the soil saline, but the sub-soil water is also saltish. The principal measures for improving these soils are :—

(a) Prevention of encroachment of sea water into the little Rann of Kutch by constructing suitable embankments or dykes ;

(b) Storage of flood waters of rivers like Manas, Saraswati and Narbada for irrigation and for leaching out salts ;

(c) Leaching by sweet water from the tube wells, specially soils having high calcium content ;

(d) Addition of gypsum along with irrigation and drainage ;

(e) Plantation of "Vilaiti Babul" (*Prosopis Juliflora*) in areas having more than 1 per cent. soluble salts ; and

(f) Construction of a chain of small tanks along the available water sheds and small rivulets in order to reduce salinity in the surrounding areas and to give sweet water in "Virdas" shallow wells in and around tank beds, for providing drinking water.

(2) *The Deccan Arid Zone.*—The problem in this part is less acute and is confined to a few areas. It could be effectively met by bunding and plantation of salt tolerant trees like "Vilaiti Babul" or *Prosopis Juliflora*.

(3) *Irrigated areas in the Deccan.*—The problem in this area is mainly one of providing drainage to good soils in the areas to be benefitted by irrigation in future. The various measures which deserve consideration are :—

(i) Conducting a soil survey on grid pattern and locating the zones fit for perennial and seasonal irrigation.

(ii) Providing surface pizar drains in order to avoid water-logging of areas and to keep down the general water tables.

(iii) Providing sub-soil drainage in areas which have saline sub-soils with hard pans.

(iv) Restricting the proportion of perennial irrigation to the minimum necessary.

(v) Providing lift irrigation by sinking a number of wells in areas where water table is likely to rise.

In the absence of any detailed survey of soils and potentialities for development, the Committee has not been able to draw up any detailed programme for the improvement of these soils by the adoption of one or more of the measures indicated. The Committee suggests that surveys should be undertaken by the soil experts for each of these regions and appropriate measures adopted for each area according to the nature of the problem and the availability of sweet water etc. to improve these lands. Side by side with these measures it is necessary to promote research (to be followed by demonstration) on suitable agronomic practices so as to test the salt-resisting capacity of different crops and lay down an appropriate cropping pattern for each area in the light of the soil, rainfall, availability of water etc.

III. Wells and Minor Irrigation Works.

24. In all areas which are to be served by Major Irrigation, a programme of well construction for a systematic utilisation of sub-soil water is necessary for purpose of extending the area under irrigation and for ensuring the necessary drainage. The size of this programme has been broadly estimated by reference to the acreage to be brought under irrigation after taking into account the number of existing wells. The total requirements in Poona Division are estimated at 36,128 and in Aurangabad Division at 3,069. No such wells are recommended for Ahmedabad and Rajkot Divisions, as the additional water for these wells would not be required in the areas under command. The details are given in a statement in Appendix VII. In areas which are not likely to get any protection from major irrigation, soil conservation and land improvement has been recommended. In all banded areas, there would be scope for additional wells at suitable sites to utilise the enriched sub-soil water resources. Such wells would have to be located with care and the size of the programme would vary widely from area to area.

25. There are, however, certain areas where due to the very porous nature of the soil and a low water table, well construction would be costly ; in such areas it is necessary to investigate the possibilities of minor irrigation works. The

scope for such works would depend largely on the topography and the rainfall. Wherever suitable economic sites for storage exist and total annual rainfall is not inadequate, the construction of irrigation tanks would be desirable. The scope for bandharas would be limited to streams which have a sustained flow in fair weather from which a sufficient flow can be diverted for irrigation. The bandharas are of two types—those constructed on perennial streams and which are, therefore, useful for kharif as well as rabi irrigation and others which are only useful for kharif. The utility of the latter is very limited as they are apt to fail when the need for water is high. The purely kharif bandharas are not, therefore, recommended.

26. The Committee would recommend surveys of areas in talukas which are outside the command of the proposed major irrigation projects with a view to selection of suitable sites for minor irrigation tanks and bandharas, so that such areas are ensured a minimum percentage of area under irrigation from existing works and new wells, tanks and bandharas. The aim should be to have 20 per cent. of the cropped area under irrigation by the end of the Fourth Plan period. The percentage should be raised further during the Fifth Plan period, if the local water resources permit. No detailed programme for different areas can be indicated in this case as the potentialities of each area have to be ascertained and developed.

IV. Animal Husbandry and Fodder Development.

27. The scarcity areas in the State offer good scope for the development of Animal Husbandry. As in most of these areas good breeds are already available, what is required is a programme for preserving and propagating the selected breeds on a large scale, providing adequate veterinary facilities and improving supply of fodder. The following measures would be necessary for the purpose.

(1) *Establishment of Cattle breeding Farms.*

28. There are, at present, 15 cattle breeding farms in the State. Most of these are small units, inadequately equipped. Some of them are housed in temporary sheds with no irrigation facilities and no provision for undertaking experimental breeding. The number of good bulls produced in these farms is, therefore, very small. There are no facilities for testing sufficient number of cows at these farms to identify the premium bulls. It is, therefore, necessary to extend these facilities first by assisting the cattle breeding farms to equip themselves adequately and to take in a large number of cows, about 500 at each farm. It would also be necessary to establish new cattle breeding farms for improving breeds like Khillar in the scarcity area of the Deccan and Kankrej in North Gujarat and Saurashtra at suitable places.

(2) *Premium Bulls.*

29. With the adoption of the measures mentioned in the foregoing paragraphs the number of premium bulls would increase and the programme of selecting premium bulls for upgrading the cattle in the rural areas could be steadily extended. It is understood that the total number of premium bulls on active list is only about 800 in the whole State. This number is too small to serve the needs of the State. For the scarcity areas alone the number of such bulls should be increased to about 1,000 in Maharashtra and 1,000 in Gujarat by the end of the Third Plan period and further expansion planned in the light of experience.

(3) *Veterinary Facilities.*

30. The existing veterinary facilities should be extended so as to cover not only each taluka headquarters but also other important places where the number of cattle in a taluka is large. Though this is a programme applicable to the entire State, the Committee would suggest that in view of the special importance of the need for developing animal husbandry in scarcity areas, priority should be given to these areas.

(4) *Development of Fodder Resources.*

31. For ensuring the supply of adequate fodder to cattle in the scarcity areas it is necessary to distinguish between districts where the main crop is jowar or bajri and the stock of the plant provides adequate fodder for normal requirements and where the problem, therefore, is essentially one of storage for bad seasons and of transport from adjacent areas, and others where there is inadequate supply even in normal times and the position in scarcity areas becomes acute. With the spread of cultivation of commercial crops like groundnut and cotton, the fodder position in these areas would become more difficult.

32. The measures for improvement of fodder supply should relate first to improvement of storage and better utilisation of available fodder. In a few areas increase in growth of fodder crops is also to be planned for. The programmes of major irrigation and contour bunding would bring about a general increase in fodder supply all round. With the adoption of dry farming and strip cropping methods in the unirrigated areas, the supply of legumes, which are useful as fodder, would also increase. These measures, however, would have to be supplemented by specific schemes for storage and growth of fodder. In the Saurashtra districts, large areas known as "Vidies" are reserved for grass cutting. Similar grass areas are to be seen in Kutch where they are known as "Rakhals". They extend over 1,20,000 acres and are to be found in Bhuj, Mandvi, Mundra, Nakhtrana, Lakhpat, Anjar and Bhachav talukas. Similar practice exists in the Deccan in the Maval tract. The vast stretches of barren stony lands are to be seen only in the eastern scarcity districts. In Saurashtra and Kutch, the grass is specially stored in Government godowns and issued in times of fodder scarcity, at reasonable rates. No such practice exists in the scarcity areas of North Gujerat or Deccan. The Committee would recommend the establishment of such facilities in all scarcity areas. It would also be worthwhile constructing large fodder sheds known as "Dutch Barns" for storage of Kadbi locally produced or for storage of grass bails brought from Maval areas. It should be ensured that in normal times a minimum stock calculated by reference to the area to be served is maintained and that the stock is periodically renewed to avoid deterioration and wholesale replacement. It should be possible to organise such facilities on a no profit and no loss basis, but in initial years a subsidy in fixing the price of sale would be justified. Efforts should be made to entrust this work to Co-operatives which may be given suitable financial assistance for the purpose.

33. The main supply of fodder in the scarcity areas comes from the stalks of jowars and bajri. These stalks are fed to cattle without proper chaffing, causing considerable wastage. This loss is estimated at 30 per cent. of the Kadbi offered for feeding the animals. If this Kadbi is properly chaffed by means of chaff-cutters, the loss can be minimised to 10 per cent., thereby increasing the actual fodder supply by 20 per cent. Power as well as hand-chaff-cutting machines are available in the market which have, however, not become popular on account of their high cost. In scarcity areas, where jowar and bajri stalks are the main source of fodder supply, the Gram Panchayats and Multi-purpose Societies should be given loans for purchase of these power-driven machines whereas circular hand-chaff-cutters may be made available to individual farmers at subsidised rates.

34. Regarding measures for increasing the growth of fodder, the Committee considers that the improvement of the quality and quantity of natural herbage is closely linked with the system of grazing. It has been estimated that production of grass per acre from reserved grass lands i.e., Vidies in Saurashtra is 302 lbs. while that from openly grazed areas is as low as 70 lbs. per acre. These figures bring out vividly the damage caused by uncontrolled grazing. Rotational grazing experiments have shown that there is considerable improvement both in quality and quantity of grass produced. This natural improvement cannot take place in uncontrolled grazing systems. Over-grazing of grass lands results in disappearance of good grasses. Poor annuals take their place with the resulting erosion. Seeding of natural grass lands with better types of grass and manuring these lands go a long way in stepping up the production of grasses. The development of these lands has, therefore, to begin with the introduction of rotational grazing which is primarily an administrative problem to be solved with the co-operation of the villagers.

35. A valuable source of fodder during the hot months exists in the arid zones in the shape of fodder trees, e.g., anjan (*Hardwickia binata*). These trees are very common in low rainfall areas and could be extensively cultivated in scarcity affected districts by adopting a planned programme of trees planting on waste lands. The Forest Department should take up this work as its afforestation programme in scarcity districts.

36. The total number of cattle in most of the scarcity areas is excessive. Along with measures for upgrading the stock and improving the fodder resources, it would be necessary to consider seriously some means of reducing their number. The problem is, however, not confined to scarcity areas and would, therefore, have to be tackled on general lines. The Committee has not been able to examine this aspect in detail but would urge an early consideration of the measures which would be appropriate throughout the State.

V. Drinking Water Facilities.

37. Measures for extension of drinking water supply to scarcity areas are of three broad types:—

(1) In some areas the sub-soil water is potable and generally adequate. Most of the villages have some assured source of supply. There are, however, difficulties in scarcity years due to the drying up of the wells and also in normal years during summer. A few villages in such areas do not have any assured source within a reasonable distance. Construction of wells in such villages and general facilities for deepening of the existing wells would be the appropriate measures for these areas.

(2) In some areas there is inadequacy of sub-soil water and the soil is rocky making well construction expensive and uncertain. In these areas, a more intensive programme of well construction based on a village to village survey of existing facilities is suggested. There is need for providing boring equipment in such areas.

(3) There are large areas specially in Banaskantha and Mehsana Districts where the well water is saline and therefore unfit for drinking purposes. In a few cases, sweet water is obtained at great depth and, therefore, there is case for boring and construction of tube wells. Where even the tube wells have yielded saline water, the problem of drinking water is very acute. It is suggested that alongside a programme of exploration of tube wells for sweet water; it is necessary to investigate piped water supply schemes for such areas. A beginning has already been made in this direction by having piped water supply schemes in the Bhal area of Surendranagar and Ahmedabad District. There are several other areas also for which such schemes deserve to be investigated. The details of these are given in the District Reports included in Volume II.

38. The Committee considers that the supply of adequate drinking water should be regarded as deserving early attention. The necessary surveys for exploration of tube wells and preparation of piped water supply schemes should, therefore, be initiated immediately and, as far as practicable, the entire programme of providing adequate drinking water facilities in these areas completed in the Third Plan period. It is expected that this programme would be supplemented, except in the saline soils, by a programme of wells in areas benefitted by major irrigation or covered by contour bunds recommended primarily for irrigation purposes.

VI. Extension of power and development of industries and transport.

39. The Committee has recognised the need for the development of industries in scarcity areas but has not had the necessary detailed information to indicate for each area the specific industries which could be developed. The Department of Industries has, however, recently prepared a Master Plan for the industrialisation of the Bombay State. It contains a detailed study of the resources and facilities available in different districts and indicates the possibilities of establishing industries in different parts of the State. The Master Plan also brings out the further facilities which are required to be provided in order to secure the location of industries in the areas concerned. On the basis of the material contained in this Master Plan it should be possible for those directly concerned with the promotion of industry to assess more closely the potentialities of development available in each area. The Committee considers that, so far as scarcity areas are concerned, priority should, at this stage, be given to the development of power where an industrial potential requiring power exists, as development of industries essentially depends on the availability of power.

40. The extension of power to scarcity areas should be planned in stages. To begin with, power should be extended to all areas which are to be served by major irrigation by the end of the Third Five Year Plan, to enable economical lifting of water from wells located within the command. Later, power should be extended to other areas as and when they come under irrigation. In unirrigated areas power should be made available wherever the supply of water in wells is good and the number of wells is large or where as a result of contour-bunding, the prospects of developing irrigation wells are good. Finally, power should also be made available to areas which have some favourable factors which are likely to assist in their industrial development immediately or on a long term view particularly the areas contiguous to or adjoining the irrigated area. Areas which, according to the Master Plan, offer prospects of industrial development should be given preference.

41. At present, power facilities are available only near large urban centres and power development has generally lagged behind demand even in such centres. The problem is essentially one of undertaking rural electrification in scarcity areas

where it is primarily used for lifting water for irrigation and thereafter for possible development of industries, at great initial capital cost and a recurring loss of revenue for some years on these unremunerative lines until an adequate load is built up.

42. Large water resources lending themselves to hydro power generation are fortunately available within a short distance of scarcity areas of Maharashtra. In Maharashtra the power available from Koyna is expected to serve scarcity areas in Sholapur, North Satara, South Satara, Poona and part of Ahmednagar Districts. There should, therefore, be little difficulty in carrying power to the scarcity areas in these districts. Regarding Ahmednagar, hydro power can be available from the Vaitarna and the Bhandardara schemes. Altogether, therefore, most of the scarcity areas in Maharashtra can be supplied with cheap hydro-electric sources available within reasonable distance. No such source is, however, available for the Marathwada Districts. In Gujerat, hydro-electric power would be available from the Narmada, Mahi and Tapi rivers. This power can be fed into grid and tapped for utilisation in the scarcity areas in due course.

43. The Committee considers that a phased programme of extension of power so as to cover the scarcity areas particularly where water is proposed to be pumped for irrigation from wells in irrigation commands in the next 15 years should be drawn up and implemented in stages. A specific amount, not less than 1/3rd of the total provision for rural electrification for the State should be reserved for scarcity areas in the Third Plan. In addition, Government should agree to subsidize the loss, if any, incurred by the Electricity Board on the maintenance of such lines in scarcity areas, for a period of 5 years.

44. In certain places in the scarcity areas where power is already available and some measure of industrialisation had already taken place, it would be useful to establish rural industrial estates. To begin with, provision should be made for two such estates in Maharashtra and two in Gujerat. Certain basic facilities for location of industries should be provided in such estates.

45. There is close connection between industry and transport. The Committee has generally laid stress on the development of land and water resources of scarcity areas and not regarded the development of transport as of primary importance. In the earlier stages when local failure of rainfall caused wholesale starvation, and food, fodder and drinking water had to be rushed from adjoining areas at short notice, development of roads was most essential. There is now a reasonable network of roads and most areas are also within short distance of rail heads. In the case of scarcity areas in North Gujerat and Marathwada, however, communications are still poor and some provision for construction of roads in these areas would appear to be a necessary part in the development programmes of these areas. The Committee would also recommend development of a rail link connecting Ahmednagar with Bombay and Bhir with Ahmednagar.

Financing the Programme.

46. It is necessary now to consider the manner in which the programme for scarcity areas should be financed. It is evident that the various development measures will have to be fitted into the Third and subsequent State Plans. As the financial allocations in the Plans are made according to the different heads of development and not according to areas, the Committee considers that definite financial provisions under each head covered by the Programme should be earmarked for scarcity areas in the Third Plan and the departments concerned should formulate concrete schemes for these areas on the lines suggested by this Committee. At present, under most heads only general schemes are prepared leaving the areas to be served for determination later. This approach requires to be changed. A specific area programme should be formulated under each general scheme. This is necessary both for a co-ordinated approach to regional development and for a quicker implementation of the Plan and should, to begin with, be done for scarcity areas.

47. The Committee has considered whether it would be desirable to have a special Scarcity Areas Development Fund for financing these programmes and has come to the conclusion that though the constitution of such a fund might give a sense of importance to the scarcity areas, its creation would not be justified in the context of planning which involves a periodical review of the entire resources of the State and preparation of annual programmes to fulfil the plan. It would not be desirable to set apart any special funds for such a large purpose like the

development of scarcity areas. Instead, the scarcity areas should participate increasingly in the growing size of the development programmes, the measures suggested by the Committee being regarded as the minimum necessary to enable these areas to avoid the threats of scarcity in the future. In the other spheres of economy and social life which also await development but which not being related directly to scarcity, have not been considered by the Committee, these areas should, along with others, share in the general development of the State. If a special fund is established, it might create an impression that any development which is to be undertaken in the scarcity areas must necessarily be financed from that Fund. This might react unfavourably on the scarcity areas themselves.

Administrative Arrangements.

48. The Committee has considered whether it is necessary to make any special administrative arrangements for implementing the development programme for scarcity areas and has come to the conclusion that while the actual implementation of the various measures should be left to the departments concerned, it is necessary to provide for co-ordination and supervision at the District, Division and State levels. In each district where a precarious area exists, a Committee consisting of officials and non-officials should be formed under the Chairmanship of the Collector, or a Sub-Committee of the District Development Board constituted with the co-option of the non-officials from the area. At the Divisional level also, a Committee of officials and non-officials under the Chairmanship of the Commissioner or a sub-committee of the Divisional Development Council may be formed. The functions of the District and the Divisional Committees would be to prepare a 15-year Development Programme for each taluka and to ensure that each year schemes are prepared for these areas on the lines of the long term programme and adequate steps taken to secure their implementation.

49. At the State level, it would be necessary to see that the schemes relating to scarcity areas are specifically fitted into the State Plan and adequately provided for in the annual budget. A watch is also required to be kept on the progress of implementation of these programmes. There should, therefore, be an officer at the State level to take the initiative in the organisation of the surveys, investigation and research referred to earlier, to co-ordinate the programmes received from the various scarcity areas for inclusion in the annual plan and budget of the State, to supervise the general progress of these schemes and to submit an annual progress report to Government.

District Programmes.

50. The programmes and policies referred to in the foregoing paragraphs indicate the general lines on which development measures for scarcity areas are required to be taken. Wherever possible the Committee has indicated the significance of different types of measures for different areas and also mentioned specific measures or schemes as suitable for certain areas. The Committee has also referred to the need for surveys and investigation in some cases and the detailed programmes in such cases can be prepared only in the light of such surveys or investigations. The Committee has, however, indicated in outline the measures necessary for each district affected by scarcity and included them in the District Reports given in Volume II of the Report. On the basis of these outlines it would be necessary to prepare detailed schemes for each taluka. This concrete regional planning can be done only in the light of intimate knowledge of local conditions. Such schemes would, therefore, have to be prepared by the local officials and non-officials and co-ordinated into an area plan for the taluka by the District Committees mentioned earlier.

CHAPTER VII.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS.

CHAPTER I.—Introductory.

No Recommendations.

CHAPTER II.—Physical Features, Rainfall and Cropping Patterns in Bombay State.

No Recommendations.

CHAPTER III.—Criteria for Determination of Precarious Areas.

1. The criteria for determining precarious areas are discussed. A close study of the factors relating to—

(i) Rainfall,

(ii) Annewari and Land Revenue Suspension data,

(iii) Declarations of scarcity in the past.

is made on the basis of talukawise or villagewise data collected for the last 30 years. (Paragraph 3).

2. The precarious areas are divided into three categories 'A' 'B' and 'C', according as there has been a total or almost total failure of crops in the area once every three years, six years or ten years respectively. The remaining areas are considered free. (paragraph 9).

CHAPTER IV.—Scarcity Areas in the Bombay State and their classification.

3. A summary of the conclusions regarding gradation of different areas is given for each district. The area and population of each taluka affected by scarcity are given in Appendix IV.

CHAPTER V.—Approach to Development of Scarcity Areas.

4. The development programme for each area should be framed in the light of the specific requirements of the area and the potentialities of development available. (para. 2).

5. The primary aim of the development programmes should be to provide certain basic conditions to remove the present uncertainty and initiate a process of steady improvement. As the problem is deep-rooted, a phased programme for removing the underlying causes is recommended. (para. 3).

6. It is necessary to explore alternative measures to increase and diversify production so as to build up a scarcity resistant economy. (para. 4).

7. The pursuit of broad objective of national policy embodied in our Plans would not automatically solve the problem of scarcity areas. Certain basic conditions should be deliberately provided in the scarcity areas in a co-ordinated manner and on a priority basis. (para. 5).

8. As the development measures for scarcity areas aim at the attainment of a reasonable minimum which would enable the areas to be free from chronic scarcity, they should get a priority. (para. 6).

9. The development measures for scarcity areas should be an integral part of the Third and subsequent Plans identified separately and implemented in accordance with a phased programme. (para. 7).

12. The requirements of the scarcity areas in the implementation of certain general policies also deserve special consideration. (para. 8).

13. Scarcity relief measures should aim at the more intensive implementation of the development programme of the area and, if necessary, may anticipate works which are due to be taken up later. (para. 9).

Irrigation Policy.

For Scarcity Areas in Maharashtra.

14. Top priority should be given to the major irrigation projects; construction of wells in the irrigation commands should be encouraged, and cheap power should be made available in such commands for lift irrigation. (para. 21).

15 20 per cent. area in the commands should be left for Dry Farming on shallow medium soils. (para. 21).

16 Well irrigation should be taken up in banded areas so as to utilise the subsoil moisture conserved by contour bunding. (para. 21).

17. Minor irrigation works may be taken up outside the irrigation command of major projects where the subsoil water is not adequate for a large wells programme. (para. 21).

For Scarcity Areas in Gujerat.

18. Top priority should be given to major and medium irrigation works. (para. 29).

19. Where minor irrigation tanks are feasible with adequate depth of water stored in them, they should be considered in preference to shallow double purpose bunds. (para. 29).

20. Wherever possible, double-purpose irrigation bunds should be constructed. (para. 29).

21. In alluvial areas where subsoil salinity is not marked, excavation of wells for irrigation should be encouraged. (para. 29).

22. Tube wells should be provided where no other mode of irrigation is available and where it is difficult to get fodder. (para. 29).

23. Percolation tanks should be thought of only for village water supply. (para. 29).

Soil Conservation and Land Improvement.

24. As the scope for major irrigation in the scarcity areas is not large, reliance has to be placed primarily on measures of Soil Conservation and Land Improvement. (para. 30).

25. The scope, content and significance of the various measures, included under Soil Conservation and Land Improvement, viz., contour bunding, nala bunding, afforestation, dry farming and strip cropping and saline soils, are explained and the lines along which development measures have to be devised are indicated. (paras. 30 to 39).

26. The relative importance of the measures would depend upon the soil conditions of the areas. In most of the scarcity areas which have no source of major irrigation, contour bunding is the most appropriate and the basic method of land improvement and requires to be supplemented by nala bunding and the adoption of dry farming and strip cropping methods. The scope for afforestation is not so general and the problem of saline soils is confined to certain tracts. (para. 40).

Animal Husbandry.

27. Though the best cattle are found in scarcity areas, their condition is far from satisfactory due to the large number of cattle, deterioration of breeds, neglect of grazing areas, ignorance of the cultivator and recurring scarcities. (para. 43).

28. Cattle and poultry rearing can be valuable subsidiary occupations in scarcity areas. Specific measures to foster improved breeding practices and to provide veterinary services are necessary. (para. 44).

Fodder Resources.

29. In scarcity areas the main source of fodder is from the stocks of the cultivated cereals and pulses. In Saurashtra large areas known as "Vidies" are reserved for cutting and grazing grass. (para. 45).

30. The fodder available in scarcity areas is generally inadequate and poor in quality. The grass lands under the control of the Revenue Department and the gchars allotted to the village are generally in a deplorable state. It is necessary to take specific measures for extension of cultivation of fodders augmenting their supplies by providing storage and transport facilities, securing a rational grazing system and improvement of village grass lands. (para. 46).

Drinking water Facilities.

31. In several scarcity areas there is lack of adequate drinking water facilities due either to salinity of subsoil water or to inadequacy of supplies specially in the hot season. It is necessary to deal with this problem immediately so that no village would be left without an assured supply of drinking water. This would mean extension of the programme of well construction, construction of surface tanks where the subsoil water is not suitable, exploration of tube wells to get potable water from the lower strata and introduction of piped water supply where subsoil water is unsuitable or inadequate. (para. 47).

Development of Industries.

32. It is necessary to consider how the economy of the scarcity areas could be broad-based so that a section of the population is able to earn its livelihood from industry. In most of the scarcity areas there is no electric power. Other facilities are also lacking. (para. 48).

33. It is necessary at this stage to stress the need for creating general conditions to facilitate industrial development in these areas. Apart from major irrigation the extension of electric power to these areas in advance of the development of the load is important. There is need for rural industrial estates in certain places. (para. 49).

34. The broad picture that emerges is that wherever major irrigation is technically feasible, it should be given the highest priority. Elsewhere, soil conservation supplemented by the programme of well-digging should be undertaken unless the nature of the soil and quality of subsoil water are unfavourable. In the areas under irrigation there is need for wells to pump the subsoil water. There is scope for extension of dry farming and strip cropping in all unirrigated areas. The scope for afforestation has to be investigated by reference to detailed surveys. The role of minor irrigation is generally less significant, except where the rainfall is adequate but its distribution is bad. Surveys of minor irrigation possibilities for areas outside the command of major irrigation projects are recommended. (para. 50).

CHAPTER VI.—Development Programmes and Policies—General.

35. Development programmes are required to be framed for the scarcity areas which cover 103 talukas; of these, 20 talukas are scarcity areas of class A, 40 talukas of class B and the remaining of class C. (para. 1).

36. The scarcity affected talukas cover about 22 of the area and 15 per cent. of the population. (para. 2).

Major and Medium Irrigation.

37. In recent years the value of irrigation works in the Deccan has been enhanced due to the suitability of the most of the areas benefitted by such irrigation for the growth of sugar-cane. (para. 5).

38. Wherever major irrigation has been introduced, the areas have been completely protected from scarcity and have offered opportunities of employment to adjoining areas. (para. 6).

39. On the basis of the studies made by the Water Resources Investigation Circle, the Committee has prepared a long term programme of development of major and medium irrigation for the scarcity areas. (para. 8).

40. Irrigation schemes intended to benefit the scarcity areas which have been completely investigated should be taken up in the Third Plan period. Preparatory work on others should be started early. (para. 10).

41. No specific programme of tube wells has been prepared as the possibilities of striking sweet water in scarcity areas have to be explored. (para. 9).

42. The Inter State Agreement, 1951, should be revised so as to make more supplies of water available from the Krishna for giving relief to scarcity areas. (para. 11).

43. It is necessary to adopt measures to ensure that the benefits of irrigation are utilised in the scarcity areas without unnecessary loss of time. (para. 12).

44. In order to ensure full utilization of water in minor irrigation tanks a consolidated assessment of lands which can derive irrigation benefits in normal years should be levied. (para. 13).

45. Major irrigation projects should be planned in such a way as to synchronize the construction of storage, pick-up weir and the irrigation distribution systems. The distribution systems should be completed blockwise to facilitate early release of water. (Para. 13).

46. The difficulties of agriculturists in constructing water courses of considerable length should be eliminated. (Para. 13).

47. Provision of finance and mechanical equipment should be made for leveling-lands in the canal commands. (Para. 13).

48. It is necessary to conduct experiments on irrigated crops to ascertain the water requirements, intervals of watering, periods of sowing, doses of manures, etc. Experimental farms should be followed by demonstration farms. (Para. 13).

49. Special credit facilities should be provided in irrigated areas. (Para. 13).

50. The water rates charged in the first few years should be concessional. (Para. 13).

51. To avoid water-logging in irrigated areas a programme of irrigation by wells is recommended. Other measures to provide drainage should be ascertained by local survey. (Para. 13).

Soil conservation and Land improvement.

52. The scope for bunding in the Third and subsequent Plan periods in the scarcity areas is estimated at about 60 lakh acres. (Para. 15).

53. An area of 30 lakh acres should be contour-bunded in the scarcity areas in the Third Plan. The lines on which a detailed programme for each scarcity affected taluka should be drawn up are suggested. (Para. 17).

54. There is need for research in the technique of contour bunding. (Para. 18).

55. A specialized personnel trained in technical aspects of soils and soil conservation methods should be built up. (Para. 18).

56. There is a need for a follow-up programme to ensure the maintenance of bunds in proper condition and the supply of technical information to farmers. (Para. 18).

57. Contour bunding should be accompanied by plantation of castor or agave on major bunds. (Para. 18).

58. The benefits of nala bunding should be studied to determine the approximate ratio of cost to benefit. The technical aspects of such bunds also require investigation before a general programme of nala bunding is framed. (Para. 19).

59. Dry farming and strip cropping methods should be extended to all scarcity areas. To begin with, one taluka preferably contour-bunded, in each district affected by scarcity should be selected for an intensive campaign. (Para. 20).

60. The existing scheme of immobilization of Rajasthan desert and Kutch should be completed early. (Para. 21).

61. In saline soils of North Gujerat, Saurashtra and Kutch plantation of Villaiti Babul should be undertaken in sizeable blocks. (Para. 21).

62. The saline soils in North Gujerat, Saurashtra and Kutch constitute a serious problem, and afforestation would help in reducing salinity.

63. In North Gujerat and Saurashtra where the hills have been denuded of forests, surveys should be initiated and afforestation schemes which are considered feasible taken up. (Para. 21).

64. In the Deccan the problem of soil erosion is specially acute in the hill sites and the river valleys. A valuable survey of the Ghod Valley recently made by a non-official agency should be utilized by the Forest Authorities to prepare concrete schemes of afforestation in these areas. The Forest Department should also carry out similar surveys for valleys of other rivers which serve scarcity areas. (Para. 21).

65. In the blank and arid parts the afforestation of a few selected areas where the conditions appear to be favourable is recommended. (Para. 21).

66. Where large blocks of arid lands are lying waste, they could be cultivated with agave. (Para. 21).

67. Revenue forests should be transferred to the care of the Forest Department except over areas which are less than 100 acres which should be transferred to Gram Panchayats. (Para. 21).

68. The saline soils in North Gujerat could be improved by one or more of the following measures :—

- (1) Prevention of encroachment of sea water into the little Rann of Kutch.
- (2) Storage of flood waters of rivers for irrigation and for leaching.
- (3) Leaching by sweet water from tube wells.
- (4) Addition of gypsum.
- (5) Plantation of Villaiti Babul.
- (6) Construction of a chain of small tanks. (Para. 23).

69. In the Deccan arid zone, the problem of saline soils should be met by bunding and plantation of salt tolerant trees. (Para. 23).

70. In the irrigated area in the Deccan the following measures are recommended :—

- (1) Conducting of soil survey to locate the zones fit for perennial and seasonal irrigation.
- (2) Providing surface pazar drains.
- (3) Providing subsoil drainage.
- (4) Restricting the proportion of perennial irrigation.
- (5) Providing lift irrigation by sinking a number of wells. (Para. 23).

71. In the absence of any detailed survey of soils, the Committee has not been able to draw up a detailed programme for the improvement of saline soils. It suggests that surveys should be undertaken by soil experts and research done on agronomic practices suitable for these areas. (Para. 23).

Wells and Minor Irrigation Works.

72. In all areas which are to be served by major irrigation a programme of well construction for a systematic utilisation of subsoil water is necessary. (Para. 24).

73. There would be scope for additional wells in all banded areas at suitable sites to utilize the enriched subsoil water resources. (Para. 24).

74. It is necessary to investigate the possibilities of minor irrigation works in areas which are not to be served by major irrigation. (Para. 25).

75. The scope for bandharas should be limited to streams which have a sustained flow in fair weather. (Para. 25).

76. About 20 per cent. of the cropped area should be brought under irrigation by the end of the 4th Plan period in each scarcity area. (Para. 26).

77. The percentage should be raised during the 5th Plan period, if the water resources permit. (Para. 26).

Animal husbandry and fodder development.

78. The facilities available at the existing cattle breeding farms should be extended by equipping them adequately to take in a large number of cows. (Para. 28).

79. It would also be necessary to establish new cattle breeding farms to improve the breeds like Khilar and Kankrej. (Para. 28).

80. The number of premium bulls should be increased to about 1,000 each in Maharashtra and Gujerat by the end of the Third Plan period. (Para. 29).

81. The scarcity areas should be given priority in the programme of extension of veterinary facilities. (Para. 30).

82. The measures for improvement of fodder supplies should relate first to improvement of storage and better utilization of available fodder. The system of storage of fodder in Government godowns prevailing in Saurashtra and Kutch should be extended to all scarcity areas. (Para. 32).

83. It would also be worthwhile constructing large fodder sheds known as Dutch Barns for storage of kadbi locally produced. In normal times a minimum stock calculated by reference to the area to be served should be maintained and the stock periodically renewed. (Para. 32).

84. In order to avoid losses due to improper chaffing, financial assistance should be given for purchases of chaff-cutters to Gram Panchayats and Multi-purpose Societies. (Para. 33).

85. The development of grazing lands should begin with the introduction of rotational grazing which is primarily an administrative problem to be solved with the co-operation of the villagers. (Para. 34).

86. Plantation of Anjan on waste lands should be taken up by the Forest Department in the scarcity districts. (Para. 35).

87. The total number of cattle in most of the scarcity areas is excessive. An early consideration of the measures which would be appropriate throughout the State is recommended.

Drinking Water Facilities.

88. The supply of adequate drinking water in scarcity areas deserves early attention. In areas where the problem arises only in summer or is restricted to a few villages, construction of wells in those villages and facilities for deepening of the existing wells are recommended. (Para. 37).

89. In rocky areas where sub-soil water is inadequate and construction of wells is expensive and uncertain, a more intensive programme of well construction based on a village-wise survey is recommended. There is need for providing boring equipment in such areas. (Para. 37).

90. In Banaskantha, Mehsana and certain parts of Ahmedabad and Saurashtra, where even tube wells have given saline water, supply of potable water by pipe line from adjoining areas is the only solution. A beginning has already been made in this direction in the Bhal area of Surendranagar and Ahmedabad Districts. There are several other areas also for which such schemes deserve to be investigated. The details of these are given in the District Reports included in Volume II. (Para. 37).

91. The necessary surveys for exploration of tubewells and preparation of piped water supply schemes should be initiated immediately; the entire programme should be completed in the Third Plan period. (Para. 38).

Extension of Power and Development of Industries and Transport.

92. The Committee has recognised the need for development of industries in the scarcity areas but has not had the necessary detailed information to indicate the specific industries suited to each area. The Department of Industries has, however, recently prepared a Master Plan for the industrialization of the Bombay State. (Para. 39).

93. At this stage, priority should be given to the extension of power to facilitate the development of industries. (Para. 39).

94. The extension of power to scarcity areas should be planned in stages. (Para. 40).

95. The problem is essentially one of undertaking rural electrification in scarcity areas where it is primarily used for lifting water for irrigation and thereafter for possible development of industries. (Para. 41).

96. Large water resources lending themselves to hydro power generation are available within a short distance of scarcity areas of Maharashtra. No such source is, however, available for the Marathwada districts. In Gujerat, hydro-electric power would be available from the Narmada, Mahi and Tapi rivers. (Para. 42).

97. A phased programme of extension of power is proposed. (Para. 43).

98. A specific amount not less than 1/3rd of total provision for rural electrification for the State should be reserved for scarcity areas in the Third Plan. In addition, the losses incurred by the Electricity Board on the maintenance of such lines in the scarcity areas should be subsidised for a period of 5 years. (Para. 43).

99. In certain places in the scarcity areas where power is already available and some measure of industrialisation has taken place, rural industrial estates should be established. Two such estates are proposed for Maharashtra and two for Gujarat, to be set up in the scarcity areas. (Para. 44).

100. There is now a reasonable network of roads in the scarcity areas, except in the areas in North Gujarat and Marathwada, where construction of roads should be a necessary part of the development programme. (Para. 45).

101. Development of a rail link connecting Ahmednagar with Bombay and Bhir with Ahmednagar is recommended. (Para. 45).

Financing the Programme.

102. As the financial allocations in the Plans are made according to the different Heads of Development and not according to areas, definite financial provisions under each Head should be earmarked for the scarcity areas in the Third Plan, and concrete schemes for these areas on the lines suggested by the Committee should be prepared by the Departments. (Para. 46).

103. It is not desirable to have a special Scarcity Areas Development Fund for financing programmes in scarcity areas. Instead, these areas should participate increasingly in the growing size of the development programme, the measures suggested by the Committee being regarded as the minimum requirements. (Para. 47).

Administrative arrangements.

104. The actual implementation of the various measures should be left to the departments concerned, but provision should be made for co-ordination and supervision at the District, Division and State levels. (Para. 48).

105. In each district affected by scarcity, a Committee consisting of officials and non-officials should be formed under the Chairmanship of the Collector. At a Divisional level, a similar Committee should be formed under the Chairmanship of the Commissioner. The functions of these committees would be to prepare a 15-year development programme for each taluka and to take steps to secure their implementation. (Para. 48).

106. At the State level, the schemes relating to scarcity areas have to be fitted into a State Plan and adequately provided for in the annual budget. A watch is also required to be kept on the progress of implementation of these programmes. There should, therefore, be an officer at the State level for this purpose. (Para. 49).

107. On the basis of the general recommendations made by the Committee it would be necessary to prepare detailed schemes for each taluka; an outline of these measures for each district affected by scarcity is given in Volume II of the Report.

DEVELOPMENT MEASURES FOR DISTRICTS

(Details are given in Volume II).

AURANGABAD DIVISION.

Osmanabad District.

The talukas of Parenda and Bhoom are regarded as precarious areas of Class C.

(i) Major Irrigation.

108. The project on Sina river near Kolegaon which would bring an additional area of 27,350 acres under irrigation in Parenda taluka is recommended.

(ii) Soil conservation.

109. The total bundable area outside the command of major and medium irrigation is estimated at 2 lakh acres. Contour bunding programme has not been extended to these two talukas so far. As Bhoom taluka will not receive adequate protection by irrigation, bunding programme is recommended for that taluka.

110. Extension of Dry Farming methods of cultivation of Kharif and Rabi crops is recommended for all unirrigated areas.

(iii) *Minor Irrigation.*

111. There is scope for developing tanks and bandharas for irrigation. Certain sites are suggested for investigation and early execution if found feasible.

112. A programme of well construction in areas to be protected by contour bunding is recommended.

(iv) *Afforestation.*

113. It would be necessary to transfer sizeable areas classed as barren and uncultivable in Bhoom and Parenda to the control of Forests Department for undertaking a programme of afforestation and agave plantation.

(v) *Cattle breeding.*

114. The tract is suitable for development of animal husbandry. It is necessary to locate a large number of Khillar bulls and cross-breed merino rams with the farmers to grade up the country stock.

(vi) *Communications.*

115. The construction of the following road links is recommended :—

- (i) Kuntalgi-Bhoom.
- (ii) Pardi-Bhoom-Parenda.
- (iii) Parenda-Kharda.
- (iv) Barsi-Parenda-Auti-Karmala.
- (v) Parenda-Nanaj.

Bhir District.

The talukas of Ashti, Patoda, Majalegaon and part of Bhir are regarded as scarcity areas of Class C.

(i) *Major Irrigation.*

116. There is no possibility of providing any large scale irrigation here with the exception of certain following medium projects which are indicated. None of the four talukas is, however, expected to get adequate protection on completion of these projects.

(ii) *Soil Conservation.*

117. The bundable areas are estimated at 2 lakh acres in each of the talukas of Ashti, Patoda and Majalegaon and 1 lakh acres in Bhir taluka. As these areas are not going to be benefited by major irrigation to the required extent, a bunding programme is recommended.

118. The extension of dry farming and strip cropping is recommended.

(iii) *Minor Irrigation.*

119. A survey for locating suitable sites for bandharas and tanks for seasonal irrigation should be taken up as a supplement to irrigation by wells.

(iv) *Animal Husbandry.*

120. The talukas of Ashti and Patoda are suitable for development of cattle breeding and sheep rearing. It is necessary to establish a large cattle breeding farm at a suitable centre in the area.

121. It is also considered necessary to enclose and develop large areas for growing grass and for afforestation.

122. Plantation of agave is recommended around forests and grass kurans.

(v) *Communications.*

123. The following road links are recommended :—

- (1) Rajuri-Chinchpur in Patoda.
- (2) Rajuri-Chikhlambe in Patoda.
- (3) Nirgudi-Amalner in Patoda.
- (4) Dahithan-Ashti in Ashti Taluka.

A railway line between Purli-Ahmednagar via Kaij, Bhir and Ashti is recommended.

(vi) Drinking Water.

124. A large number of villages in the talukas of Bhir, Ashti and Patoda are without adequate facilities for drinking water. Provision of deep wells in such villages is recommended.

(vii) Electric Power.

125. Cheap electric power should be provided to give impetus to small scale industries and installation of electric pumps on wells.

Aurangabad District.

The talukas of Vaijapur and Gangapur are regarded as scarcity areas of class C.

(i) Irrigation.

126. Apart from some irrigation from the Dheku project in Vaijapur and the Kham project in Gangapur, the upper Godawari Project ex-Nandur-Madhameshwar would benefit Vaijapur to the extent of 80,000 acres and Gangapur to the extent of 20,000 acres, thereby giving fairly good security against famines in Vaijapur Taluka. Early completion of these projects and a programme of well construction in areas commanded by major irrigation are recommended.

(ii) Soil Conservation.

127. The soils in these scarcity talukas are light and undulating and provide good scope for contour bunding. An area of about 3 lakh acres is bundable outside the proposed major irrigation commands. Contour bunding work in Gangapur Taluka is recommended as that taluka would not be adequately protected by major irrigation.

128. Extension of dry farming and strip cropping methods is recommended for all irrigated areas.

(iii) Minor Irrigation.

129. There is scope for development of bandharas and tanks. A survey of suitable sites is recommended.

(iv) Development of Industries.

130. The supply of cheap electric power is recommended for these talukas to give impetus to development of sugar industry, ginning and pressing factories, oil mills, power looms etc.

(v) Horticulture and Dairy Development.

131. As the tract is suited for Horticulture and Dairy, a liberal provision for fruit blocks under major irrigation is recommended.

132. This area should be developed also for dairy industry. The existing Manmad-Parbhani Rail Section should be converted into broad gauge to facilitate movement of refrigerated wagons for milk transport between Vaijapur and Bombay.

POONA DIVISION.**District North Satara.**

The Man Taluka and eastern part of Khandala are scarcity areas of Class B and Part of Phaltan and the eastern part of Khatav are scarcity areas of category C.

(i) Irrigation.

133. The Vir Dam Project which is in progress would benefit further the existing commanded areas of Phaltan and afford additional, though indirect, relief to the southern part of the taluka. The Tambwe tank which is under completion would also benefit the area. The Andhali tank in Man Taluka would benefit an area of 3,680 acres.

134. The only possibility of bringing more area under irrigation is by constructing tanks, bandharas and wells. A few suitable sites for bandharas and tanks are recommended.

(ii) Soil Conservation.

135. There is wide scope for taking up contour bunding. The bundable areas are estimated at 2 lakh acres in Man, 1 lakh acres in Khatav, 50,000 acres in Phaltan and 50,000 acres in Khandala peta.

(iii) Animal Husbandry.

136. Cattle breeding and sheep rearing are important subsidiary occupations in these talukas. It is necessary to establish a large khillar cattle breeding farm in the area and to strengthen the activities of the existing sheep breeding farm at Dahiwadi.

(iv) Afforestation.

137. It is necessary to take up afforestation programmes in Man, Khatav and Khandala areas.

(v) Electric Power.

138. The talukas of Man, Khatav and Phaltan have a large number of wells with good underground currents. These currents would be further strengthened as more and more area is brought under contour bunding. The supply of cheap electric power for lifting water in these areas is recommended. The supply of power would also facilitate the development of small scale industries.

South Satara District.

Jath taluka and Atpadi part of Khanapur taluka are classed as chronic scarcity areas of Class B.

(i) Major and Minor Irrigation.

139. There is no possibility of major irrigation. The only solution for providing increased irrigational facilities is through minor irrigation tanks, bandharas and wells. A survey to investigate suitable sites for such work is recommended.

(ii) Soil Conservation.

140. The scope for soil conservation appears to be large. Bundable areas in Jath are estimated over 3 lakh acres and those in Atpadi exceed 70,000 acres.

(iii) Animal Husbandry.

141. Subsidiary occupations like cattle breeding, sheep rearing and poultry keeping have already found favour with the farmers of Jath and Khanapur talukas. Large scale breeding farms for khillar cattle, sheep and poultry are recommended.

142. The construction of Dutch Barns for storage of fodder is recommended for Jath and Atpadi.

(iv) Afforestation.

143. The existing areas classed as revenue forests and sizeable areas out of the existing categories of pastures and barren lands should be transferred to the Forest Department for improvements by a regular programme of afforestation and rotational grazing.

(v) Electric Power.

144. The supply of cheap electric power from Koyna to these areas for pumping water from the wells and for the gradual development of Small Scale industries is recommended.

Sholapur District.

The whole district is regarded as affected by chronic scarcity excepting the major portion of Barsi taluka. The talukas of Sangola and Karmala are grouped under A category; Pandharpur, Madha and part of Malshiras are grouped under B category; while the rest of the talukas are classed as C.

(i) Major Irrigation.

145. At present none of the talukas excepting Malshiras are adequately protected by major irrigation. The Vir Dam Project which is under construction would step up the irrigated areas in Sangola to 31.8 per cent., in Pandharpur to 83.7 per cent., in Mangalwedha to 26.1 per cent. and in Malshiras to 70.7 per cent. The Kudnoor project which was included in the 2nd Plan would benefit Akkalkot taluka to the extent of 7,000 acres. Besides these there are the following projects which would benefit the scarcity areas:—

- (i) Kukadi ex-Pimpalvandi.
- (ii) Bhima Lift Irrigation ex-Ujjani,
- (iii) Sina canals ex-Kolegaon.

In case the above projects are taken up the irrigated acreage in the talukas of Karmala would go upto 35.9 per cent. in Mohol to 44.6 per cent. and in Madha to 17.0 per cent. The talukas of Madha, North Sholapur, South Sholapur and Akkalkot have, however, no prospect of getting sufficient protection from major irrigation.

146. A programme of well-sinking in areas commanded by major irrigation and the provision of cheap electric power for pumping are recommended.

(ii) Soil Conservation.

147. There is good scope for contour bunding work in the whole district. The Committee, however, recommends that contour bunding work should be immediately taken up in the talukas of Madha, North Sholapur, South Sholapur, Akkalkot and Barsi which are not likely to be adequately protected by major irrigation.

(iii) Minor irrigation.

148. It is possible to develop some bandharas and tanks on rivers outside the major irrigation commands. Such works are recommended for talukas which are likely to have less than 20 per cent. area under irrigation.

(iv) Animal Husbandry.

149. The whole district is known for cattle breeding, sheep rearing and poultry keeping. It is recommended that large scale breeding farms for khillar cattle, sheep and poultry should be established at suitable centres.

150. The intensification of veterinary aid for animals and improvement in existing marketing facilities for poultry is recommended.

(v) Forests.

151. There is a large area classified as (i) revenue forests, (ii) barren and uncultivable land, and, (iii) grazing and grass. Sizeable areas should be made over to the Forest Department for development as forests and pastures on scientific lines.

Ahmednagar District.

Of the areas regarded as affected by chronic scarcity, Shrigonda taluka and Rashin circle of Karjat are scarcity areas of 'A' category; Parner, Ahmednagar and the major portion of Karjat taluka are of 'B' category and the remaining three talukas of Sangamner, Jamkhed and Pathardi are of 'C' category.

(i) Irrigation.

152. The Ghod Project which is in progress would benefit Shrigonda and Karjat talukas to the extent of 30,800 acres and 28,000 acres respectively. The Kukadi project, if undertaken, is expected to benefit Parner to the extent of 32,300 acres, Shrigonda Taluka to the extent of 74,000 acres, and Karjat to the extent of 62,500 acres. The project on Sina river could also benefit Karjat taluka to the extent of 19,000 acres. The Adhala-Mahalungi Project would benefit Sangamner to a small extent of 6,650 acres.

(ii) Soil Conservation.

153. There is good scope for contour bunding in this district. As a number of talukas would receive adequate protection from major irrigation, the contour bunding programme should be undertaken early in the remaining talukas of Ahmednagar, Sangamner, Pathardi and Jamkhed, which would not receive that protection.

(iii) Minor Irrigation.

154. There is scope for constructing bandharas and tanks. Suitable sites should be located in the talukas of Ahmednagar, Parner, Sangamner, Pathardi and Jamkhed as these areas will not be adequately protected by major irrigation.

(iv) Afforestation.

155. The large area classed as revenue forests, and barren and uncultivable wastes should be handed over to the Forest Department for development as grazing areas or forests.

156. The high-lying rugged terrain in Sangamner, Parner and Rahuri, are suitable for forest and grass development. The plantation of agave and birda (nyrabolans) should be taken up in these areas.

(v) Animal Husbandry.

157. There is scope for development in the talukas of Ahmednagar, Jamkhed and Pathardi, while sheep rearing is suited to the plateau areas of Sangamner and Parner. Facilities should be provided for the development of these subsidiary occupations.

Poona District.

The talukas of Dhond and Sirur are regarded as precarious areas of class 'A'; while parts of Indapur, Baramati, Purandhar and Haveli are considered as scarcity areas of Class 'B'.

(i) Major Irrigation.

158. The Mutha canals have benefitted Haveli taluka to the extent of 15,000 acres and Dhond taluka to the extent of 4,150 acres. The Nira Left Bank Canals have provided irrigation to Baramati and Indapur talukas to the extent of 44,272 acres and 38,500 acres respectively. The Ghod Project in progress would protect an area of 1,53,000 acres in Sirur. The Mutha project which is under construction would afford protection to Dhond taluka to the extent of 1,02,000 acres and to Indapur over 75,000 acres. The projects on River Bhima ex-Chaskaman and Pimpalgaon are capable of benefitting areas in Haveli, Dhond and Sirur talukas. Similarly, the Kukadi project would benefit Sirur taluka. On completion of the projects in progress and others which could be undertaken, the percentage of irrigated area to net cropped area would be :—Dhond—61 per cent., Sirur—24 per cent., Indapur—46 per cent., and Baramati—35 per cent. All the talukas except Purandhar and Haveli would thus be adequately protected.

159. There is need for a programme of well construction and of supply of electric power for pumping water in the areas under major irrigation.

(ii) Soil Conservation.

160. Contour bunding is recommended for the Purandhar taluka as this area is not likely to get advantage of major irrigation.

(iii) Minor Irrigation.

161. It is possible to develop a large number of small irrigation tanks and bandharas for seasonal irrigation outside the major irrigation command. A survey of suitable sites should be taken up in Purandhar taluka which would not be protected by major irrigation.

(iv) Animal Husbandry.

162. The hilly areas in Baramati, Dhond, Indapur and Sirur are suited for cattle breeding and sheep rearing. A large cattle breeding farm for khillar is recommended which should be located in Indapur or Dhond taluka.

(v) Industries and Power.

163. The availability of irrigation facilities would provide scope for establishing sugar factories in Dhond, Indapur and Sirur talukas. Provision of electric power is recommended to these areas and to Purandhar taluka for pumping sets on wells.

AHMEDABAD DIVISION.**Banaskantha District.**

Santhalpur, Radhanpur, Wav and Tharad talukas are considered as scarcity areas of Class A, and parts of Dhanera and Deodar talukas are scarcity areas of Class B.

(i) Irrigation.

164. There is no major irrigation scheme protecting the scarcity areas of this district. There is some prospect of getting water from the River Indus to serve a part of this area. The exact scope of this scheme is not known. If arrangements could be made with Pakistan Government to supply the Indus water, its utilisation in the above scarcity areas should be given a high priority.

(ii) Drinking Water.

165. There is acute hardship in some of the villages, particularly those near the Runn of Kutch. This question requires to be given the highest priority in this area and drinking water should be made available by pipe-line from the adjoining areas where tube wells have been constructed or from other available sources as done in Bhal area of Surendranagar and Ahmedabad. Suitable schemes should be prepared for compact groups of villages with a sizeable population.

(iii) Bunding.

166. The area suitable for bunding in the scarcity zone is estimated at 1 lakh acres. As the soil in this area are generally sandy, the technical aspects of conservation should be examined from the point of view of the benefits likely to be served before a programme of contour bunding is introduced. Dry farming and strip cropping would prove beneficial in this area.

(iv) Cattle Breeding.

167. There is great scope for cattle breeding in this district. A cattle breeding farm at Kankrej or Deesa should be established and the number of premium bulls should be increased.

(v) Afforestation.

168. A forest belt is essential in this area adjoining the Runn of Kutch. The plantation of Villaiti Babul along the border and in sizeable blocks in barren area is recommended.

Mehsana District.

Harij Mahal, Sami taluka and part of Chanasma taluka are considered as scarcity areas of Class A; the remaining part of Chanasma and parts of the Patan, Sidhpur, Kadi and Kalol talukas are areas of Class B.

(i) Irrigation.

169. The areas which are not so far protected by irrigation schemes are Sami, Harij (part), part of Chanasma and Kakoshi and the Khakharia areas of Sidhpur, Kadi and Kalol would be protected if the high level Narbada scheme is taken up. This scheme requires to be taken up early as large areas of North Gujerat and Saurashtra regions affected by scarcity would be protected by this scheme.

(ii) Land Improvement.

170. Though an area of about 1,46,000 acres in scarcity areas is considered available for contour bunding, the soils being generally sandy; the exact scope of contour bunding appears to be limited. Due to salinity, drainage would appear to be more important than bunding.

171. The preparation of drainage channels in the areas not likely to come under irrigation command on the lines of those existing in Viramgam Taluka requires investigation.

(iii) Minor Irrigation.

172. In the areas affected by salinity, wells for irrigation would not be useful. Certain sites for minor irrigation tanks have been suggested for investigation.

(iv) Cattle Breeding.

173. The district exports the largest number of buffaloes to Bombay and other places. Breeding of pedigree buffaloes requires to be taken up in this area. A Cattle Breeding farm should be started in Patan or Chanasma having irrigation facilities.

174. Ahmedabad market being near, there is scope for developing dairy industry in this district on the lines of the Anand Dairy Scheme.

(v) Afforestation.

175. There are large areas of waste lands in certain parts of the scarcity areas which would be suitable for afforestation to protect and improve the surrounding areas. The Villaiti Babul definitely grows without much effort. It would be necessary to select a few sizeable areas on the basis of a rapid survey.

(vi) Drinking Water.

176. Sub-soil water in some of the villages of Harij, Sami and Chanasma being brackish, hardship is felt to procure drinking water. Except in villages where sweet water could be obtained by deep bores, it would be necessary to supply water from the adjoining areas by pipe line. A special survey of these areas from this point of view should be undertaken and specific schemes formulated for inclusion in the Third Five-Year Plan.

Ahmedabad District.

Viramgam taluka is a precarious area of class A, Dhanduka taluka and a part of Dholka taluka are of class B and the remaining part of Sanand taluka are scarcity areas of class C.

(i) Irrigation.

177. Some of the medium and minor irrigation schemes already taken up in the district would give protection to parts of Viramgam, Dholka and Sanand. However, the major part of Dhandhuka and parts of Viramgam, Dholka and Sanand would remain unprotected. About 10,000 acres of Sanand Mahal would be benefitted by the Sabarmati (Dharoi storage) scheme and the remaining parts of Viramgam, Dholka and Sanand could be irrigated by the upper Narbada Scheme. It is necessary, therefore, to take up both the schemes as early as possible.

(ii) Drainage

178. Schemes like Ghoda feeder which serve double purpose viz., draining the storm water and feeding storage tanks, are found useful in this area. For taking up similar schemes a survey of the area not served by major irrigation scheme and not served by double purpose bunds should be undertaken.

(iii) Bunding

179. The scope for bunding in this district would be restricted to the areas which are not saline and which are not suitable for double purpose bunds. Areas which would benefit from major irrigation have to be excluded. In the bunded areas, which are not affected by salinity, a programme of well construction is required.

(iv) Afforestation.

180. There are large waste lands in the southern Viramgam and the western parts of Sanand and Dhandhuka which should be afforested by planting trees suitable for saline areas.

(v) Drinking Water.

181. A scheme for supplying potable water by pipe line has been undertaken to serve some of the villages of Bhal area. Similar schemes should be investigated for other villages in the Bhal area in which no potable water is available nearby.

(vi) Fisheries.

182. The scope for fishing along the sea coast of Dhandhuka and in some of the inland waters specially the 'Nal Sarover' should be examined by the Department of Fisheries.

Panch Mahals District.

Only Dohad Taluka is considered as a scarcity area of class C.

(i) Irrigation.

183. About 14,000 acres have been brought under medium irrigation works. Some surface tanks may be feasible but the main problem is to educate the people to utilise the water available from rainfall and irrigation works.

(ii) Bunding.

184. The area is suitable for contour bunding. The estimated acreage to be bunded is 60,000 acres.

(iii) Afforestation.

185. There is good scope for forest development in this area which gives part-time employment to the Adivasi cultivators. There is an area of 12297 acres of Government waste land in this taluka from which suitable blocks could be selected for afforestation.

186. There appears to be scope for a saw mill to take out timber sizes for building purposes and for export of forest produce.

(iv) Cattle Breeding.

187. The number of cattle being in excess of the local resources, it is necessary to regulate their number.

188. There is scope for establishing a cattle breeding farm in the interior of the taluka to supply pedigree bulls and cows.

Kaira District.

Cambay and Matar Talukas in this district have been considered as scarcity areas of Class B and Mehmedabad as of Class C.

(i) Irrigation.

189. The Mahi project which is in progress is expected to serve practically the whole of the scarcity area and would protect it from scarcity and also solve the problem of drinking water. It is therefore necessary to complete that project early.

Broach District.

Half the western part of Jambusar Taluka is Class B scarcity area and the remaining half along with Wagra Taluka and part of Hansot along the sea coast are scarcity areas of Class C.

(i) Irrigation.

190. The entire scarcity area would be protected by the low level Narbada scheme which is in progress.

(ii) Drinking Water.

191. There are about 20 villages in Jambusar and Wagra which experience hardship. This difficulty would also be solved when major irrigation is received.

(iii) Land Improvement.

192. There is, however, a strip of Khar land in this area which would require specialised treatment on the lines of other Khar Lands in the State.

RAJKOT DIVISION.

Kutch District

The whole district is affected by scarcity. The talukas of Anjar, Nakhtrana, Abdasa, Lakhpat, Rahpar, Khavda and Khadir are considered as scarcity areas of class 'A'; the talukas of Mundra and Bachav of class 'B' and the remaining talukas of Mandvi and Bhuj of class 'C'.

(i) Irrigation.

193. Well irrigation is developed in the talukas of Bhuj, Nakhtrana, Anjar, Mandvi and Mundra. In other talukas scope for wells construction is limited. The projects undertaken during the I and II Plan periods would bring under irrigation an additional area of about 58,000 acres. The talukas of Bhuj, Nakhtrana and Mandvi would get fair protection on completion of these projects. The reliability of the irrigation tanks and projects is, however, very low in years of low rainfall. The following medium irrigation projects which have been surveyed are recommended :—

Taluka.	Name of location of the project.	Area likely to be irrigated.
Anjar	... Taper	... 9,240
Anjar	... Khedoi	... 2,553
Nakhtrana	... Chhawad	... 13,335
Nakhtrana	... Bhujinath	... 6,720
Nakhtrana	... Aral	... 3,883
Nakhtrana	... Kharadia	... 1,470
Nakhtrana	... Godaputa	... 1,155
Nakhtrana	... Mathal	... 2,730
Abdasa	... Jangadia	... 8,557
Abdasa	... Chok	... 1,200
Lakhpat	... Nara	... 9,135
Lakhpat	... Ghodhtad	... 7,665
Lakhpat	... Ber	... 1,512
Rahpar	... Karude-Dabunda	... 1,155
Khavda	... Juna Dabunda	... 2,200
Mundra	... Kalaghoga	... 3,885
Bachav	... Adoi	... 2,900
Bhuj	... Kaswati	... 1,595

194. There is prospect of getting supplies of Indus waters from Pakistan which would be of great value in protecting Kutch against scarcity.

(ii) Soil Conservation.

195. Though there is a large area estimated at over 5,71,800 acres which is considered bundable, contour bunding should be restricted to cultivable areas only where bunding would be economical.

(iii) Animal Husbandry and Fodder supply.

196. The nomadic tribes like Mhaldaries and Bharwars which maintain herds of cattle and flocks of sheep should be assisted to settle where adequate water and fodder resources can be provided.

197. Grazing areas should be enclosed and developed for grass on scientific lines. Farms for breeding Kankrej bulls and Jodia rams should be set up at suitable centres.

(iv) Industries and Fisheries.

198. Surveys to assess the quality and extent of mineral deposits should be undertaken.

199. The possibilities of utilising lignite for power generation should be investigated.

200. The long sea coast offers good scope for developing of deep sea fishing.

(v) Drinking Water Supply.

201. The talukas of Rahpar, Abdasa, Anjar and part of Bhuj experience difficulties of drinking water as the wells and tanks go dry in summer. Deep bores should be tried in the existing wells to augment the supply of water.

Rajkot District.

The talukas of Malia, Morvi and Wankaner are considered as precarious areas of Class C.

(i) Major Irrigation.

202. On completion of the projects on rivers Machu, Aji Demi and Brahmani which are under construction, the irrigated areas would increase to 20 per cent. in Wankaner, 3 per cent. in Morvi and 1.5 per cent. in Malia. No other irrigation projects in the area are feasible. The prospect of securing Indus water from Pakistan should be explored.

(ii) Soil Conservation.

203. The bundable areas in the scarcity talukas of Wankaner and Morvi are estimated at 37,000 acres. Contour bunding programme should be undertaken after ascertaining the area under command of new projects.

(iii) Animal Husbandry.

204. A large cattle breeding farm should be located in the area. A sheep farm in order to produce good rams should also be established.

205. There is scope for developing dairy industry in these areas.

(iv) Forests.

206. The shelter belt to stop the encroachment of the Rann should be completed early.

(v) Drinking Water.

207. A few villages in Mali and Morvi talukas experience acute scarcity of drinking water, as the underground water is saline. Investigation of schemes for piped water supply for these villages is recommended.

Surendranagar District.

All the talukas of the district except the taluka of Chotila are considered to be suffering from chronic scarcity. These talukas are considered as scarcity areas of Class B, with the exception of Dasada which is treated as scarcity area of Class A.

(i) Irrigation.

208. The underground water is generally brackish. A few medium irrigation schemes like Sukhbhadar, Bhogavo, Chandrabhaga, Khari and Brahmani are expected, on completion, to bring about 40,000 acres under irrigation in the district. The highest percentage of irrigation would be in Halvad Taluka which would have 14 per cent. of the cultivated area under irrigation. The High Level Narmada Scheme is recommended as it would benefit substantially the talukas of Dasada, Lakhtar and Limbdi. In areas outside the command of major irrigation, there is scope for investigation of suitable sites for minor irrigation tanks.

(ii) Soil Conservation.

209. The talukas of Muli, Sayala and Wadhavan afford scope for contour bunding. The bundable acreage in these talukas is estimated at 3 lakh acres. In the other flat areas the possibility of constructing double purpose bunds on the lines of Viramgam taluka should be investigated.

(iii) Afforestation.

210. The work of establishing the shelter belt for immobilizing the Rann of Kutch should be completed early.

(iv) Animal Husbandry.

211. There is scope for a large cattle breeding farm and establishing dairy units.

(v) Drinking Water.

212. As the underground water in the areas bordering the Rann is brackish, piped water supply schemes should be investigated for villages which experience difficulty of drinking water.

Bhavnagar District.

The talukas of Gadhada, Bhavnagar (northern part) and Vallabhipur (eastern part) are regarded as precarious areas of class 'B' while the talukas Botad, Gariadhar, Kundla Mahuva (Part), Bhavnagar (part) and Vallabhipur (part) are grouped under category 'C'.

(i) Major Irrigation.

213. The area under irrigation in the scarcity affected talukas is small and mostly under wells. There seems to be no possibility of developing any major projects to benefit talukas of Bhavnagar, Vallabhipur and Gariadhar. The other talukas would be benefitted by the projects on Bhimdad, Surajwadi, Malan and Shetrunji rivers. The taluka of Mahuva would get the maximum benefit to the extent of 22,500 acres. The projects on Sukhabhadar and Bagad rivers are recommended to benefit Botad and Mahuva talukas.

(ii) Soil Conservation.

214. Excepting in the Bhal and the coastal areas, there is good scope for soil conservation work. The bundable area in the scarcity part is estimated at 5,75,000 acres. Contour bunding is recommended in all talukas except those where more than 20 per cent. of the area would be under major irrigation.

215. If the results of the Dutch Scheme of land reclamation are promising, it should be extended to other adjoining areas which have a similar problem.

(iii) Animal Husbandry.

216. The establishment of large breeding farms for Gir cattle and sheep is recommended.

(iv) Forests.

217. A survey for demarcating large areas for afforestation and grass areas is recommended.

(v) Industries and Power.

218. In view of the scope for developing small-scale industries, an Industrial Estate should be established in the district.

(vi) Fisheries.

219. In view of the scope available for developing fishing industry, provision of facilities for deep sea fishing, storage and marketing of fish is recommended.

(vii) Drinking Water.

220. The problem of drinking water exists in some of the villages of Bhal tract due to the underground water being brackish. An early survey for preparation of schemes for supplying piped water to groups of villages is recommended.

Jamnagar District.

The talukas of Okhamandal, Kalyanpur, Jodia and Kalwad are regarded as chronic scarcity areas. Okhamandal taluka is considered as scarcity area of Class A, Kalyanpur, of Class B and Jodia and Kalwad as Class C.

(i) Irrigation.

221. The existing area under irrigation is negligible. There are no important major or medium schemes except the Fulzar scheme which is under construction and the Dhandh scheme which could be taken up. These schemes would benefit Kalwad and Kalyanpur talukas to the extent of 4,500 and 1,800 acres respectively.

222. The development of minor irrigation tanks and bandharas for seasonal irrigation should be taken up wherever suitable sites can be located.

(ii) Soil Conservation.

223. There is good scope for contour bunding. The total bundable area in scarcity talukas is estimated at 4,75,000 acres.

(iii) Animal Husbandry.

224. To develop cattle breeding and sheep-rearing, which are important occupations in this district, the existing grass areas should be improved by rotational grazing and sizeable blocks of barren and waste lands should be enclosed and improved for grazing.

(iv) Drinking Water.

225. Drinking water difficulties are experienced by many villages. Schemes for supply of water to villages should be prepared on the lines of one already sanctioned.

(v) Industries.

226. Bauxite and Gypsum are found in Kalyanpur taluka. Further investigations to assess the quality and extent of these deposits should be taken up.

Amreli District.

The talukas of Lathi, Amreli, Khamba, Jafrabad, Rajula, Babra and Lilia are considered as chronic scarcity areas. Lathi taluka is scarcity area of Class B, while the rest are classified as C.

(i) Irrigation.

227. Only small areas are irrigated by wells. The Khodiar project would benefit an area of 18,500 acres in Amreli taluka and 500 acres in Lilia taluka. The Shetrunji project would cover 13,000 acres of Rajula taluka and 7,500 acres of Jafrabad.

228. Minor irrigation schemes already surveyed in the talukas of Khamba and Lathi should be taken up.

(ii) Soil Conservation.

229. There is scope for undertaking programme of contour bunding in these areas. An area of 4 lakh acres outside the major irrigation commands is considered bundable. A programme for constructing wells in banded areas should be taken up.

(iii) Animal Husbandry

230. As this district is the home of Gir cows and Jafrabad buffaloes, large scale farms for these breeds should be located at suitable centres.

(iv) Industries and Fisheries.

231. The large acreage under groundnut and a long coast-line with good ports at Jafrabad and Kodinar, afford good scope for development of industries like oil-pressing, vegetable products, soap manufacture, and fishing industry.

(G.C.P.) L-A H 644-9a

CHAPTER VIII

CONCLUSION.

1. The Fact Finding Committee worked as a Study Group under the Committee of Secretaries referred to in Paragraph 3 of Chapter I. The Committee of Secretaries held six meetings and generally guided the Fact Finding Committee in the matter of its scope and method of work and also indicated the broad criteria for determining scarcity areas and fixing priorities for development. The Fact Finding Committee would like to express its gratitude to the Committee of Secretaries for the very valuable guidance it gave from time to time.

2. The Committee would like to acknowledge with thanks the considerable assistance it received from the Bureau of Economics and Statistics of the Government of Bombay, in the compilation of basic data for each taluka, in the collection and analysis of the figures relating to rainfall, in the preparation of maps and in the conduct of survey of percolation tanks. The Deputy Director of the Bureau, Shri P. J. Divatia, was closely associated with the earlier meetings of the Committee and made valuable contributions to the work of the Committee relating to determination of Scarcity areas.

3. The Committee wishes to record its appreciation of the valuable services rendered by Shri N. V. Desai, Deputy Collector, to the work of the Committee. His intimate knowledge of revenue matters, capacity for organising data and devotion to work have been of great assistance to the Committee. The thanks of the Committee are also due to its staff of two Stenographers, two assistants and two Typists all of whom put in hard work to compile the report in time.

N. S. PARDASANI,
Chairman.

B. S. APTE,
Member.

G. K. PHADTARE,
Member.

SACHIVALAYA :
Bombay, 21st April 1960

APPENDIX I

SCARCITY INQUIRY.

QUESTIONNAIRE.

(General Note.—Except where it is otherwise clear from the context of the Questions, information should be furnished separately for scarcity areas of each taluka in the district).

I. Scarcity Conditions.

1. Comment on the rainfall pattern in your district and indicate which areas you would consider as: (a) precarious, i.e., suffering from chronic shortages; and (b) scarcity affected, i.e., occasionally affected by inadequate or untimely rainfall.

2. Give a short history of the declaration of famine, scarcity, or recognition of conditions akin to scarcity in your district indicating for each of the last 30 years the number of villages affected in each taluka. In case full information is not available, information should be furnished for as many years and as many areas as possible.

3. Give figures of annewari for those villages in which suspension of land revenue was granted at least once in the last 10 years in the Form shown below—

Information regarding annewari for the last 10 years in respect of villages affected by scarcity conditions :—

		Name of Taluka.					
S. No.	Name of village.	Annewari.			Total of Suspensions.		
		1948-49, 1949-50, 1950-51, 1951-52, 1952-53, 1953-54, 1954-55, 1955-56, 1956-57, 1957-58.	Full	Half	Total		

4. Are there any areas in your district where scarcity was declared in the past but no scarcity conditions have been declared during the last ten years? If so, give a brief description of those areas and the factors which, in your opinion, have helped those areas.

5. Are there any areas in your district which did not suffer from scarcity during the earlier years but have been affected by scarcity only during the last ten years? If so, give a brief description of these areas and indicate the factors which you consider are responsible for the change.

II. Land Revenue.

6. Give a brief review of the remission and suspension of land revenue in your district with special reference to scarcity areas. Do you consider any changes necessary in the present policy of remission and suspension?

III. Tagai Advances.

7. Give a brief review of the accumulation of arrears of tagai advances in your district with special reference to scarcity areas. Would you favour any changes in the present policy of repayment?

8. Do you consider the present system of advances of tagai suitable for the needs of the agriculturists? If so, have you any suggestions to improve the system of advances of tagai in scarcity areas?

9. Do you think that the scarcity areas should receive special consideration in the matter of advance of tagai loans—

(a) in a normal year; and

(b) in the year following scarcity?

If so, in what ways?

IV. Drinking Water.

10. Is there a survey made of the drinking-water facilities in the scarcity areas? How many villages in these areas are still without a single well or other dependable source of supply?

11. Do the drinking-water wells in these areas dry up in the scarcity periods? What permanent measures can be taken to ensure supply of water even in scarcity periods? What would you consider as a reasonable minimum of drinking water facilities to be made available in these areas? What would be the approximate cost of such a programme for each taluka?

12. In which of the scarcity areas would it be necessary to provide piped-water-supply? What would be the approximate cost of such a scheme for each of the scarcity-affected areas of your district?

V. Cattle and Fodder Supply.

13. Give a brief account of the quality of cattle in scarcity areas. To what extent has fodder to be imported from—outside (a) in a normal year and (b) in scarcity periods?

14. Have you any suggestions to make regarding increasing production of fodder in or near the scarcity areas?

VI. Holdings and Land Improvement.

15. How does the size of average holding of land in scarcity areas in your district compare with that in adjacent areas? Give figures wherever possible.

16. Distinguish between the different types of soils in the scarcity areas in your district and indicate the special characteristics which render them unfit for cultivation or reduce their productivity considerably. Have any measures been taken so far to deal with this problem? If so, where and with what results?

17. Do you have any cultivable waste in the scarcity areas in your district? If so, what measures would you suggest to bring these under the plough? If possible, give an estimate of the approximate cost involved.

18. Has any land improvement work other than contour bunding been done in the scarcity areas in the district? If so, how much and at what cost per acre? How much more area in the scarcity affected parts can be improved in this way?

19. Has any contour bunding work been done in the scarcity areas in your district? If so, how much? To what extent have the areas in which contour bunding has been done benefitted? How does their yield compare with the yield in other adjoining areas—

(a) in normal years; and (b) in scarcity years?

20. What is the further scope for contour bunding work in the scarcity areas? What will be the approximate cost to complete the entire work in each of the talukas affected by scarcity? What percentage increase in the annual yield would you expect as a result, taking an average period of three years—one scarcity and two non-scarcity?

VII. Irrigation.

21. What is the extent of the irrigated area in the scarcity parts of your district? Give information in the Form indicated below:—

Name of Taluka.

Source. 1	Net Area Irrigated. 2
1. Major Irrigation	...
2. Medium Irrigation	...
3. Tanks	...
4. Bandharas	...
5. Wells	...
6. Other sources	...
Total	...

22. Is the irrigation water available in the scarcity areas in the district utilised fully when the rainfall is poor? If not, what is the percentage of water not utilised and what are the general reasons for failure to make use of this water?

23. Is the irrigation water available in the scarcity areas utilised when the rainfall is timely and adequate? If so, to what extent? If it is not fully utilised during normal years what is according to you the best way of utilising this water fully?

24. Mention the Minor Irrigation works constructed during the last 25 years or so which have gone out of order or have resulted in loss of acreage covered due to unsatisfactory arrangements for maintenance. What arrangements would you suggest for their proper maintenance?

25. Do you have any Percolation tanks in the scarcity areas in your district? If so, is there a marked improvement in the water table of the areas surrounding the tanks? Have the lands adjacent to these tanks suffered from complete failure of crops during any scarcity period?

26. It is said that irrigation tanks are of little use in scarcity areas since they contain no water when the rains are poor and when, therefore, the need for water is greatest. How far is this view justified by experience in your district?

27. Are there any irrigation schemes which you would consider as feasible and highly desirable for the scarcity-affected areas in your district? Which of these schemes have been surveyed? If the schemes are fairly big, please give an idea of the approximate cost and area to be benefitted (by description and by acreage) by each. Proposals sent earlier for inclusion in the Second Plan in general or for any programme in particular but not finally accepted, may please be repeated. For minor schemes, indicate the areas to be covered and the total cost involved.

VIII. Afforestation.

28. Have any measures related to Forest development been undertaken in the scarcity areas in your district? If so, indicate the type of work done and the area in each taluka which has been benefitted.

29. What further measures for Forest development would you favour for the scarcity areas in your district? Indicate the approximate cost of these measures for each taluka and point out in what manner the areas will get the actual benefit of these measures.

30. Are there any industries connected with the utilisation of forest products in your district? Is there any scope for development of these in scarcity areas?

IX. Communications.

31. Do you consider any measures of improvement in communications—Railways, Roads, Bridges, etc., as of special importance in the improvement of scarcity areas in your district? If so, please mention the names of places and the types of development necessary.

XI. Industries, Fisheries and Livestock Development.

32. What are the various industries located in or near scarcity areas in your district? How many people do these employ? Have you any suggestions for developing these or starting other industries including processing industries?

33. Are there any mineral resources in the scarcity areas in your district? If so, to what extent are they exploited? Do you have any suggestions to step up their exploitation or to utilise them in industries?

34. Has there been any development of fisheries in the scarcity areas in your district? Is there any scope for further development in or near the scarcity areas?

35. Is there scope for cattle or sheep development in the scarcity areas in your district? If so, has any development taken place? What schemes would you suggest for further development?

XI. General Review of work done.

36. Indicate the types of work undertaken in the past in the scarcity periods which have been of special value in effecting improvement of scarcity areas. Which types of works have generally deteriorated or otherwise failed to produce any permanent results? Which types are costly or otherwise difficult to maintain?

37. In the context of the development of the district as a whole, have the scarcity areas in your district been comparatively neglected in the past or do they appear to have been specially favoured? Please indicate broadly the position under each Head of Development.

38. Has the population in the scarcity-affected areas been increasing or declining at a rate different from that prevailing in the areas adjacent to them? Is there any marked movement of people from this area or into it?

39. Are there any opportunities of employment available to the scarcity-affected people of your district in adjacent areas, in periods of scarcity or in normal times?

XII. *Future Development.*

40. On what broad lines would you suggest further development of areas liable to scarcity in your district?

41. Would you favour any allocation of priorities in the types of schemes to be undertaken in the scarcity areas in your district—

- (a) during the scarcity periods; and
- (b) as preventive or protective measures?

42. Would you favour any special administrative arrangements for implementing a programme of development of scarcity areas? How should they be related to the normal administration of the various departments at different levels?

43. Have you any suggestions regarding problems of development of scarcity areas which, in your opinion, are not adequately covered by replies to the foregoing questions?

APPENDIX II.

DISTRICTS VISITED BY THE FACT FINDING COMMITTEE.

Serial No.	Date.	District.
1.	4th, 5th and 6th February 1959	Poona.
2.	25th to 27th February 1959	South Satara.
3.	18th to 20th March 1959	Ahmednagar.
4.	2nd to 4th April 1959	Sholapur.
5.	13th and 14th April 1959	Aurangabad.
6.	26th and 27th April 1959	West Khandesh.
7.	28th and 29th April 1959	East Khandesh.
8.	30th April and 1st May 1959	Nasik.
9.	12th and 13th May 1959	Osmanabad.
10.	14th and 15th May 1959	Bhir.
11.	8th to 11th June 1959	North Satara.
12.	22nd and 23rd June 1959	Ahmedabad.
13.	24th and 25th June 1959	Mehsana.
14.	26th and 27th June 1959	Banaskantha.
15.	21st and 22nd August 1959	Rajkot.
16.	22nd to 24th August 1959	Surendranagar.
17.	25th and 26th August 1959	Jamnagar.
18.	29th and 30th September 1959	Nanded.
19.	30th September and 1st October 1959	Parbhani.
20.	4th and 5th November 1959	Bhavnagar.
21.	6th November 1959	Amreli.
22.	8th December 1959	Yeotmal.
23.	9th December 1959	Akola.
24.	10th December 1959	Buldana.
25.	15th and 16th January 1960	Panch Mahals.

APPENDIX III.

Statement showing the Distribution of Average Rainfall.

District.	June to August		June to September		September and October.		June to October		No. of years on which the average is based.
	Average rainfall (in inches).	Average rainy days (in days).	Average rainfall (in inches).	Average rainy days (in days).	Average rainfall (in inches).	Average rainy days (in days).	Average rainfall (in inches).	Average rainy days (in days).	
1	2	3	4	5	6	7	8	9	10
1. Nasik ..	31.65	35	39.51	45	11.37	14	43.02	49	28
2. Sholapur ..	11.50	20	17.64	28	9.55	13	21.03	34	28
3. Poona ..	26.04	32	32.40	40	10.30	14	36.34	46	28
4. Ahmednagar ..	12.21	20	18.51	28	9.50	12	21.72	33	28
5. Buldhana ..	21.97	32	28.08	40	8.12	11	30.09	43	28
6. West Khandesh ..	20.52	30	26.80	38	8.07	11	28.59	41	28
7. East Khandesh ..	20.95	31	27.37	40	8.38	11	29.33	43	28
8. Aurangabad ..	19.08	31	25.58	39	8.76	12	27.84	43	28
9. Yotmal ..	28.60	38	35.93	47	9.37	12	37.97	50	28
10. Akola ..	24.04	33	30.37	42	8.27	11	32.31	45	28
11. Nagpur ..	33.95	40	41.53	50	9.95	13	43.90	53	28
12. Osmanabad ..	20.20	32	27.53	42	9.96	14	30.16	46	28
13. Kolaba ..	105.81	71	123.23	88	22.55	23	128.36	93	28
14. Ratnagiri ..	107.42	74	122.21	91	21.30	24	128.62	98	28
15. Thana ..	79.40	62	92.50	77	17.12	18	96.52	81	28
16. Chanda ..	42.44	44	50.74	55	11.04	14	53.47	58	28
17. Bhandara ..	42.00	43	50.57	53	10.91	14	52.91	57	28
18. Wardha ..	31.45	38	39.78	48	10.44	13	41.89	51	28
19. Amravati ..	27.17	34	34.56	43	9.35	12	36.53	46	28
20. Bhir ..	15.43	24	23.81	33	10.82	12	26.25	37	28
21. Parbhani ..	22.15	32	29.81	41	9.08	12	31.83	44	28
22. Nanded ..	26.22	35	34.55	45	10.30	13	36.52	48	28
23. *North Satara ..	11.04	21	15.72	29	8.64	13	19.62	33	27
24. South Satara ..	12.26	26	15.52	32	8.16	14	20.41	40	9
25. Kolhapur ..	55.49	50	63.55	60	14.35	19	69.84	60	17
26. Bombay ..	63.49	58	77.40	70	15.92	15	79.41	73	15
27. Ahmedabad ..	19.81	23	24.22	28	4.90	6	24.70	20	28
28. Kaira ..	25.04	29	31.10	35	6.69	7	31.73	36	28
29. Surat ..	48.97	47	59.93	57	12.89	13	61.85	60	28
30. Broach ..	26.92	30	34.06	37	8.35	8	35.27	39	28
31. Amreli ..	15.93	20	19.72	26	4.58	6	20.51	27	14
32. Panch Mahals ..	28.51	32	36.88	40	9.67	10	38.18	42	14
33. Banaskantha ..	21.06	23	25.17	28	4.66	5	25.72	28	10
34. Mehsana ..	17.60	24	23.03	29	5.76	6	23.45	30	14
35. Kutch ..	11.57	12	13.52	14	2.10	2	13.67	15	17
36. Madhya Saurashtra ..	19.88	22	23.10	27	3.91	5	23.19	28	27(7)

*The average for this District is based on the (7) Talukwise figures available.

APPENDIX III—contd.

District.	June to August		June to September		September and October.		June to October.		No. of years on which the average is based.
	Average rainfall (in inches).	Average rainy days (in days)	Average rainfall (in inches).	Average rainy days (in days)	Average rainfall (in inches).	Average rainy days (in days)	Average rainfall (in inches).	Average rainy days (in days).	
1	2	3	4	5	6	7	8	9	10
37. Sabarkantha ..	27.54	33	35.22	38	8.63	7	36.17	39	10(4)
38. *Gohilwad ..	15.81	N.A.	21.50	N.A.	5.98	2	21.79	N.A.	6(15)
39. *Zalawad ..	15.69	..	18.63	..	3.60	..	18.69	..	6(9)
40. *Sorath ..	22.86	..	26.51	..	3.92	..	26.78	..	6(15)
41. *Halar ..	18.89	..	21.81	..	2.99	..	21.88	..	6(9)
42. Danga ..	58.10	57	73.45	80	18.00	26	76.10	83	6(2)
43. Baroda ..	34.52	36	43.16	44	9.75	9	44.27	45	15(4)

*Rainy days not available as these are based on the monthly rainfall statistics of Saurashtra State (1950-55), issued by the Directorate of Saurashtra, Rajkot. Figures in brackets in the last column indicate the number of Talukas on which the average is based.

APPENDIX IV.

Area and Population of the Scarcity affected Talukas in Bombay State.

Division	District	Taluka.	A		B		C		Total	
			Area	Population.	Area	Population	Area	Population	Area	Population
Aurangabad	Aurangabad	1. Vaijapur	....	....	....	....	615.45	1,04,825	615.45	1,04,825
		2. Gangapur	....	....	....	....	505.20	85,724	505.20	85,724
		District Total	..	..	..	..	1120.65	1,90,549	1120.65	1,90,549
Bhir	Bhir	3. Bhir (Part)	....	....	....	....	388.0	87,590	388.0	87,590
		4. Ashil	....	....	....	....	581.12	86,222	581.12	86,222
		5. Patoda	....	....	....	....	510.08	83,536	510.08	83,536
		6. Manjlegaon	....	....	....	....	594.56	1,17,020	594.56	1,17,020
		District Total	..	..	..	..	2073.76	3,74,368	2073.76	3,74,368
Osmanabad	Osmanabad	7. Bhoom	....	....	....	....	339.0	50,619.00	339.00	50,619
		8. Parenda (Part)	....	....	....	....	271.0	47,886.00	271.00	47,686
		District Total	..	..	..	..	610.0	98,305.00	610.00	98,305
Total for Division		..	..	..	..	3804.4	6,63,222	3804.4	6,63,222	

Poona	Poona	7.	Sirur	610.5	1,08,108	....	....	....	610.5	1,03,108
		8.	Dhond 1	516.1	89,162	....	....	....	516.1	89,162
		4.	Indapur (part)	....	....	440.0	44,228	....	440.0	44,228
		1.	Baramati (part)	....	....	405.0	1,00,704	....	405.0	1,00,704
		1.	Parandhar (part)	....	....	108.0	25,850	....	108.0	25,850
		4.	Haveli (part)	....	....	102.0	36,130	....	102.0	36,130
			District Total	1126.6	1,92,270	1055.0	2,06,912	....	2181.6	3,99,182

Ahmednagar	Ahmednagar	5.	Shrigonda	617.6	95,007	....	....	....	617.6	95,007
		6.	Karjat	140.0	18,414	420.1	55,244	....	560.1	73,668
		1.	Parner	....	....	690.2	1,06,078	....	690.2	1,06,078
		1.	Ahmednagar	....	....	585.2	2,06,153	....	585.2	20,6,153
		8.	Sangamner	....	....	....	....	624.5	1,29,381	1,29,381
		2.	Pathardi	....	....	....	....	425.4	97,575	97,575
		4.	Jamkhed	....	....	....	....	336.8	59,397	59,397
			District Total	757.6	1,18,421	1695.5	3,67,475	1386.7	2,86,353	3839.8

APPENDIX IV—contd.

Division	District	Taluka	A		B		C		Total	
			Area	Population	Area	Population	Area	Population	Area	Population
Poona	Sholapur	22 Karmala	621.5	1,00,089	.....	.....	.....	.....	621.5	1,00,089
		23 Sangola	699.8	1,03,990	.....	.....	.....	.....	699.8	1,03,990
		24 Madha .. ..	.....	.....	596.5	1,22,174	.....	.....	596.5	1,22,174
		25 Pandharpur .. ..	.....	.....	497.6	1,28,552	.....	.....	497.6	1,28,552
		26 Malahiras .. ..	.....	.....	196.0	40,943	.....	.....	196.0	40,943
		27 Mohol .. ..	.....	.....	.....	.....	549.5	1,02,119	549.5	1,02,119
		28 Mangalvedha .. ..	.....	.....	.....	.....	440.5	70,008	440.5	70,008
		29 Akkalkot .. ..	.....	.....	.....	.....	536.8	1,49,647	536.8	1,49,647
		30 North Sholapur .. ..	.....	.....	.....	.....	284.3	3,25,632	284.3	3,25,632
		31 South Sholapur .. ..	.....	.....	.....	.....	461.5	93,503	461.5	93,503
		32 Barsi .. ..	.....	.....	.....	.....	105.0	31,129	105.0	31,129
District Total ..			1,321.3	2,04,079	1,290.1	2,91,669	2,377.6	7,72,038	4,989.0	12,67,766
North Satara		33 Khandala .. ..	.....	.....	102.0	23,548	.....	.....	102.0	23,548
		34 Man .. ..	.....	.....	556.0	83,478	.....	.....	556.0	83,478
		35 Khatav .. ..	.....	.....	.....	.....	340.0	47,574	340.0	47,574
		36 Phaltan .. ..	.....	.....	.....	.....	152.0	33,260	152.0	33,260
		District Total ..	.....	.....	658.0	1,07,026	492.0	80,834	1,150.0	1,87,860

	.. South Satara	37 Jath	..	..	873.07	1,08,270	..	..	873.07	1,08,270	
		78 Khanapur	..	..	169.00	22,690	..	..	169.00	22,690	
		District Total	..	..	1,042.07	1,30,960	..	..	1,042.07	1,30,960	
		Total for Division	5,205.5	5,09,770	5,740.6	11,04,042	4,256.3	11,39,225	13,202.47	27,53,037
Ahmedabad	.. Banaskantha	Santhalpur	..	..	393.0	36,177	..	..	393.0	36,177	
		Radhanpur	..	..	268.6	45,091	..	..	268.6	45,091	
		Wav	..	..	492.6	68,766	..	..	492.6	68,766	
		Tharad	..	..	420.9	66,371	..	..	420.9	66,371	
		Dhanera (part)	..	..	..	..	216.0	32,254	..	216.0	32,254
		Deodar (part)	..	..	..	..	162.0	32,250	..	162.0	32,250
		District Total	..	..	1,575.1	2,16,405	378.0	64,504	..	1,953.1	2,80,909
Mehsana	.. Harij	..	..	..	158.3	33,655	..	..	158.3	33,655	
		Sami	..	..	522.0	48,248	..	..	522.0	48,248	
		Chanasma	..	..	114.0	37,944	227.0	75,893	..	341.0	1,13,837
		Patan	..	..	..	..	405.0	1,68,424	..	405.0	1,68,424
		Sidhpur (part)	..	..	..	..	64.0	38,700	..	64.0	38,700
		Kadi (part)	..	..	..	..	80.0	30,787	..	80.0	30,787
		Kalol (part)	..	..	..	..	66.0	38,699	..	66.0	38,699
		District Total	..	..	794.2	1,19,847	842.0	3,52,503	..	1,636.3	4,72,350

APPENDIX IV—contd.

Division	District	Taluka	A		B		C		Total	
			Area	Population	Area	Population	Area	Population	Area	Population
Ahmedabad	..	Virangam	650.5	1,59,108	....	....	....	....	650.5	1,59,108
		Dhandhuka	....	....	1,076.9	1,27,265	....	....	1,076.9	1,27,265
		Dholka	....	....	305.0	66,518	304.9	66,518	609.9	1,33,036
		Sanand	....	....	147.2	32,727	147.2	32,726	294.4	65,453
		District Total	650.5	1,59,108	1,529.1	2,26,510	452.1	99,244	2,631.7	4,84,862
Kaira	..	Cambay	....	....	398.6	1,34,316	....	....	398.6	1,34,316
		Matar	....	....	222.7	77,592	....	....	222.7	77,592
		Mehmedabad	....	....	....	....	193.4	1,09,953	193.4	1,09,953
		District Total	....	....	621.3	2,11,908	193.4	1,09,953	814.7	3,21,861
Broach	..	Jambusar (part)	....	....	257.6	61,568	128.3	30,782	385.9	92,350
		Wagra	....	....	....	....	348.0	44,717	348.0	44,717
		Hansot (part)	....	....	....	....	77.0	15,980	77.0	15,980
		District Total	....	....	257.6	61,568	653.3	91,479	810.9	1,53,047
Panchmahals	..	Dohad	....	....	....	....	334.9	1,43,383	334.9	1,43,383
		Total for Division	3,019.9	4,95,360	3,628.0	9,16,993	1,533.7	4,44,059	8,181.6	18,56,412

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Rajkot	Kutch	Anjar	482-0	73,746				1,482-0	73,746
		Nakhatrana	708-0	55,183				708-0	55,183
		Abdasa	940-0	54,182				940-0	54,182
		Lakhpat	1,485-0	12,152				1,485-0	12,152
		Rahpar	1,027-0	70,544				1,027-0	70,544
		Khavda	224-0	6,890				224-0	6,890
		Khadir	118-0	2,240				118-0	2,240
		Mundra			396-0	52,470		396-0	52,470
		Bhachav			641-0	45,699		641-0	45,699
		Mandvi					560-0	97,024	560-0
		Bhuj					840-0	87,130	840-0
		District Total	4,984-0	2,74,937	1,037-0	98,169	1,400-0	1,84,154	7,421-0
	Surendranagar	Dasada	543-5	57,888				543-5	57,888
		Wadhwan							

APPENDIX IV—*continued*

Division	District	Taluka	A		B		C		Total	
			Area	Population	Area	Population	Area	Population	Area	Population
		Wadhwan	....	....	280.6	94,565	....	....	280.6	94,565
		Muli	....	....	316.8	30,502	....	....	316.8	30,502
		Dhrangadhra	....	....	398.8	67,310	....	....	398.8	67,310
		Halvad	....	....	584.9	40,949	....	....	584.9	40,949
		Lambdi	....	....	663.4	1,00,485	....	....	663.4	1,00,485
		Lehtar	....	....	274.0	33,053	....	....	274.0	33,053
		Sayala	....	....	290.7	30,989	....	....	290.7	30,989
		District Total	543.5	57,888	2,809.2	3,97,853	....	....	3,352.7	4,55,741
Jamnagar	..	Okhamandal	273.3	42,424	....	....	....	....	273.3	42,424
		Kalyanpur	....	....	545.6	49,986	....	....	545.6	49,986
		Jodia	....	....	....	....	328.0	52,146	328.0	52,146
		Kalavad	....	....	....	....	440.7	55,424	440.7	55,424
		District Total	273.3	42,424	545.6	49,986	768.7	1,07,570	1,587.6	1,99,980
Bhavnagar	..	Bhavnagar	....	....	102.0	60,538	204.0	1,21,078	306.0	1,81,614
		Gadhada	....	....	255.4	45,163	....	....	255.4	45,163
		Vallabhipur	....	....	89.4	14,607	89.4	14,604	178.8	29,211
		Botad	....	....	....	....	258.8	59,984	258.8	59,984
		Gariadhar	....	....	....	....	162.1	47,087	162.1	47,087
		Mahuva (part)	....	....	....	....	164.0	56,836	164.0	56,836
		Kandla	....	....	....	....	481.4	1,12,008	481.4	1,12,008
		District Total	....	....	446.8	1,20,308	1,359.7	4,11,598	1,806.6	5,31,908

Amreli	Lathi	..	....	....	361.2	84,059	....	....	361.2	84,059
	Amreli	..	....	....	....	....	259.3	82,549	259.3	82,549
	Khamba	..	....	....	....	....	142.3	19,260	142.3	19,260
	Jafrahad	..	....	....	....	....	148.6	29,842	148.6	29,842
	Rajula	..	....	....	....	....	292.3	59,768	292.3	59,768
	Babra	..	....	....	....	....	142.4	47,447	142.4	47,447
	Liliya	..	....	....	....	....	152.1	34,365	152.1	34,365
District Total		..	....	....	361.2	84,059	1,137.0	2,73,187	1,498.2	3,57,246
Rajkot	Malis	..	....	....	....	....	287.4	40,197	287.4	40,197
	Morvi	..	....	....	....	....	609.0	1,24,597	609.0	1,24,597
	Vankaner	..	....	....	....	....	432.4	60,821	432.4	60,821
	District Total		1,308.8	2,25,615	1,308.8	2,25,615
Total for Division		..	5,800.8	3,75,249	5,199.8	7,50,375	5,974.2	12,02,121	16,974.8	23,27,745

APPENDIX V.

Benefits of Percolation Tanks.

In order to assess the usefulness of percolation tanks the Bureau of Statistics and Economics was requested to carry out a sample survey and give an analysis of the data collected indicating the percentage increase in irrigation resulting from the construction of percolation tanks. Accordingly, the Bureau of Statistics carried out a sample survey covering 10 percolation tanks in the Districts of North Satara and Ahmednagar. The note submitted by the Bureau of Statistics is reproduced below. For the reasons detailed below, the Committee took the view that no conclusions could be drawn.

(1) Assuming that all the water or at least major portion of the water stored in a percolation tank after allowance for evaporation losses at the pond finds its way by percolation to the wells situated at a level lower than the bed of the tank, the replenishment of the underground water resources depends on the quantity of water stored in a percolation tank. In the sample survey carried out by the Bureau of Statistics the number of wells fed by such tanks and the quantum of water stored by such tanks were not considered as a correlated item. For example, in the case of Aljapur tank in Patan taluka the total number of wells commanded by the percolation tank is only six and the Bureau of Statistics has also considered the six wells for the purpose of sample survey. In other words, the results obtained would indicate maximum utilisation of the underground water resources since the tapplings done are comparatively small, whereas in case of Kanandgaon percolation tank only 20 wells were selected out of a total number of 76 wells expected to derive benefit from the percolation tank.

(2) The capacity of the tanks has not been mentioned and has not been considered for the purpose of availability of water by percolation into the wells.

(3) It is also a well-known fact that the underground water resources are depleted to a great extent at the end of a bad season. Consequently, if a bad season is followed by another bad season the quantum of water available for irrigation in a well is miserably small. It is in such a year that irrigation needs are the maximum, that is, the number of waterings required to bring the crop to maturity is high. Consequently, in such a year the actual area irrigated is very small both in kharif and in rabi (a) since the basic availability of underground water is itself small and (b) the actual waterings required to bring the crop to maturity is larger. It is also a well-known fact that if the monsoons are reasonably fair to bring the crops to maturity during monsoons a maximum of one watering is required to get a good crop. The available water resources in a well can, therefore, serve a large acreage in such a year during the monsoon period. Similarly, for rabi irrigation if the rainfall in the year happens to be reasonably good the underground water resources in a well are replenished substantially and the irrigation needs of rabi crop are comparatively very little. Here again, the crops need perhaps one watering, or at the most two, to bring them to full maturity. In view of these facts the area which could be irrigated by a well in a reasonably good year is larger both in monsoons and in rabi. In view of these facts, the base period and the current period selected for comparison have to be fixed with a common ground with reference to the rainfall received during that year and the year previous to it. The year previous to it determines the condition of the subsoil water table prior to receiving replenishment during the current year's monsoon and the precipitation during the current year determines the actual demand of water for irrigation by the standing crops both in kharif and rabi.

(4) Out of the 10 tanks selected by the Bureau, data in respect of four tanks for the base period are not available. The fifth tank namely at Bori was constructed in the year 1957. This tank could therefore be expected to be filled only during the year 1958-59 and accordingly will have only a single year's data for the current period. During the current period the sub-soil water table would receive supplies in one season only and would not build up the sub-soil water table in so short a time. The data in respect of this tank therefore is inadequate. The statement given below shows the figures of rainfall in the previous year and the current year at the nearest rain-gauge stations affecting the tank both for the base period and the current period in respect of the remaining five tanks.

Serial No.	Name of the Tank and Year of construction.	Rainfall in the base year period.	Rainfall in the current period.
1	2	3	4
1	Salpa P.T. (1955)	1952-53	1956-57
		1953-54	24.82
		1954-55	16.64
2	Adriks (Kd.) (1955)	1952-53	1956-57
		1953-54	1957-58
		1954-55	1958-59
3	Kanandgaon (1953)	1950-51	1956-57
		1951-52	19.70
		1952-53	24.35
4	Supa (1954)	1951-52	8.50
		1952-53	25.44
		1953-54	13.02
5	Bhavdi (1952)	1949-50	1956-57
		1950-51	25.50
		1951-52	31.30
		1957-58	17.13
		1958-59	26.20

In view of the differences in rainfall in the two periods no useful comparison can be made to arrive at the benefits of Percolation tanks.

A NOTE ON THE SAMPLE SURVEY OF PERCOLATION TANKS.

Q. 1: Introduction.

Percolation tanks were constructed in some of the areas which are usually subject to scarcity. The purpose behind the construction of these tanks is to increase the area under irrigation and also the irrigation potential of the wells in its vicinity. This increase in potential results from the fact that the water stored in the tank percolates through the soil and by virtue of which the water level in the well increases.

Q. 2: Purposes.

In order to assess some of the important direct benefits accruing from Percolation tanks, a sample survey of the wells commanded by various Percolation tanks was undertaken.

Q. 3: Method of Survey.

Primary data regarding No. of wells commanded by the Percolation tanks under survey was collected from official village records and by contacting Talathis of villages concerned. The survey was conducted by 'personal interviews' with each of the households availing of the selected wells commanded by the tanks. A schedule was canvassed for each of such households.

Q. 4: Coverage and Period of Survey.

The data was collected during the months of January and February 1960. The following tanks were included for the survey :—

Tank No.	Name of Tank.	Bombay State.	
		Taluka or Mahal.	District.
1	Adarki (Bk.) P.T.	Phaltan	North Satara.
2	Aljapur P.T.	Phaltan	North Satara.
3	Salpa P.T.	Phaltan	North Satara.
4	Adarki (Kd.) P.T.	Phaltan	North Satara.
5	Korale P.T.	Phaltan	North Satara.
6	Bori P.T.	Khandala	North Satara.
7	Bhade P.T.	Khandala	North Satara.
8	Kanandgaon P.T.	Rahori	Ahmednagar.
9	Supa P.T.	Parner	Ahmednagar.
10	Bhavdi P.T.	Parner	Ahmednagar.

The tanks, Adarki (Bk.), Aljapur and Korale in Phaltan Taluka could not be taken up for the survey due to two major considerations viz. (i) the tanks were constructed in 1945 or so and hence it was impossible to collect comparative data for the period (it being distant past) prior to the actual construction of tank; (ii) the land records for 1945, prior to the integration of the then Princely State Phaltan Taluka with Indian Union, were not maintained properly.

Q. 5: Sampling Design.

Sampling design used is 'Simple random sampling'; separate sampling was done for each of the abovementioned tanks. For each tank, a list of the wells commanded by the tank (that is generally the wells below the level of the tank were commanded) was prepared in consultation with village Talathis. From the list of wells, a simple random sample of 'twenty wells' was selected without replacement. In the case of tanks, commanding less than twenty wells, all the commanded wells were selected. The basic frame and sample numbers are summarised as follows :—

No. of P.T.	Name of P.T.	Total No. of wells commanded.	No. of selected wells.	Raising Fraction.
1.	Adarki (Bk.) P.T.	25	20	1.25
2.	Aljapur P.T.	6	6	1.00
3.	Salpa P.T.	11	11	1.00
4.	Adarki (Kd.) P.T.	47	20	2.35
5.	Korale P.T.	8	8	0.01
6.	Bori P.T.	67	20	3.35
7.	Bhade P.T.	30	20	1.50
8.	Kanandgaon P.T.	176	20	8.80
9.	Supa P. T.	86	21	4.09
10.	Bhavdi P. T.	52	20	2.60

Q. 6: Period of Data Collected.

In order to assess the effects of the tanks, comparative data about the aspects like actually irrigated (net and gross) area, potentially irrigable but not irrigated area etc., was collected for two periods viz. base period and current period.

Base period covered two agricultural years (i.e. July 1 to June 30) prior to the actual construction of tank, while current period related to the two agricultural years viz. 1957-58, 1958-59. As the year of construction varied with the tank, the base period for collection of information for each of the tanks also differed. On judging the increase in the irrigation potential of any tank, the same has to be related to the year of construction of the tank. Base periods of the tanks are given below:—

Tank No.	Name of Tank	Year of construction.	Base period	
			Year I.	Year II.
1	2	3	4	5
1	Adarki (Bk) P.T.	(1945)	....	....
2	Aljapur P.T.	(1945)	....	....
3	Salpa P.T.	(1955)	1953-54	1954-55
4	Adarki (Kd.) P.T.	(1955)	1953-54	1954-55
5	Korale P.T.	(1945)	....	....
6	Bori P.T.	(1957)	1955-56	1956-57
7	Bhade P.T.	....	....	....
8	Kanadgaon P.T.	(1953)	1951-52	1952-53
9	Supa P.T.	(1954)	1952-53	1953-54
10	Bhavdi P.T.	(1952)	1950-51	1951-52

Q. 7: Broad Conclusions.

(i) For the tanks situated in North Satara District, the increase in net irrigated area in the current period over that in the base period varied between 3.4 per cent. to 6.5 per cent. while in the tanks in Ahmednagar District, the corresponding increase was 19.5 per cent. and 33.5 per cent.

(ii) The percentage increase in gross irrigated area is relatively higher than that in net irrigated area for all the tanks. This signifies that the tendency to grow two or more crops on the same piece of irrigated land has shown considerable improvement with the construction of tanks.

For the tanks situated in North Satara District, the increase in gross irrigated area in the current period over that in the base period varies between 6.0 per cent. to 9.9 per cent. while for tanks in Ahmednagar District, it was 27.8 per cent. and 41.5 per cent.

(iii) The area which could be irrigated but not actually irrigated during the current period varied between 1 per cent. and 29 per cent. of actually gross irrigated area during the current period—the highest percentage was observed in the tanks situated at Adarki (Khurd) in North Satara District and Kanadgaon in Ahmednagar District. The major reasons, for non-utilisation of irrigation potential are:—

- (i) Lack of sufficient implements;
- (ii) Lack of sufficient man-power or Agricultural labourers;
- (iii) Lack of proper bunding system;
- (iv) Lack of hydraulic pump to reclaim areas for irrigation;
- (v) Well of insufficient depth;
- (vi) Dispute among partners owning the well.

The above results show that Percolation Tanks in Ahmednagar District have given relatively better results. This may be due to (i) the tanks in Ahmednagar District were constructed comparatively earlier and (ii) the soil condition in Ahmednagar District might be more suitable so that the water in the tank could percolate.

IRRIGATED AREAS & PERCENTAGE INCREASE.

No. of P. Tank.	Name of P. Tank.	Wells		Base Period		Current Period		Addition.		Percentage Increase.	
		Total.	Selected.	Actually Irrigated area.		Actually Irrigated area.		Additional not irrigated area.	Additional Gross irrigated area.	Net Irrigated area.	Gross Irrigated area.
		3	4	Net.	Gross.	Net.	Gross.	9	10	11	12
				A. g.	A. g.	A. g.	A. g.	A. g.	A. g.		
3	Salpa	11	11	46 29	50 16	48 14	53 27	1 25	3 1	3.487	6.002
4	Aderkai (Khard)	47	20	61 22	73 15	63 26	77 37	2 4	4 22	3.412	6.201
6	Bori	67	20	125 35	157 27	134 2	183 13	8 7	15 26	6.495	9.925
8	Kanadgaon	176	20	60 28	65 12	72 18	83 18	11 30	18 6	19.364	27.795
9	Supa	86	21	38 18	40 22	51 19	57 15	13 1	16 33	33.906	41.492
10	Bhaodi*	(52)*	10	59 17	59 17	72 07	73 19	12 30	14 2	21.457	23.642

* Date for Bhaodi tank is received only for one of the two villages commanded and hence the results against tank No. 10 refer to only incomplete coverage.

APPENDIX VI.

Statement showing Bundable areas in Bombay State.

District.	Taluka.	Classi- fica- tion.	Total bundable acreage.	Acreage bunded up to 31st March 1959.	Acreage to be bunded up to 31st March 1961 (Addi- tional).	Area available for Bunding.
1	2	3	4	5	6	7
I. POONA DIVISION.						
1. Poona	1. Dhond	.. A	1,00,000	9,400	....	90,600
	2. Sirur	.. A	2,10,000	68,500	90,000	51,500
	3. Baramati (Part)	.. B	70,000	9,700	....	60,300
	4. Indapur (Part)	.. B	1,20,000	7,800	10,000	1,02,200
	5. Purandhar	.. B	60,000	14,000	10,000	36,000
	6. Havli (Part)	.. B	22,000	1,200	....	20,800
			5,82,000	1,10,600	1,10,000	3,61,400
2. Sholapur	1. Sangola	.. A	2,25,000	63,500	....	1,61,500
	2. Karmala	.. A	2,50,000	43,000	....	2,07,000
	3. Pandharpur	.. B	1,84,000	49,800	20,000	1,14,200
	4. Madha	.. B	2,25,000	31,200	....	1,93,800
	5. Mangalwedha	.. C	1,43,000	19,800	....	1,23,200
	6. Malashiras	.. C	1,23,000	9,800	....	1,13,200
	7. South Sholapur	.. C	1,50,000	23,500	20,000	1,06,500
	8. North Sholapur	.. C	1,00,000	3,100	20,000	76,900
	9. Akalkot	.. C	2,00,000	6,100	....	1,93,900
	10. Mohol	.. C	2,00,000	27,000	....	1,73,000
	11. Bara	.. C	2,00,000	2,800	60,000	1,37,200
			20,00,000	2,79,600	1,20,000	16,00,400
3. Ahmednagar	1. Shrigonda	.. A	1,30,000	42,200	....	87,800
	2. Karjat	.. A & B	1,15,000	94,600	20,400	....
	3. Parner	.. B	1,68,000	88,300	82,700	....
	4. Ahmednagar	.. B	1,00,000	13,000	2,000	85,000
	5. Pathardi	.. C	1,20,000	2,700	40,000	77,300
	6. Jamkhed	.. C	1,16,000	19,200	55,000	41,800
	7. Sangamner	.. C	1,50,000	10,800	....	1,39,200
			9,00,000	2,68,800	2,00,100	4,31,100
4. North Satara	1. Man	.. B	2,00,000	12,500	7,500	1,80,000
	2. Khatev (Part)	.. C	2,00,000	9,300	6,500	84,200
	3. Phaltan (Part)	.. C	50,000	2,400	2,500	45,100
	4. Khandala (Part)	.. B	20,000	1,600	2,500	15,900
			3,70,000	25,800	19,000	3,25,200
5. South Satara	1. Jath	.. B	3,10,000	31,800	55,000	2,23,200
	2. Khanapur	.. B	70,000	7,500	10,000	52,500
			3,80,000	39,300	65,000	2,76,700
Total for Poona Division			42,32,000	7,24,100	5,14,100	29,93,800

APPENDIX VI—contd.

District.	Taluka.	Classi- fica- tion.	Total bundable acreage.	Acreage bunded up to 31st March 1959.	Acreage to be bunded up to 31st March 1961 (Additional).	Area available for Bunding.
1	2	3	4	5	6	7
II. AURANGABAD DIVISION.						
1. Aurangabad	1. Vaijapur	C	2,00,000	200	19,000	1,80,800
	2. Gangapur	C	1,00,000	900	4,000	95,100
			3,00,000	1,100	23,000	2,75,900
2. Osmanabad	1. Paranda (Part)	C	1,00,000	....	....	1,00,000
	2. Bhoom (Part)	C	1,00,000	....	....	1,00,000
			2,00,000	....	....	2,00,000
3. Bhir	1. Patoda (Part)	C	2,00,000	1,000	2,000	1,97,000
	2. Ashti (Part)	C	2,00,000	4,100	16,000	1,79,900
	3. Manjalegaon (Part)	C	2,00,000	100	....	1,99,900
	4. Bhir (Part)	C	1,00,000	4,000	3,100	92,900
			7,00,000	9,200	21,100	6,69,700
Total for Aurangabad Division ..			12,00,000	10,300	44,100	11,45,800
III. AHMEDABAD DIVISION.						
1. Banaskantha	1. Tharad	A	50,300	22,300	....	27,200
	2. Wav	A	....	....	....	....
	3. Santhalpur	A	....	....	....	....
	4. Radhanpur	A	....	....	....	....
	5. Deedar (Part)	B	25,000	....	....	25,000
	6. Dhanera (Part)	B	25,000	....	....	25,000
			1,00,000	22,300	....	77,700
2. Mehsana	1. Herij	A	10,000	240	300	9,560
	2. Sami	A	10,000	800	200	9,000
	3. Chanasma	A & B	50,000	130	100	49,770
	4. Patan	B	10,000	....	....	10,000
	5. Sidhpur	B	25,000	....	800	24,200
	6. Kadi	B	25,000	2,400	1,600	21,000
	7. Kalol	B	25,000	9,600	1,500	13,900
		1,55,000	13,170	4,400	1,37,430	

APPENDIX VI—contd.

District.	Taluka.	Classi- fica- tion.	Total bundable acreage.	Acreage bunded up to 31st March 1959.	Acreage to be bunded up to 31st March 1961 (Addi- tional.)	Area available for Bunding.
1	2	3	4	5	6	7
III. AHMEDABAD DIVISION—contd.						
3. Ahmedabad	1. Virangam	.. A	1,00,000	160	250	99,590
	2. Sanand	.. B	1,80,000	960	250	1,78,790
	3. Dholka	.. B	1,00,000	....	....	1,00,000
	4. Dhandhuka	.. B	1,70,000	5,490	1,500	1,63,010
			5,50,000	6,610	2,000	5,41,390
4. Panch Mahals	.. Dohad	.. C	1,00,000	28,000	10,000	62,000
			1,00,000	28,000	10,000	62,000
5. Kaira	1. Mehmedabad	.. C	....	....	....	....
	2. Matar	.. B	....	....	....	....
	3. Cambay	.. B	....	....	....	....
6. Broach	1. Jambusar (Part)	.. C	....	....	....	....
	2. Waghra (Part)	.. C	....	....	....	....
	3. Hansot (Part)	.. C	....	....	....	....
Total for Ahmedabad Division			9,05,000	70,080	16,400	8,18,520
IV. RAJKOT DIVISION.						
1. Surendranagar	1. Dasada	.. A	....	....	....	....
	2. Dhrangadhra	.. B	....	....	....	....
	3. Halwad	.. B	....	....	....	....
	4. Wadhwan	.. B	1,00,000	....	....	1,00,000
	5. Muli	.. B	1,00,000	....	....	1,00,000
	6. Sayla	.. B	1,00,000	....	....	1,00,000
	7. Lakhtar	.. B	....	....	....	....
	8. Limdi	.. B	1,00,000	....	....	1,00,000
			4,00,000	....	....	4,00,000
2. Rajkot	1. Wankaner	.. C	1,00,000	3,900	19,000	77,100
	2. Morvi	.. C	2,70,000	1,200	5,000	2,63,800
	3. Malia	.. C	1,00,000	....	....	1,00,000
			4,70,000	5,100	24,000	4,40,900

APPENDIX VI—concl'd.

District.	Taluka.	Classi- fica- tion.	Total bundable acreage.	Acreage bunded upto 31st March 1959.	Acreage to be bunded up to 31st March 1961 (Additional).	Area available for Bunding.
1	2	3	4	5	6	7
3. Jamnagar	1. Okhamandal	A	50,000	....	....	50,000
	2. Kalyanpur	C	1,75,000	....	....	1,75,000
	3. Kalavad	C	1,50,000	2,600	3,500	1,43,900
	4. Jodia	C	1,00,000	300	2,000	97,700
			4,75,000	2,900	5,500	4,66,600
4. Bhavnagar	1. Bhavnagar	B & C	25,000	300	500	24,200
	2. Vallabhipur	B & C	25,000	....	....	25,000
	3. Gadhadra	B	1,00,000	3,700	5,000	90,300
	4. Botad	C	1,10,000	1,200	1,000	1,07,800
	5. Gariadhar	C	75,000	2,700	4,000	68,300
	6. Kundla	C	1,50,000	7,200	2,500	1,40,300
	7. Mahuva	C Part	90,000	1,300	1,500	87,200
			5,75,000	16,400	15,500	5,43,100
5. Amreli	1. Lathi	B	70,000	13,200	6,800	50,000
	2. Bahra	C	1,00,000	....	....	1,00,000
	3. Amreli	C	60,000	3,800	3,200	53,000
	3. Lilia	C	50,000	....	....	50,000
	4. Khamba	C	50,000	....	....	50,000
	5. Rajula	C	50,000	....	....	50,000
6. Jafrabad	C	20,000	....	....	20,000	
			4,00,000	17,000	10,000	3,73,000
6. Kutch	1. Anjar	A	50,000	....	....	50,000
	2. Nakhtrana	A	50,000	....	....	50,000
	3. Abdasa	A	1,00,000	....	....	1,00,000
	4. Lakhpat	A	20,000	....	....	20,000
	5. Rahpar	A	1,00,000	....	....	1,00,000
	6. Khedir and Khavda	A	16,500	....	....	16,500
	7. Mundra	B	50,000	....	....	50,000
	8. Bhachav	B	1,00,000	....	....	1,00,000
	9. Mandvi	C	50,000	....	....	50,000
	10. Bhuj	C	50,000	700	14,000	35,300
			5,86,500	700	14,000	5,71,800
Total for Rajkot Division			20,08,500	42,178	69,000	27,95,322
Grand total			92,43,500	8,46,670	6,43,600	77,53,230

APPENDIX VII

Number of Wells required in Irrigation Commands, in Bombay State.

Taluka.	Name of the Scheme.	Irrigation in acres.	Perennials in acres.	80 per cent. of Perennials in acres.	No of wells at 5 Acres per well.	
1. POONA DIVISION.						
1. Poona District.						
Shirur	1. Ghod Canals ex-Chinchani.	15,300	2,020	1,616	323	
	2. Bhima Left Bank Canal ..	38,100	9,900	7,920	1,584	
	3. Kukadi Project ..	16,600	2,195	1,756	351	
						2,258
						-452
						Net .. 1,806 1,806
Dhond	1. Mutha Canals ..	71,200	16,700	13,360	2,672	
	2. Paragaon Lift ..	35,000	9,100	7,280	1,456	
	3. Bhima Right Bank Canal ex-Pimpalgaon.	16,200	4,240	3,392	678	
						4,806
						Deduct at 20 per cent. for existing wells .. -961
						Net .. 3,845 3,845
Indapur	Nira Left Bank Canal Mutha Right Bank Canal. }	1,07,950	25,400	20,320	4,064	
						Deduct at 20 per cent. for existing wells .. -813
						Net .. 3,251 3,251
Purandhar	Nira Left Bank Canal ..	1,400	3,300	2,640	528	
						Deduct at 20 per cent. for existing wells .. -105
						Net .. 423 423
Haveli	Mutha Canals ..	17,600	4,140	3,312	662	
	Bhima Right Bank Canal ex-Pimpalgaon.	10,800	2,840	2,272	454	
						1,116
						Deduct at 20 per cent. for existing wells .. -223
						Net .. 893 893
Baramati	Nira Left Bank Canal ..	45,062	10,600	8,480	1,696	
	Mutha Canals ..	8,250	1,940	1,552	310	
						2,006
						Deduct at 20 per cent. for existing wells .. -401
						Net .. 1,605 1,605
2. Sholapur District.						
Karma's	Kukadi Left Bank Canal ..	76,800	10,150	8,120	1,624	
						Deduct at 20 per cent. for existing wells .. -325
						Net .. 1,299 1,299

Taluka.	Name of the Scheme.	Irrigation in acres.	Perennials in acres.	80 per cent of Perennials in acres.	No of wells at 5 Acres per well.
Sangola	Nira Right Bank Canal	42,038	9,950	7,960	1,592
					Deduct at 20 per cent. for existing wells .. —318
					Net .. 1,274 1,274
Madha	Ujjani Lift Irrigation Scheme I and II.	22,800	5,940	4,752	950
					Deduct at 20 per cent. for existing wells .. —190
					Net .. 760 760
Pandharpur	Ujjani Lift Irrigation Scheme I	76,050	19,800	15,840	3,168
	Nira Right Bank Canal	1,04,000	24,450	19,560	3,912
					8,030
					Deduct at 20 per cent. for existing wells .. —1,806
				Net .. 6,424 6,424	
Malsira	Nira Right Bank Canal	1,36,500	32,100	25,680*	5,136
					Deduct at 20 per cent. for existing wells .. —1,027
					Net .. 4,109 4,109
Mohol	Ujjani Lift Stage I and II	93,100	24,200	19,360	3,872
					Deduct at 20 per cent. for existing wells .. —774
					Net .. 3,098 3,098
Mangalwedha	Nira Right Bank Canal	42,000	9,860	7,888	1,578
					Deduct at 20 per cent. for existing wells .. —316
					Net .. 1,262 1,262
Akkalkot	Nil.				
North Sholapur	Nil.				
South Sholapur	Ujjani Lift Irrigation Scheme, r.	23,250	7,350	5,880	1,176
					Deduct at 20 per cent. for existing wells .. —235
					Net .. 941 941
Barsi	Nil.				
3. Ahmednagar District.					
Shrigonda	Ghod Canals ex-Chinchani	30,800	4,000	3,248	650
	Kukadi Left Bank Canal. ex-Pimpalwandi	74,000	9,770	7,816	1,563
					2,213
					Deduct at 20 per cent. for existing wells .. —443
					Net .. 1,770 1,770
Karjat	Ghod Canals ex-Chinchani	28,000	3,700	2,960	592
	Kukadi Left Bank Canal	62,500	8,250	6,600	1,320
					1,912
					Deduct at 20 per cent. for existing wells .. —382
				Net .. 1,530 1,530	

Taluka.	Name of the Scheme.	Irrigation in acres.	Perennials in acres.	80 per cent. of Perennials in acres	No. of wells at 5 Acres per well.
Parner	Kukadi Left Bank Canal	32,300	4,270	3,416..	683
				<i>Deduct at 20 per cent. for existing wells</i> ..	-137
				Net ..	546 546
Ahmednagar	Nil.				
Sangamner	Nil.				
Pathardi	Nil.				
Jamkhed	Nil.				
4. North Satara District					
Phaltan	Nira Right Bank Canal	42,000	9,860	7,888	1,578
				<i>Deduct at 20 per cent. for existing wells</i> ..	-316
				Net ..	1,262 1,262
Khandala	Do.	1,000	235	188	38
				<i>Deduct at 20 per cent. for existing wells</i> ..	-8
				Net ..	30 30
5. South Satara District					
Jath	Nil.				
Khanapur	Nil.				
				Total for Poona Division ..	36,128
2. AURANGABAD DIVISION.					
1. Aurangabad District					
Vaijapur.	Upper Godavari Project Part II and Stage I	44,500	5,870	4,696	939
				<i>Deduct at 20 per cent. for existing wells</i> ..	-183
				Net ..	751 751
Gangapur	Upper Godavari Project Part II Stage I.	1,06,900	14,100	11,280	2,256
				<i>Deduct at 20 per cent. for existing wells</i> ..	-451
				Net ..	1,805 1,805
2. Bhir District					
Manjalegaon	Jayakwadi Project Stage I (Sindhphana Project)	44,500	4,005	3,204	641
				<i>Deduct at 20 per cent. for existing wells</i> ..	-123
				Net ..	513 513
				Total for Aurangabad Division ..	3,069
3. RAJKOT DIVISION.					
Nil.					
4. AHMEDABAD DIVISION.					
Nil.					