

LANDFORMS AND LANDUSE  
IN EASTERN R. R. DIST OF A P

DISSERTATION SUBMITTED IN PARTIAL  
FULFILMENT OF THE REQUIREMENT  
FOR THE AWARD OF THE DEGREE

IN MASTER \* OF \* PHILOSOPHY \* IN \* GEOGRAPHY  
By

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Diss

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JAWAHARLAL NEHRU UNIVERSITY

JULY 1983



C E R T I F I C A T E

This is to certify that the dissertation entitled "A study of landforms and landuse in eastern Ranga Reddy district of Andhra Pradesh" is submitted by Neelam Joel Luther in partial fulfillment of the requirements for the Awarding of the Degree of Master of Philosophy in Geography". The work is original and has not been submitted partially or as a whole for the Award of Degree to any other University. The work was done under my supervision and guidance.

*Kusum Chopra*  
21.7.89

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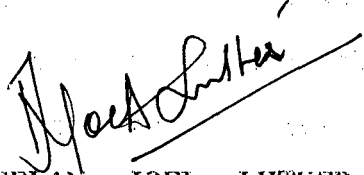
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## ACKNOWLEDGEMENTS

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NEELAN JCEL LUTHER.



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## ABSTRACT

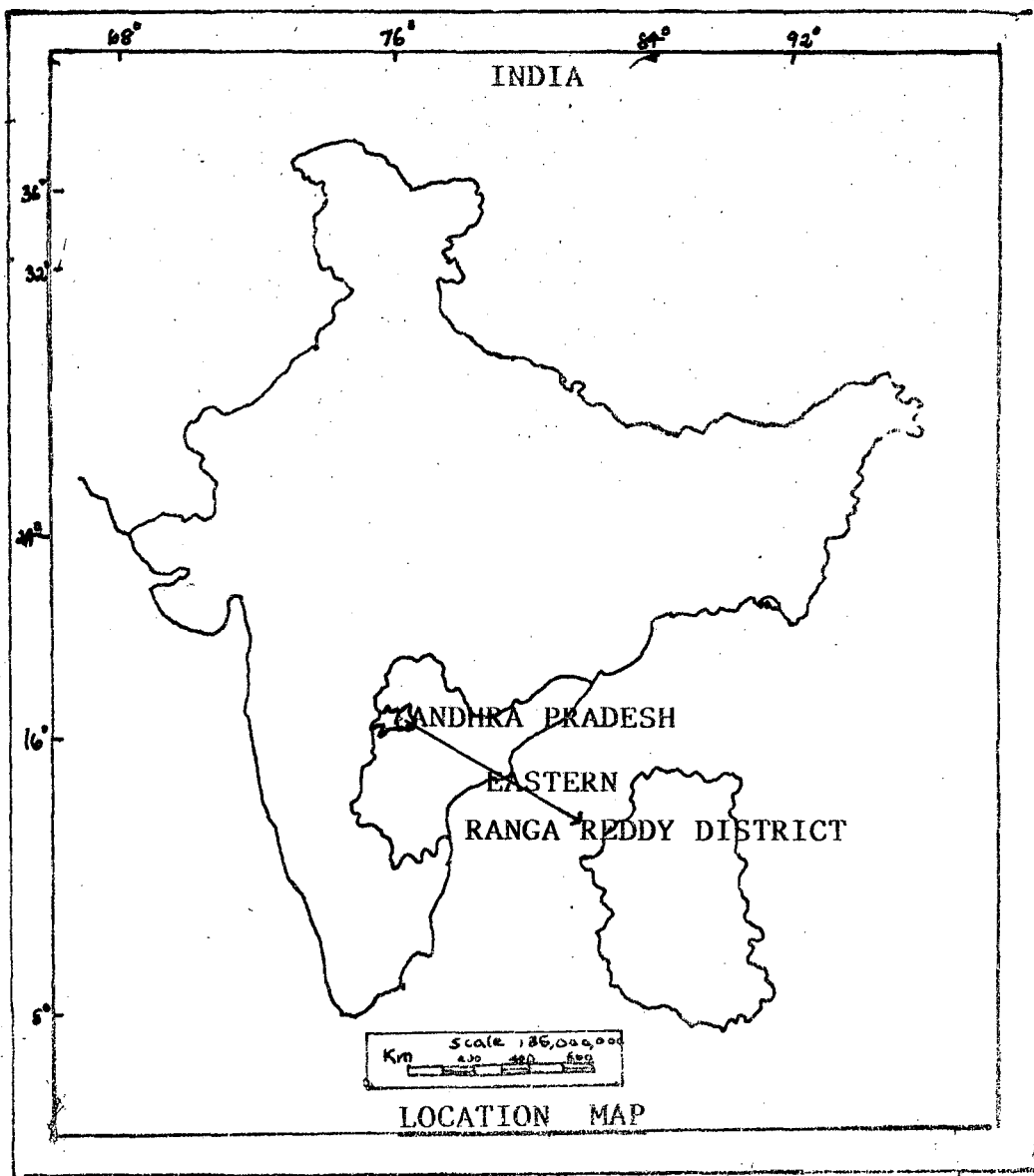
An area of about 1823 square kilometres around metropolitan Hyderabad included in Toposheets Number 56K and a part of 56L on 1: 2,50,000 scale as been mapped in detail. An attempt has been made to study the Geomorphology and the land use pattern of this area to facilitate future studies and land utilisation pattern and environmental problems and their control.

The area mostly consisted of tor and boulder topography showing pedestal rocks characteristic of semi arid regions with a few dolerite dykes intruding here and there mostly in a southwest to northeast direction.

The Archean rocks of this area are granitic which include pegmetites, Feldspar veins and Quartz Veins. White granites, Grey granites and pink granites are found in this area with epidote veins occurring here and there. The strike of lineaments have been studied and the influence of these lineaments on drainage pattern has been studied. Along the fractures the ground water flows out due to seepage in some areas. The drainage pattern is dendritic with shallow valleys.

The land use pattern of the area has been described in the

following pages and has many human settlements around seasonal tanks. Quarrying activity is seen in most of the regions. Soils are red sandy soils which if properly manured and irrigated give good results. This field survey provides information which probably will not be available in the near future due to rapid destruction of Geomorphic features because of human interference.



# EASTERN PART OF RANGAREDDY DISTRICT OF ANDHRA PRADESH

78° 15'

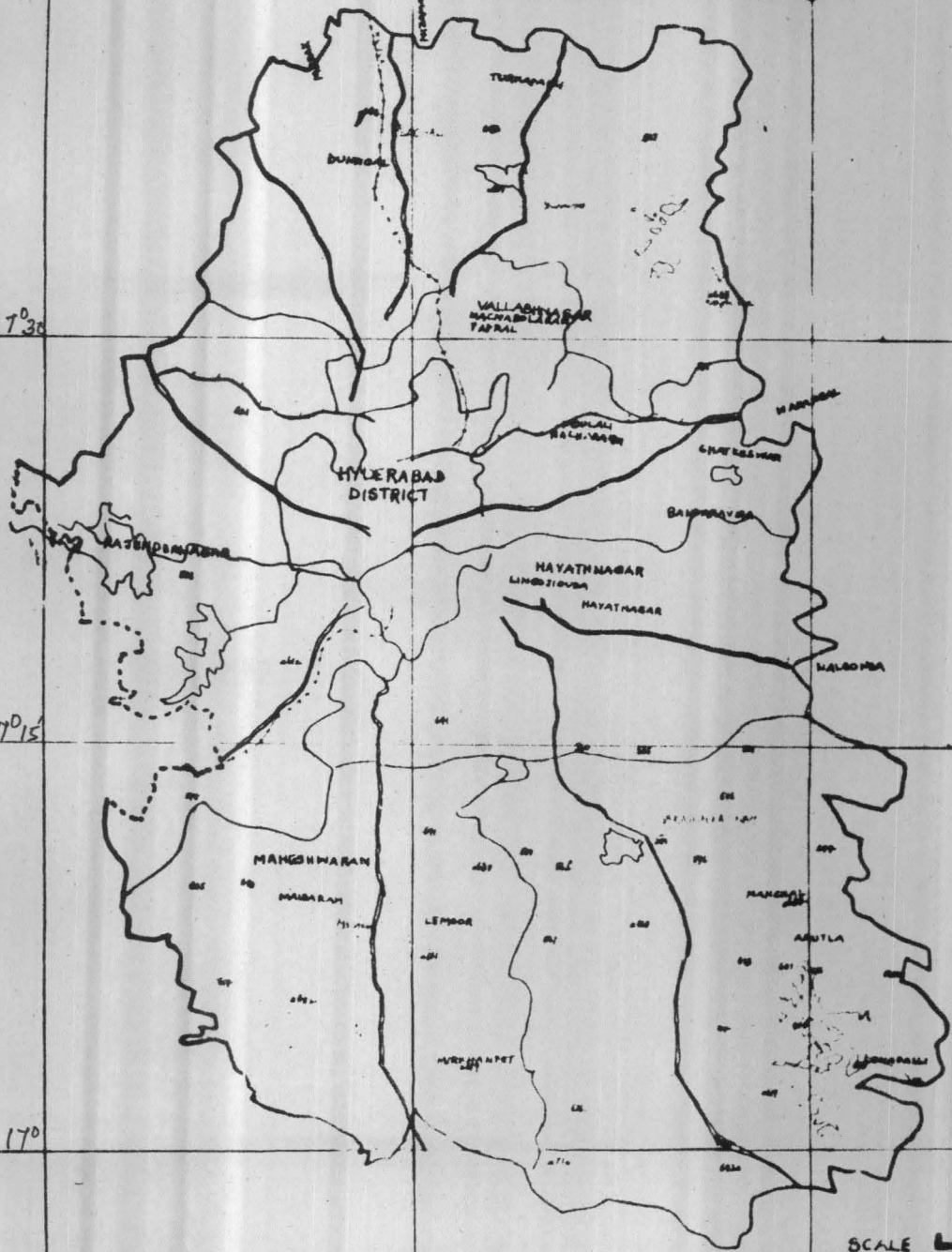
78° 30'

78° 45'

17° 30'

17° 15'

17°



SCALE 1 : 2,50,000

SATELLITE IMAGE IRS

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## INTRODUCTION:

An area of about 1823 square kilometres around Metropolitan Hyderabad and in the eastern part of Ranga Reddy district included in the Toposheets 56 K and 56 L on 1:2,50,000 scale has been mapped in detail on 1:2,50,000 scale. The area lies approximately between 17° and 17°40' of the northern latitudes and 78° 21' and 78° 50' of the eastern longitude. An attempt has been made to correlate the Geomorphology and the other related aspects of this area with the land use pattern in this area to work towards achieving an optimum land utilisation pattern in this area.

## SCOPE OF STUDY

"News of the first ever artificial earth satellite launched into orbit by the Soviet Union went around the world with lightning speed. This was on October 4th 1957."<sup>1</sup> Thirty years have gone and with the passage of time we can now study the earth's resources - Geomorphology and other related aspects and land evaluation with the help of Satellite Imagery. The efforts made in the country include the conduct of aerial flights using different types of sensors like

- 
1. Koval Alexander et Al "Thirty steps into space" in Space flights serve life on earth (p.6) 1987.



cameras, multispectral scanners. Besides those setting up of ground based data processing and interpretation systems for the reception and processing of data from U.S. Land sat satellites was done. All these efforts lead to valuable experience and insight into a number of aspects related to construction and implementation of satellites, remote sensing data reception and processing, analysis and utilisation. With this background an Indian Remote sensing satellite (IRS) was planned for launch during 1985-86 time frame.<sup>2</sup> After launching the IRS satellite, scope for studying the lithology, geomorphology and land use has increased taking into consideration the time frame and keeping the cost involvement in mind. For this purpose exploratory, reconissance and detailed surveys had to be undertaken to correlate the details available in the remote sensed data and the truth available on the ground. After evaluating the ground truth a study to find the best possible land use pattern in the area was done keeping the Geology, Geomorphology, drainage, Hydrogeology, the plants, animals and the interference of man into consideration.

#### OBJECTIVES:

Aim of the present investigation is the evaluation of the various Geomorphic systems, the processes involved and the products obtained. Geomorphic products were identified on the ground and

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2. Deekshatula B.L. and Rajan Y.S., "Foreword" in Remote Sensing. Indian Academy of Sciences Bangalore, (P.,1) 1984.

photographs were taken in order to express the ground truth. Exploratory and Reconnaissance surveys of land use were done in order to draw a land use map, based on the satellite image and the ground truth available. The field work involved the identification of rock, types and their position on the map. The climate hydrogeology soils and land use patterns were studied and were related to the land units found in the area. The environmental problems in the area were noted in order to facilitate future studies and also recognize the place of geology, geomorphology in the planning design and development of regions. The flora and fauna were also studied to a small extent. Each geomorphic unit/landform has been evaluated for its ground water potential, Physiography, Weathering, erosion, composition of soil surface materials, macro and micro climates etc which are useful in planning and management of the available land and environmental resources for optimum land utilization.

#### METHODOLOGY:

The work involved in studying this area included:

- 1) Satellite imagery interpretation.
- 2) Field work.
- 3) Topographic Map work and
- 4) Analysis of Samples taken in the field.

### 1) SATELLITE IMAGERY INTERPRETATION:

An IRS satellite image in the path-row of 2556 and the sub-scene of Liss-2A, taken in a false colour composite film and standard band combination of 2, 3 and 4 passing through the area on 2nd April 1988. The satellite image was taken in summer season as this image had the proper cloud cover which was necessary for geographical and landuse interpretation. The cultivable land was later observed in the field work done after the monsoon for mapping the landuse pattern. The image was on 1:2,50,000 scale and this was mapped to identify the geomorphic features. Geomorphic features were identified during field work and the ground details were verified with the features in the satellite image. A Geomorphological map was prepared to give the accurate graphic representation. The land use pattern was mapped with the help of a TM satellite image.

### TOPOGRAPHIC MAP WORK:

With the help of Topographic map sheets relative relief and the drainage pattern was mapped. For the use of the field study in the Topographic map was sometimes enlarged to a scale of 1 centimetre : 100 metres. Thus facilitating identification and correlation. Drawing pattern was clearly indicated in the map and field work gave

added information incorporating correction on the map. The Topographic map shows a undulating terrain with contours representing a 100 metre slope that is 1:2,50,000 scale and 20 metres slope in 1:50,000 scale. Spurs and valleys were identified and 'V' shaped valleys rock outcrops, traingulation points were identified. Reserve Forest, Vegetation in the area is given in the Topographic map. Shrubs and Bushes are found in most of the area and cultivable land around water tanks and springs and river valleys. It provided very valuable information regarding human settlements and cultural features like Roadways, Railway Lines etc. The density of population was visualized after seeing the colonies in the Topographic Map as well as field work.

FIELD WORK:

The field work involved the identification of rock types, and their position on the map (Preparation of the Geological map), Samples of various rocks and soil profiles were collected. The work included measurement of the direction of Joint planes with the help of a Brunton Compass and the observation of general geomorphic features like rock outcrops, valleys, spurs, gullies and the action of physical and chemical weathering on the same. Photographs of interesting physical features were taken. Physical features like contours, hills, rivers and cultural features like Railway tracks, roads, settlements etc were correlated with the toposheet. The precise position and location of Geomorphic landforms was done by back bearing using the Clinometric Compass. Mineral identification of various granite rock types was undertaken and on this basis the Geological map was drawn. Groundwater conditions and surface water conditions of the area was also studied. Striding was done to measure the lengths of Rivers, hills, valleys etc. Ground truth details were verified keeping Toposheet and the Satellite Imagery in mind. Terrain characteristics like slope, Morphological features, soil type, Erosional characteristic were observed and interesting features were photographed. The ~~features~~ characteristics observed in the satellite image were identified. The various types of vegetation and the various irrigation sources in the area were observed. Soil samples were taken from soil profiles to indicate the amount of weathering and erosion in the area. A photograph of

a pediplain leading from a higher region to a water body was also taken photographs of weathered and erosional characteristics were also taken. Some landuse, photographs were also photographed and water bodies and springs helping in the cultivation of land were observed.

#### LABORATORY ANALYSIS OF SAMPLES:

Soil samples were collected from different soil profiles and each horizon was subjected to sieve analysis seperately to get the medium grain size of the soil to help in classification. Soil samples were dried up thoroughly in the hot sun and hot plate and 100 grains of each layer was taken and put into sieves of various sizes (sieve sizes of 4, 6, 12, 18, 30, 60, 72, 80, 120). The sieves were fitted into the ro-tap and each sample was ro-tapped for a period of 15 minutes. The amount of material in each sieve was weighed in a physical balance and was noted down according to its scale. The sample weights were added up to get its cumulative weight. This was plotted on a graph against phi on the X-axis. The Medium grain size was evaluated and the ~~mask~~ ~~was~~ ~~calculated~~. At different places the PH water samples and the depth of the Water Table was found out to determine whether the water was easily available for cultivation or not. Rock samples were collected to study the mineral contents of the rocks.

DATA BASE

Data for studying the area was collected from satellite imagery obtained from the National Remote Sensing Agency, Hyderabad. The Image was taken by the Indian Remote Sensing Satellite - IA on the 2nd April 1988. The image belonged to the Path-25 and the Row 56 of the satellite travel. The image was a sub-scene Liss-2, A, (Scene specific image). It was made out of a paper print and was a False Colour composite product. The standard band combination were 2, 3 and 4 and the scale was 1:2,50,000 scale. This satellite image was kept on a light table and the Geomorphic features of the whole area was mapped. Then the satellite image was verified with respect to certain test areas by actual ground observations and measurements. A proforma for the verification of ground truth was used. This proforma recorded the path and row of the imagery. The Topographical Map number, The data, Scale of the Toposheet, the latitudes and longitudes were recorded. Besides this the major land use categories with approximate area covered under each category were observed. Terrain characteristics in terms of the Geomorphological features, the type of slope in the area, the soil type and weathering and erosional characteristics were observed. All other details, regarding the strike and dip of joints, veins and their Permeability, solubility, hardness and jointing were noted. Besides the structure of the rocks at various places as to whether



they are massive, stratified, folded or faulted were observed. The field survey provided an insight into the Geological, hydrological, cultural and other factors. Toposheets published by the survey of India were used for field work. They were useful in measuring heights and ground features. The toposheets used in this work were based on both on 1:2,50,000 scale and 1:50,000 scale. The toposheets used in the 1:2,50,000 scale were 56K and 56L. The toposheets used in the 1:50,000 scale were 56 K And 56 K in the northern part of the area covering Medchal taluk. 56K6 , 56K8 , 56K10 , 56K11 , 56K12 and 56K16 were used to observe the features of the surrounding areas immediately outside the Metropolitan Hyderabad and the eastern part (Hayatnagar) taluks and a part of the southern region including Ibrahimpatnam taluk. The toposheets 56L/5 and 56L/9 and 56L/13 were used to survey and observe the southern most part of the area. The data collected on the field was observed and analysed in the laboratory.

#### SELECTION OF THE STUDY AREA:

This particular region was selected because of the availability of the data and because of its varied land use patterns, varied Geological history were tropical landforms as formed in this area help in the study of tropical areas.

AREA STUDIED:

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An area of about 1823 square kilometres included in the topographic sheet numbers No. 56K and 56L have been mapped in detail on 1:2,50,000 scale. The area studied was the Eastern part of the Ranga Reddy district of Andhra Pradesh including the taluks of Medchal, Hayatnagar, Ibrahimpatnam and Maheshwaram. It is accessible by all weathered motorable roads proceeding out of the twin cities of Hyderabad and Secunderabad. To the northwest is the Bombay highway and slightly to the east of it is the road leading to Narsapur. The National Highway Number 7 leading to Nagpur goes via Medchal. The road going via Bolarum leads to Shamirpet and the north eastern side. Towards the Eastern side is the road leading to Ghatkesar from Uppal in Hyderabad. The road leading to Vijayawada goes across Hayatnagar. To the southwest the Nagarjunasagar road which goes via Ibrahimpatnam. The road via Pahadisharief to the extreme south was also taken for the field work.

Lithological, Geomorphological and land use studies were conducted to facilitate an optimum land utilization pattern in the area which is dependant on Geomorphology, Hydrology, Soil and Vegetation cover, the exogeneous processes in the area and the products due to the exogeneous processes like weathering and

erosion. The climate and the rainfall availability in different seasons were also observed.

#### GENERAL GEOLOGY:

The rocks of this area are of the Archean age and are granitic. The granitic massifs have been jointed and have been emplaced by pegmatite veins and epidote veins and a few basic bands of mafic minerals. The general features observed as a direct influence of the Geological structures of the rock are tors and boulders. As a result of Aeolian weathering along weak planes of joints, pedestal rocks are formed.

#### VEGETATION:

Mostly consists of shrubs and bushes with few trees. Vegetation is sparse and is represented by 3 to 4 feet high shrubs. There is a lot of grass growing wherever the water table is high. Cultivable land is found around water tanks and valleys where streams flow. A few vineyards are found around Hyderabad and Secunderabad.

#### DRAINAGE:

Radial and dendritic pattern of drainage is found with streams flowing out on all sides of outcrops. The chief river in the area

is Musi which rises in the Anantagiri Hill to the west of Hyderabad. It flows due east passing through the city of Hyderabad. A reservoir called the Osmansagar across the Musi supplies water to the city of Hyderabad.

#### CLIMATE AND RAINFALL:

Morphogenetically this area is a semi-arid region with Morphological characters of medium to strong action of running water and strong arid action. The South west monsoon brings a heavy rainfall around the first week of June. The average rainfall in the district is 769.9 mm. The rainfall in the district generally crosses from the south towards the north. Due to the continental nature of climate summers are hot with average summer temperature above 30° C and winter temperature around 15-25° C .<sup>3</sup>

#### LAND USE:

The land use pattern generally consisted of built upland including settlements and transportation network, agricultural land including cultivable lands, dryland agriculture, vineyards. Forests were both Reserve Forests and Degraded Forests. Waste lands consisted of fallow land, upland with or without shrub and rocky boulders and barren land. Pastures were found in abundance in this

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3. Alam Manzoor S., "Climate and Rainfall" in The Planning Atlas of Andhra Pradesh (1973).

area. Water bodies are mostly seasonal tanks with streams joining them from elevated areas. There is only one river , River Musi flowing from east to west in this region.

CHAPTERIZATION:

The chapters that were included in the dissertation consisted of 1) Study of landforms. 2) The Land Use Pattern. 3) Landform Landuse Relationship. 4) Summary & Conclusion.

LITERATURE SURVEY

The Andhra Pradesh district gazettiers file records very clearly the Geology physical features and the land use pattern of the Ranga Reddy district. However the last edition was brought out in the year 1983. The NRSA technical report No.0071 records the Satellite Image Interpretation of Andhra Pradesh. Naresh Bedi, also in his paper published as the NRSA technical report No.0745 has given a clear Geomorphic description has found in the landsat image. Prof. Shah Manzoor Alam in the planning Atlas of Andhra Pradesh gives a clear description of the physiographic features, drainage, geology and vegetation of Andhra Pradesh. The Central Government Water Department has clearly described the Hydrogeology and ground water potential of each district in Andhra Pradesh. Voluntary Organisations like Wamarti have been working on different physiographic features and have been instrumental in publishing few reports regarding the ground water availability around the twin cities. The Indian Council of Agricultural Research have mentioned the soil status and about the vegetation of various cropping patterns present in Ranga Reddy district of Andhra Pradesh. A Doctoral Thesis published by Manoj Saxena presents a clear understanding of Musi River Basin. The Geological Survey of India

publication special edition No.9 gives an idea of the Hydrogeology, Geomorphology and the land use pattern in the western part of Medak district and around the twin cities of Hyderabad and Secunderabad. The Andhra Pradesh Engineering Research Labs, The Andhra Pradesh Agricultural University and Water and Land Management Training Research Institute and the Water Development Society have brought out interesting publications which have helped the Author in presenting this dissertation.

The Author was enlightened because of the ideas given by various Geomorphologists, Soil Scientists and the Scientists in the National Remote Sensing Agency.



# GEOMORPHOLOGICAL MAP

18° 15'

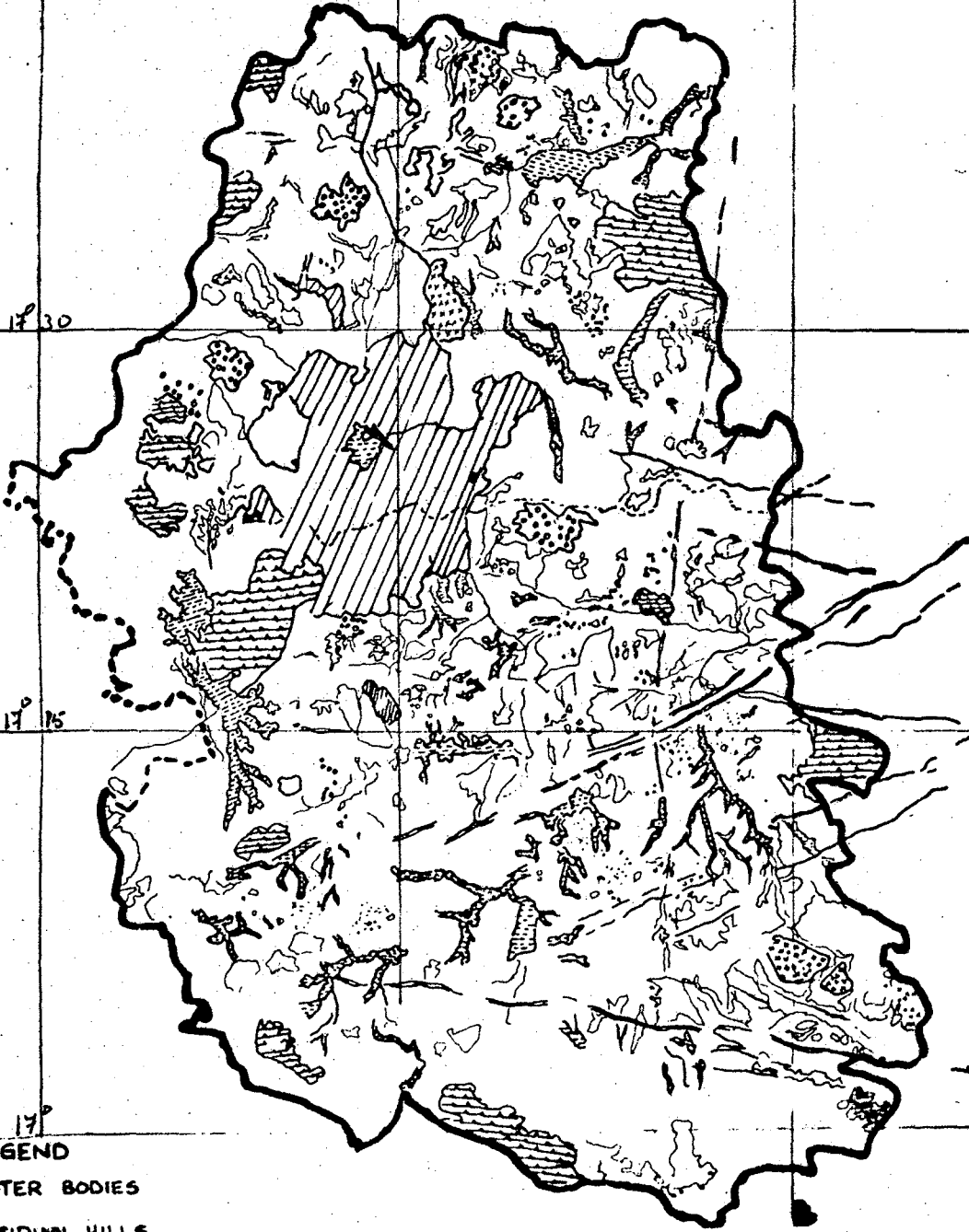
OF EASTERN RANGAREDDY DIST 78° 45'

18° 30'

17° 30'

17° 15'

17°



## LEGEND

- WATER BODIES
- RESIDUAL HILLS
- TOR + INSELBERG COMPLEX
- HIGHLY WEATHERED AREA
- PEDIMENT
- DEPOSITIONAL AREA - BAJADA
- Solerdi Dyke

SCALE 1 : 2,50,000

LAND FORMS AND GEOMORPHIC PROCESSES**Geology:**

The study of land forms includes not only their present day distribution, but ascribe them to certain processes which may be either endogenetic or exogenetic.<sup>4</sup> In this regard the study of geology becomes imperative as it has a marked structural control over land forms especially in a topography as in the Deccan where older topographies are very much preserved. The geology of this area is old and represents a typical granitic topography. The study of the geology of an area includes the rock types and their location as given in the map. It also includes the extent and the variation of composition by megascopic observation carried out during field work. Structures such as joint plains and lineations of mica flakes and quartz, Feldspar, and epidote veins were observed. (see photo graph No 1) . Pegmatite intrusions were also observed and segregation of mafic and felsic minerals was observed. Gneisses of two types were found grey gneiss and pink gneiss. The greygneiss is conspicuously banded, the light bands being rich in quartz and feldspar and the dark bands in mica. Granites are the predominant in rocks in the area and granites form a monotonous pediplain relived at various places by hills,

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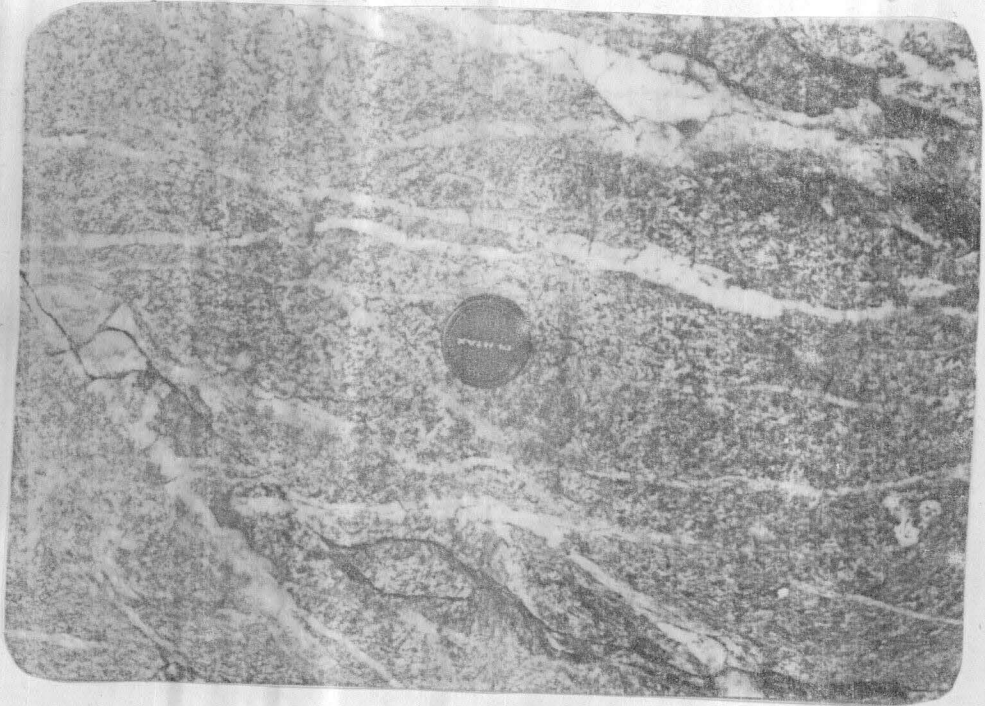
4. Thornbury William D. "Some Fundamental Concepts" in Principles of Geomorphology pp 16-21 (1984)



2. BOLERITE AYKE

3. PEGMATITE VEIN





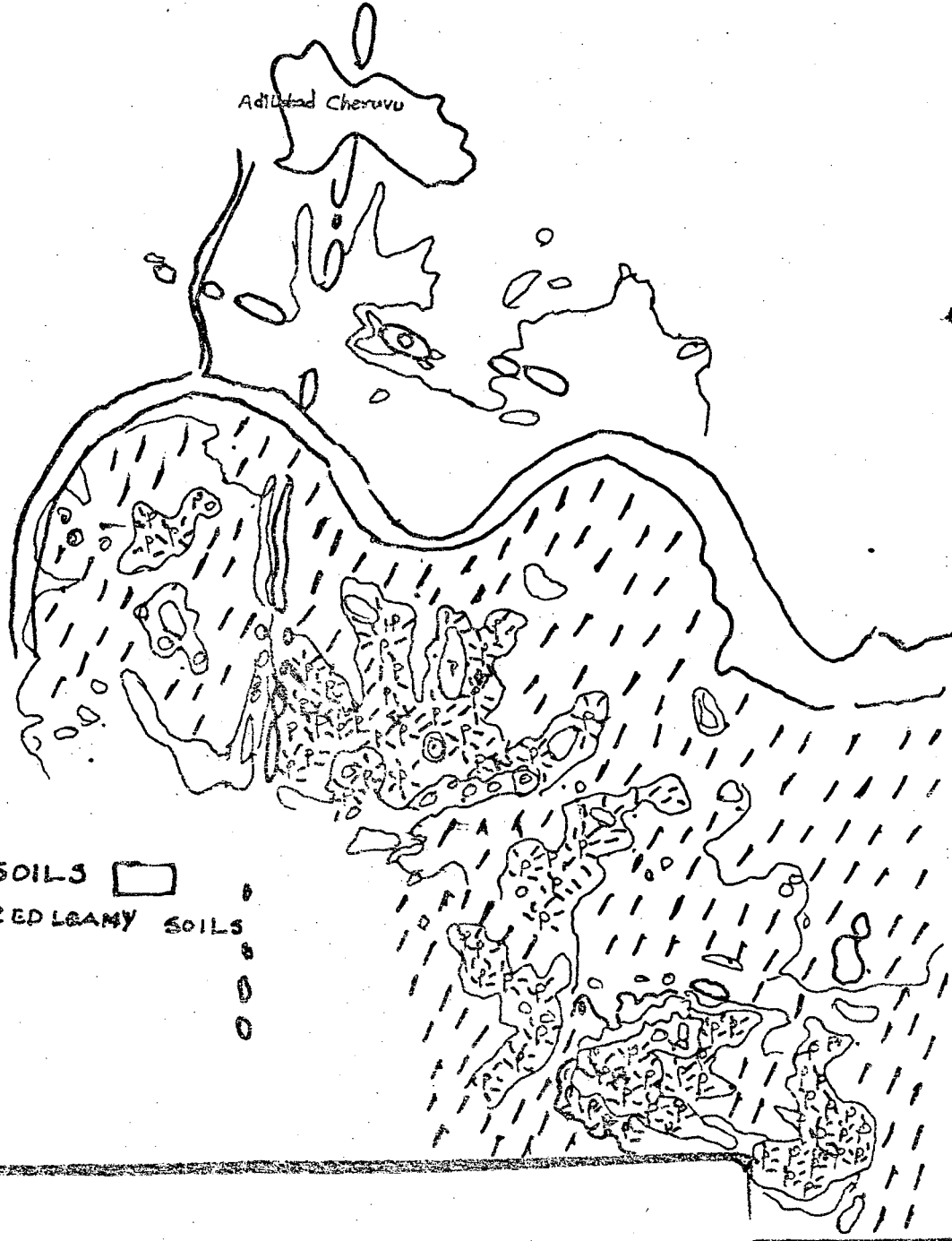
1. QUARTZ VEIN

mounds and rarely hill ranges consisting of fresh rock. The granites are traversed by numerous dolomite dykes. Being harder and darker in colour than granitic rocks in which they occur they usually stand out as prominent ridges. The dykes range upto 30.5 meters in thickness and are several kilometers in length. There is one dyke which travels in the north to south direction in the eastern part. This is the lengthiest in the region under study. The length is almost 33.5 kms in length from the northern end ( near the bunding ) , till the southern end which is a little to the south of Lashkarguda. (See photo graph no 2) Below the cheruvu Musi river is another dyke traversing in the northeast southwest direction. At the southern end is a long dyke traversing in the east west direction. It runs below Loyapalli valley in the south till Mucherla in the east. The types of land forms found in this area include constructional, erosional and compound areas. The upland or the Deccan trap mass is on the western side of the pediplain. After general observation it was found that among the granites the texture included a great variety of both Porphyrite and equigranular massive banded and streaky with erratic distribution of pegmatic veins. (see photographs no 3) Porphyrite granites weather into mural boulders which form caves. Granites containing only quartz and feldspar frequently give rise to sandy plains with poor soils but rich in alkalis. The hills at places consist of massive rock with mural jointing

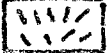
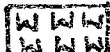
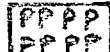
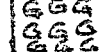
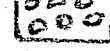


# GEOLOGY AND SOILS IN HAYATH NAGAR TALUK.


Adilabad Cheruvu



## LEGEND

-  LINEATION OF MINERALS
-  WHITE GRANITE
-  PINK GRANITE
-  GREY GRANITE
-  DOLERITE

## SOILS

-  RED LOAMY SOILS

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as if piled up and arranged by human effort. The area surrounding Hyderabad is abundantly endowed with large outcrops of these hard rocks granites have been the cause of many to take refuge in their stronghold as a shelter against natural elements and also their enemies

### LANDFORMS

**Erosional :** A few residual hills are found at the periphery of the main Deccan trap mass and a few small exhumed fragments of granitic gneiss from below the traps. The process of exhumation is thought to result from the action of deep weatherings and subsequent uplift by earth movements leading to accelerated erosion and removal of weathered rock layers.

**CONSTRUCTIONAL:** The pediplain is formed by coalescing pediments of three types

- 1) Fragments of active pediment or fresh pediment
- 2) Fragments of pediment under destruction
- 3) Buried pediments standing between these pediments are residual hill masses forming tor and inselberg complexes. There are prominent clefts and pediment passes also.

**COMPOUND FEATURES:** Among the constructional and erosional terrain associations are formed, Certain compound



features like flood plains of valuable compound terrain will be black soil cover and dendritic drainage<sup>5</sup>. The process of exhumation is thought to result from the combined action of deep weathering and subsequent uplift of earth movements leading to accelerate erosion and removal of the weathered rock layers. Pediplain is developed as the end stage of planation in the normal cycle of erosion in temperate climates. Pediplain is the final stage in arid and semi arid climates ( after w penck ). This pedim~~ent~~ is mainly due to subsurface weathering and accumulation of debris at certain places. Three types of slopes were identified by Penck. Uniform slopes were believed by him to indicate of constant intensity of erosion wanting development ; Convex slopes were associated with an increasing intensity of erosion waxing development. The general level of the slope found in this area was concave because of the climatic conditions present in the area.<sup>6</sup>

In the pediplain are found some features like Batholites. The twin cities of Hyderabad and secunderabad are basically built on a Batholith. A batholith is a gneiss body(usually made of granite ) of dimensional grater then 40 sq miles.

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5. Naresh Bedi, Geomorphie Evaluation of Andhra Pradesh on landsat Imagery, NRSA Technical Report - 0728.
  6. Vaidyanadhan. R. (1977) Recent Advances in Geomorphie Studies of Peninsular India. A review Ind. J. Earth Sciences 4 (pp 13-35).

A) The river Musi and its tributaries are the main drainage causing the erosion of these rocks and for the continual removal of material from the higher lands to the lower lands causing an undulating topography. The granitic country gives rise to hills and valleys and the latter were dammed at several places for purposes of irrigation and drinking water. Level of the granitic country in this region rises towards the northwest and groups of hills become longer and more numerous to the west of Hyderabad city. The general slope of the land is from the west to the east and southeast. The whole area was surveyed and the Toposheets, Field Work and the Satellite Image revealed the following features. The area was divided into the North, East and South regions and each of these regions were located to the North, East, and the South of Hyderabad and Secunderabad.

#### NORTHERN REGION:

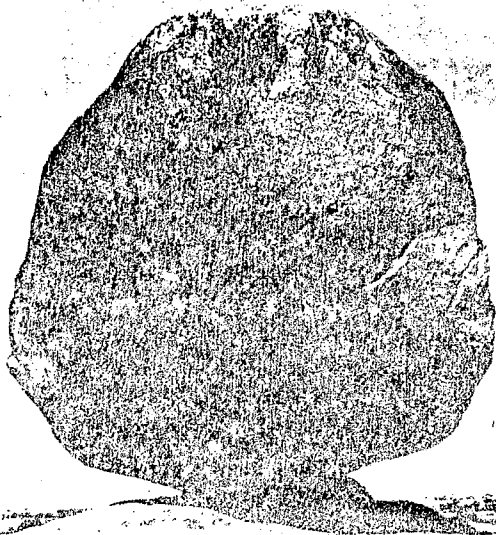
The area studied is between the boundary of Ranga Reddy District to the north of Medchal and the road leading to Warangal in the South. On the western side it is separated from Rajendranagar Taluk as per the boundary line shown in the map. This area is generally pediplain sloping in a Northwest to Southeast direction. The contour of 600 metres runs in a northwest to the southeastern part in the middle and then again

to the northwest and thereafter to the northeast. It runs in the form of a 'U' shape with its base at the south, southeast and east. The 500 metres contour runs from the southeast towards the west. The drainage pattern is generally of the radial or of the dendritic pattern. Streams flow from all sides from the out crops indicating a radial pattern of drainage. This kind of a drainage is found in outcrops like the triangulation point 643 (Dablipur in the northwest) triangulation point 642 and the outcrop just to the North of Nizampet (south west), Kondrigutta (614) (towards the west) Peddagutta triangulation point 631 (towards the eastern side of the centre) and Keshavpur triangulation point 622 (towards the eastern part of the area). The rest of the area shows a pattern of dendritic drainage. There are irregular branching of tributary streams in many directions and almost at any angle. These develop upon rocks of uniform resistance like granites and are an implication of a notable lack of structural control. However in certain cases like outcrops the drainage is approximately controlled by the structures of the area (like dip etc). The Shamirpet Cheruvu is the largest water tank in the area. The area is a plain which has descended from the Deccan Traps region in the west. It has both depositional and erosional features in the plain. The depositional features include the fluvial plain and the valley

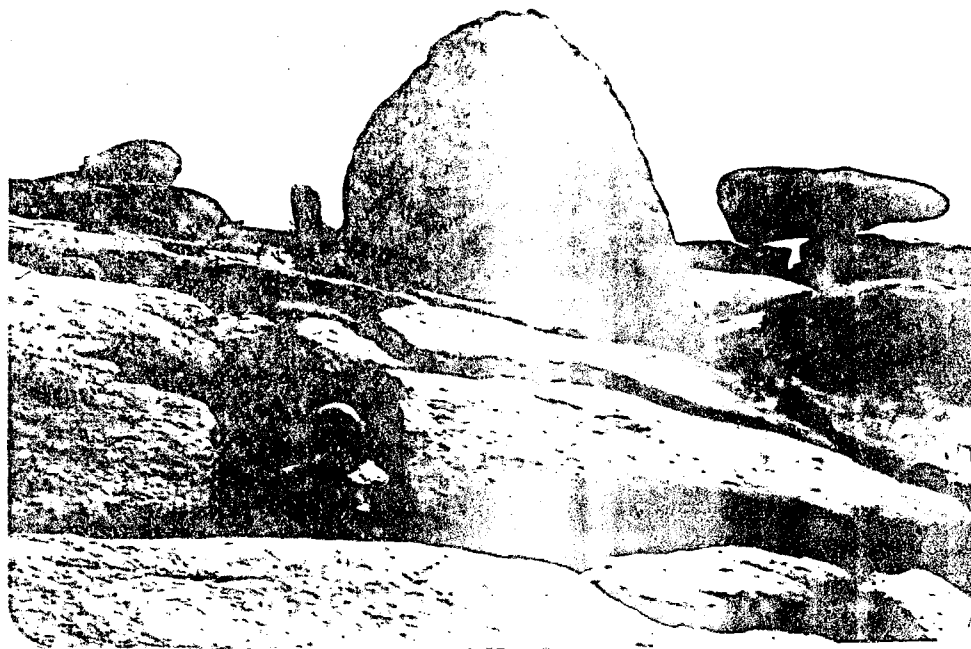
3a. PEDIMENT BEING LOWERED INTO A PLAIN



fills which are because of the deposition of unconsolidated rock waste (colluvial and alluvial) in the valley after being derived from the denudation of surrounding uplands. The erosional features include the pediment inselberg complexes and the pediplain is generally an undulating plain. The massive hills include Mesa and Butte like structures. In the northern most part of the region is found a residual hill with a height of 633 close to the Air Force Academy near the Railapuram Tank. The whole area is a pediment with tor and inselberg complexes between the north and the south flowing tributaries joining the Shamirpet Vagu to the east of Kaisaram. The Shamirpet Cheruvu is located to the south of such a tall and inselberg complex called the Venkateshwarula Gutta. A photograph of the pediment being lowered into a plain was taken (See Photograph No 3a). The pediment had a gradient of about 5 degrees and was a gently sloping surface. Above these were tors and boulders and photographs of weathered granitic material was taken. (See Photograph No. ). A pedestal rock was observed near Kistapur where a spot height of 599 is found. The pedestal rock was thoroughly rounded rock structure which was almost about the same length and height and breadth. It was about 12 feet in length and 12 feet in breadth. (See photograph No. 4 ). This showed the maturity of the weathering process in the area. Near the Venkateshwarula Gutta a jigsaw puzzle like structure was observed



A. PÉDESTAL ROCKS



5 JIGSAW PUZZLE (GRANITE ROCK)

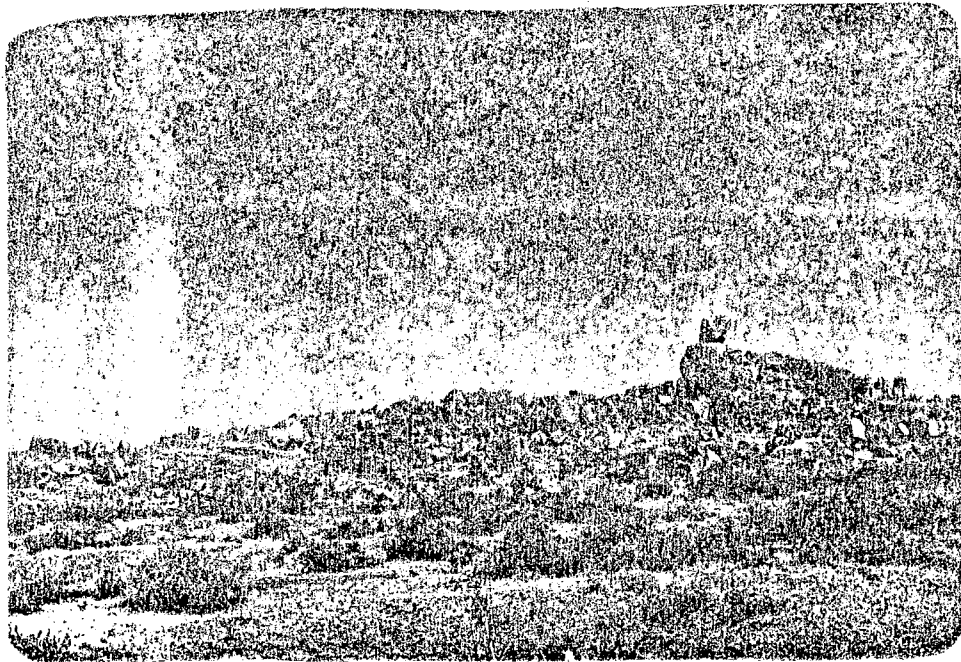


6 GIANT ROCK CLEAVAGE

which indicated the breaking of rock along joint plains. (See photograph No.5 ). These rocks the joints could have developed during the cooling and contraction of rocks and are known as primary joints. These horizontal joints were about 5 to 10 feet in length. Most joints could have been initially tight fractures but because of weathering the joints may have enlarged into open fissures as seen in the photograph. All these above aspects showed that the area was the matured eroded area. Giant cleavage of rocks was observed at some places as shown in the photograph close to Venkateshwarula Gutta. The cleavage was about 10 feet in height and 20 feet in length. (See photograph No.6 ). As we move southwards the whole pediment area is covered with rocky knobs here and there like the ones at Uparpalli to the south east of Shamirpet Lake. Residual hills form a part of the pediment area like Dulapalli in the west (triangulation point 635, Nizampet 620, 628, Kondrigutta 614 and Kishorigutta 635 in the east). The Pochampalli Khurd is made up of tors and inselberg. A sheet rock area  $\Delta$  633 is found slightly to north west of Railapuram. Kolla Cheruvu is a major water body in the area to the west of Railapuram on the main road travelling northwards just after pedbashirabad. The Shamirpet Vagu is the major valley fill in the area besides the other valley fills found in the various streams. Most of the streams are traversing in a north to south direction or South to North direction and a few showing



7 MATURE LAND



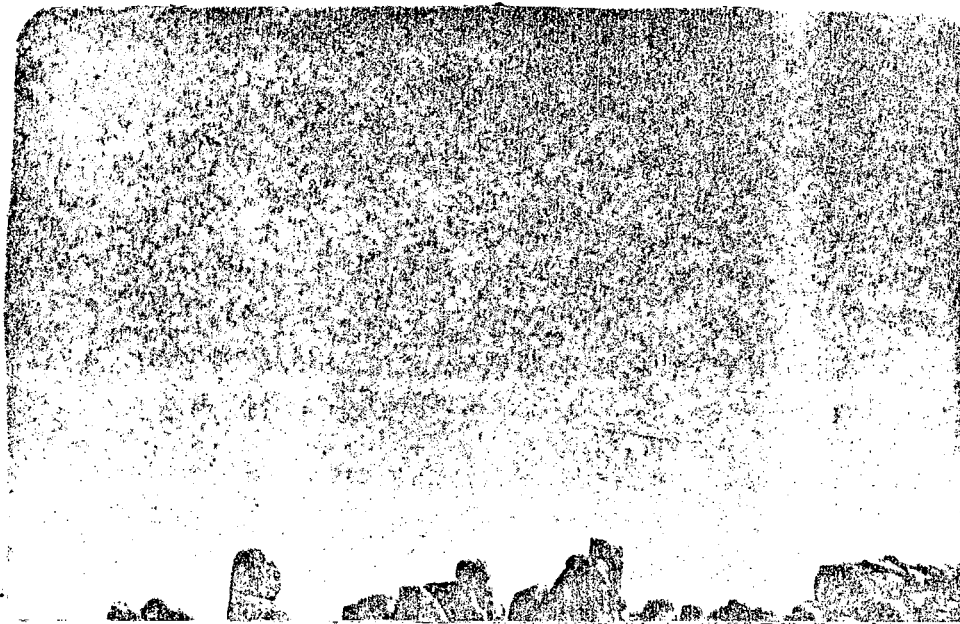
8 TORS



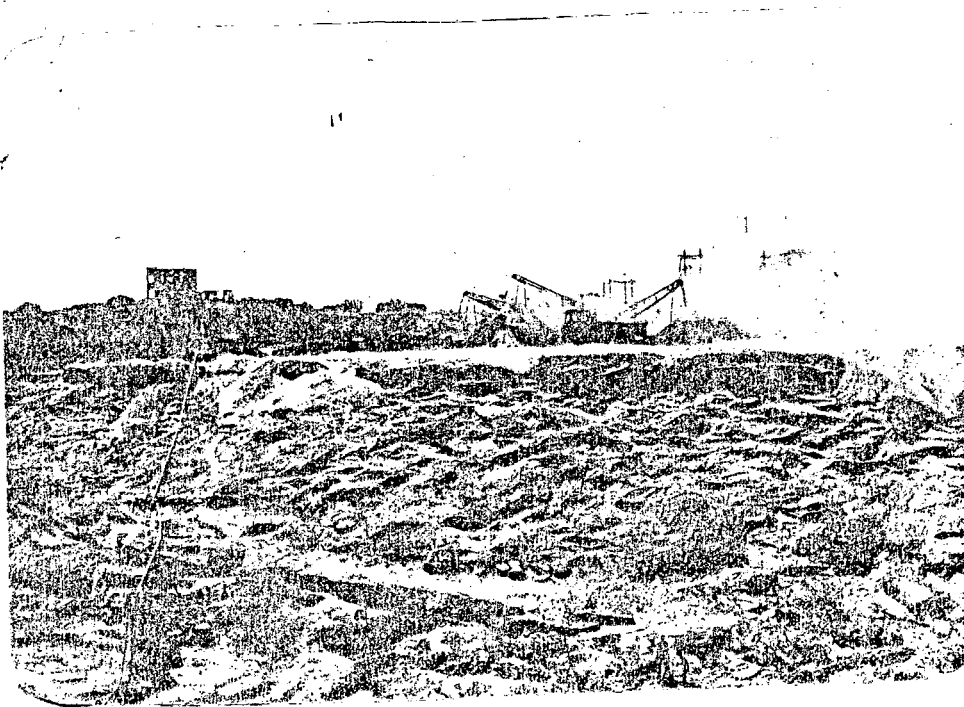
a northwest to southeast trend in the eastern part of the area. The low lying area which is a plain is useful for cultivation. Rocks are rounded and shown as a matured weathered area . (See photograph No. 7 ). Enklonigutta  $\Delta$  614 is located about 3 kilometres to the south of Kishorigutta. Ermulli Vagu which flows in a north west to south east direction in the south eastern part joins Adilabad Cheruvu after crossing the railway line and the road before Ghatkesar and after going around the Maisammagutta in a northwest-southeast direction. This starts in Peddagutta and flows to join the Madyala Vagu coming from Iriagutta at a tank near Cherial before finally joining river Musi.

#### THE EASTERN REGION:

The area studied included the geographical area between the road leading to Warangal in the North and the road leading to Vijayawada in the south. This region is also a part of the pediplain with residual hills and Tor and Inselberg complexes included within the region. (See photograph No. 8 ). The river Musi which is a tributary of river Krishna and passes through the city of Hyderabad is found in this area traversing from the west to the east. The area studied included granitic gneisses, a dolerite dyke. (See photograph No. ) and a tor and boulder.



(4) TOR & BOULDER TOPOGRAPHY



10 QUARRY

(See photograph No.9 ) topography. The slopes studied in the area included boulder controlled slopes. The main dolerite dyke in the region traversing in a northsouth direction is included in this area cutting across river Musi. Just after crossing Ghatkesar to the south is situated the Maisamma Gutta  $\Delta$  563 which has boulders all over the place. The slope in this elevated area is a boulder controlled slope. The Amberpet Reserve Forest is located at a higher elevation of about 580 feet above sea level. The highest triangulation point is 635 which is to the South Eastern part of this region. A radial form of drainage is found in this area. Bandaravirala and Chinnaravirala are located at a higher elevated area but are being quarried. (See photograph No.10 ). To the north of Abdullapur  $\Delta$  635 and the spot height of 585 feet above sea level are elevated areas. The area is a plain land with 500 metres contour running both to the north and the south of this region. The contour descends to the central region where the river Musi flows. Meandering of river Musi is seen in this area because of structural controls as well as a decrease in velocity due to a decrease in the gradient. Pool and Ripple sequences are found in this part of the river. To the extreme northwest is the Tor and Inselberg complex (See photograph No. ) close to which the Mansurabad Reserve Forest is located. The Dolerite dyke starts at Bacharam Reserve Forest in the south and is crossed by river Musi. After going to the north

the Adilabad Cheruvu divides the dyke before the dyke proceeds to the north beyond the boundary of Ranga Reddy District. Dykes are discordant igneous bodies of more or less tabular shape and exhibit a cross cutting relationship with the country rocks. The rocks constituting the dykes in this region are hard and compact and they have survived erosion in this region and have been projected slightly above the country rocks. The dyke is of an average height of 20 feet. Another dolerite dyke runs in a slightly east west direction from Narpalli Reserve Forest in the west to the Chinna Musi river in the east beyond the Ranga Reddy district boundary. The drainage pattern is of a dendritic nature flowing from the northwest to southeast and from the southwest to northeast with all the drainage lines joining the river Musi flowing through the middle part of this region in a west to east direction.

#### SOUTHERN REGION:

The area studied lies to the south of the national highway leading to Vijayawada. This region includes the taluks of Ibrahimpatnam and Maisaram. The area is generally covered by the 600 metres contour running in the northwest to southeast direction and goes up to the north east with a 'U' bend in the southeast. Another contour takes a 'V' shaped direction from the

northeast to southeast direction with the base located in the central part. The area generally increases in height as one travels to the south with  $\Delta$  706 being the highest spot height to the southwest of this region. This is slightly to the northwest of Nednoor Metta. The other residual hills included in this area are Phulmandi Gutta  $\Delta$  682,  $\Delta$  647, in the Nandapally Reserve Forest in the East Pittalaka Gutta  $\Delta$  683 to the northwest of Kishanpalli in the middle and  $\Delta$  643 in the Nomul Reserve Forest in the West and  $\Delta$  703 on the northern side of the road in the valley leading to Loyapalli in the extreme southeast. There is one main dolerite dyke travelling in a east west direction from Gumadavalli Forest in the east. Besides this there are two dolerite dykes traversing in a southwest to northeast direction just to the northwest of the valley which leads to Loyapalli. None of these dykes cut the north to south traversing dyke. The Western part of the region consists of the pediment with residual hills here and there as mentioned above. Besides, this is the pediment inselberg complexes between the dykes in the western part of the region. There is a sloping surface from the south to the north just near the southern part of Ibrahimpatnam Cheruvu and to the south east is found an area of deposition. All through the valley leading to Loyapalli we find deposition of unconsolidated rock waste (alluvium and colluvium) derived from

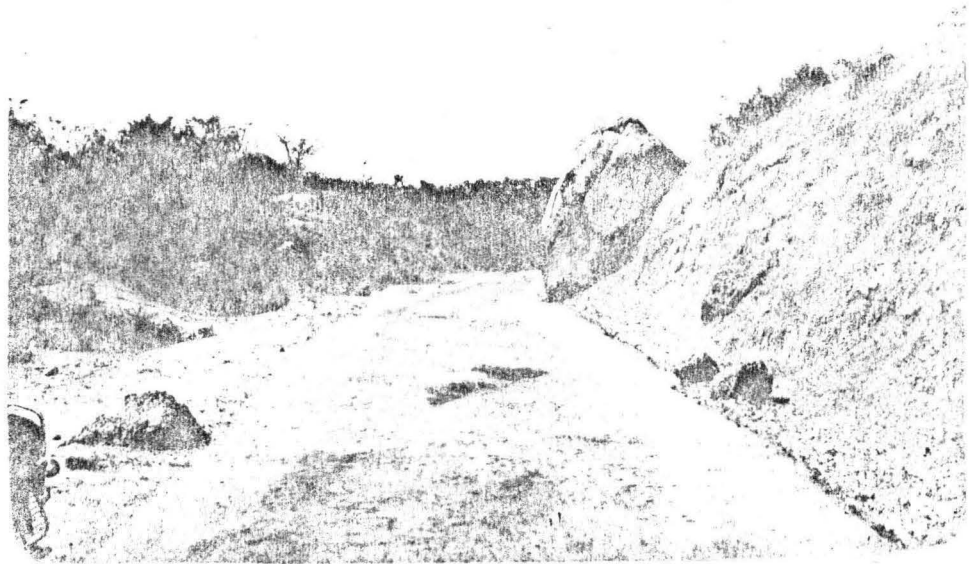


11 CHEMICALLY ALTERED ROCKS



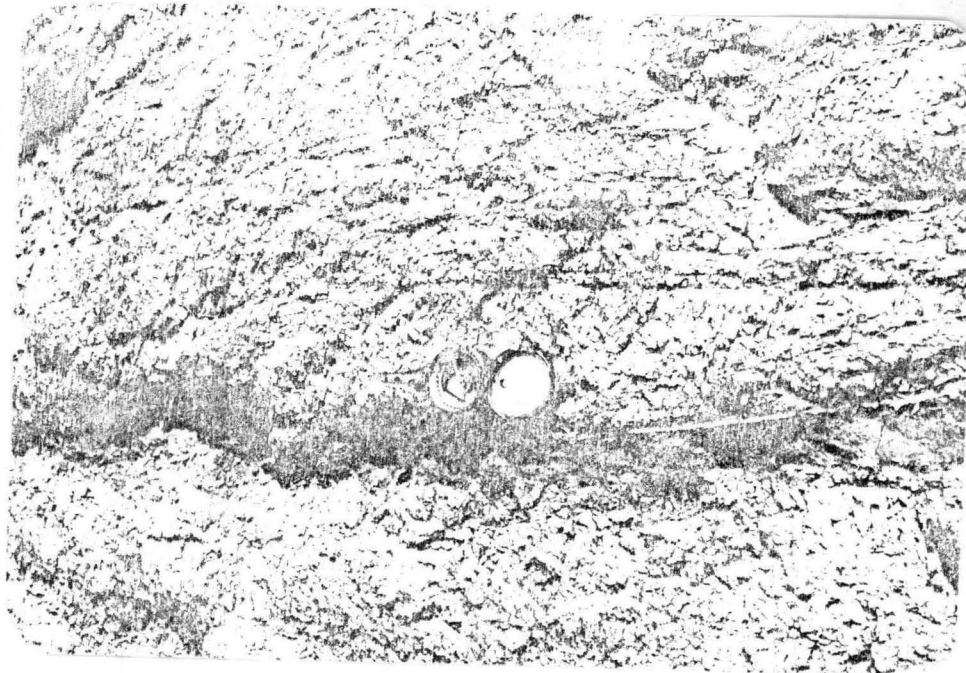
12 BIOLOGICAL WEATHERING

the denudation of surrounding uplands and deposited in the valley. The uplands on the northern side of the valley consists of weathered features because of which the valley fill is filled with depositional material. To the south of the dolerite dyke traversing eastwest and the region to the south of Loyapalli Valley is made up of residual hills. To the extreme south of this region is found an area of extreme weathering and erosion. Between the Loyapalli Valley and the northern part of the region are many hilly areas with steeply sloping sides. The contours are spaced between each other very closely and the region has dense forests and valleys with steep heights. The pediment on the western side consists of pediment inselberg complexes. In the Loyapalli Valley photographs of chemical weathering were taken. (See photograph). The area close to the Ibrahimpatnam Lake consisted of a mature region whilst the region to the north of Loyapalli Valley contained a spur and valley topography (see Photograph no ) of pegmatite veins which are intrusive rocks and which cool at a very slow rate were found in the granitic rocks. They were several feet in length. Quartz Veins were found in granite. (See Photograph No. ). The quartz veins in this region contained Silica ( $SiO_2$ ) the oxide of silica. Since the area was left untouched for several kilometres and due to the presence of water biological weathering was observed. Physical features such as joints, fractures easily determine the case with which moisture enters the rock surfaces. Algae and Mosses grow wildly on these rock surfaces. (See photograph No. 12). Boulder controlled slopes were observed and road side boulders (See photograph No. 13 ) were observed in the eastern part. These boulders had rolled down from the slopes and these cause problems

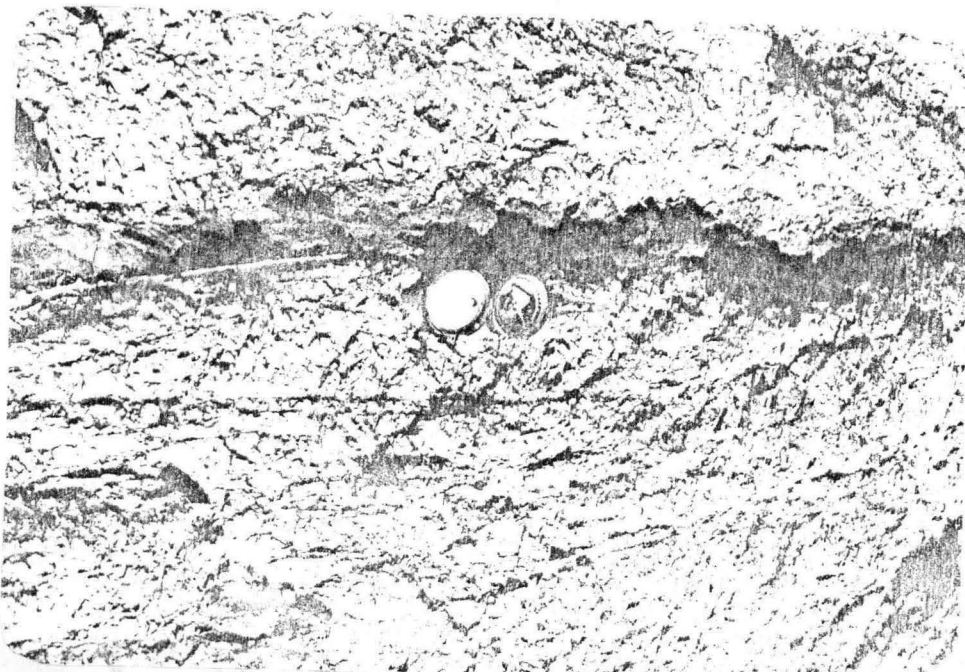


13 ROAD SIDE BOULDERS





14



to travellers going by these roads. Rock joints in this region were measured with the help of a Brenton compass. The dip and strike measurements were as follows:

90° dip            90° Strike

57° dip            93° Strike

54° dip            15° Strike

Stream flow was measured and this showed a irregular pattern.

65° towards 94°

90° towards 90°

90° towards 70°

The granitic material possessed some dolerite sills (See photograph No ~~14~~ ). The spur and valley topography helped in the



15 WEATHERED ROCK



15 VALLEY



16 SPRING



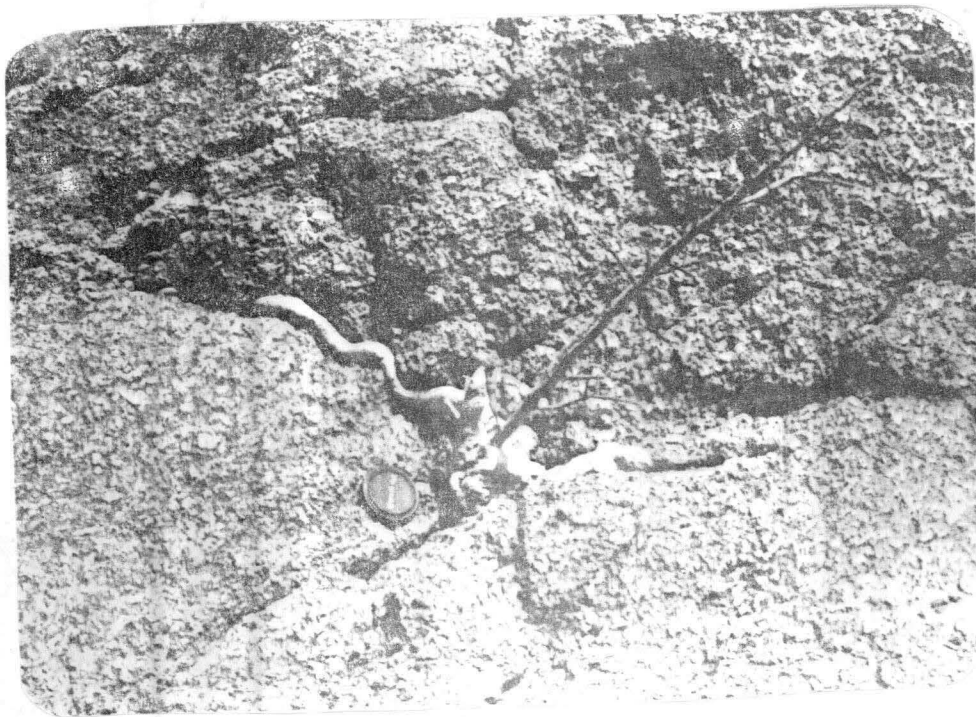
17 EFFECT OF WATER

observation of a valley being formed because of the action of water. Only one spring near the Bugga Tanda provided water to the whole valley. A photograph of the spring was taken (See photograph No. ).

#### GEOMORPHIC PROCESSES FOUND IN THE REGION:

Weathering is a group term for all processes that produce an essentially irreversible change in rocks and rock forming minerals at or near the earth's surface. Rocks disintegrate at the boundaries of mineral grains and along joints and cracks. Erosion is a comprehensive term applied to various ways by which the mobile agencies obtain and remove rock debris. Technically erosion is acquisition and transportation of material by a mobile agent like water, wind etc<sup>8</sup>. Both weathering and erosion are degradational processes and are found in the eastern part of Ranga Reddy district. All around the huge batholithic granite of Hyderabad is flat land of alluvium to a certain extent and other igneous and metamorphic rock types which are less resistant than granite and have been broken up due to mechanical or chemical weathering. The weathering processes in this area are due to temperature changes (thermal expansion and contraction) Geodynamic stress (unloading and off loading) and organic processes (root wedging etc) (See Photograph No. ). Most rocks in the area are composed of several minerals and each with a different thermal

- 
7. Sharma V.K. "Weathering and Mass Wasting" in Geomorphology, Earth Surface, Processes and forms. Tata Mc' Graw
  8. Thornbury William D., "Geomorphic agents and processes" in Principles of Geomorphology Wiley Eastern Report (1984) p.37.

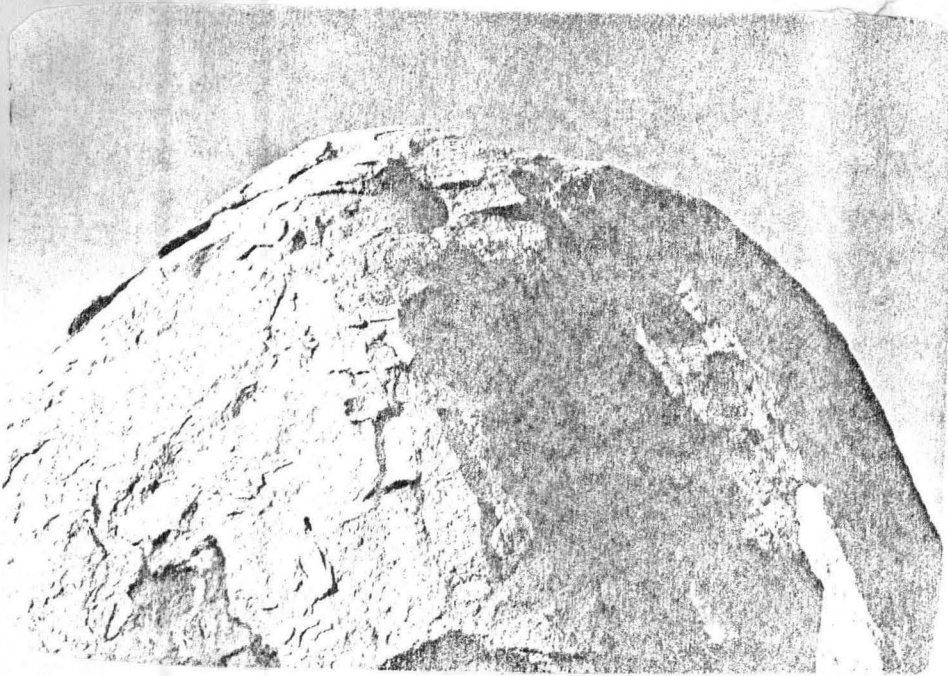


18 BIOLOGICAL WEATHERING

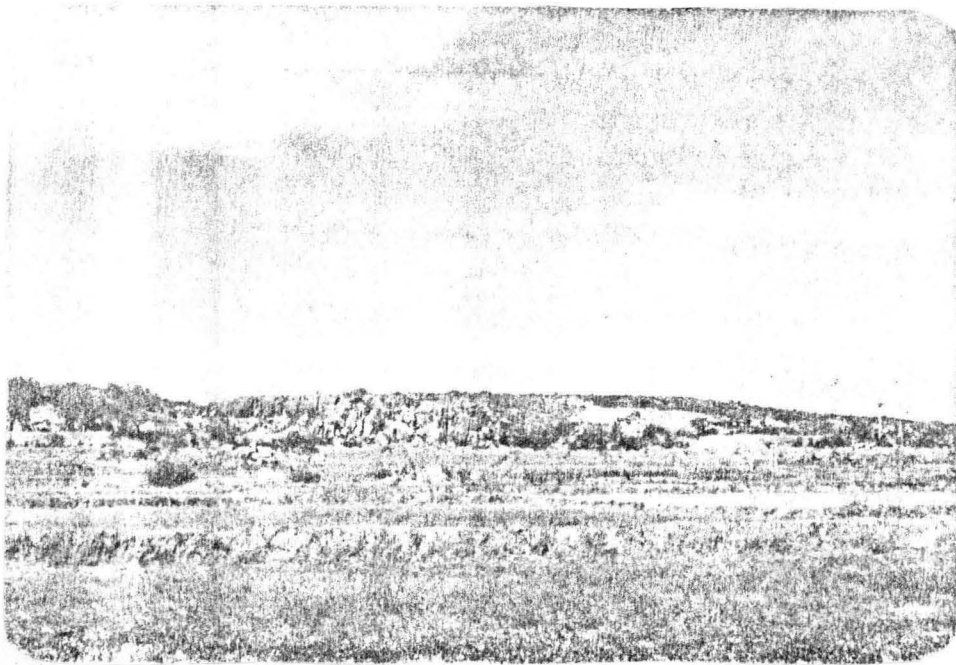


(2) TOR & BOULDER TOPOGRAPHY





20 EXFOLIATION PROCESS



21. BLOCK WEATHERING (ALONG JOINTS)

co-efficient of expansion. The process of mass exfoliation where the outer layer of the rock comes off layer by layer was observed in this area (See photograph No. 20). In the northern region block jointing was observed (see photograph no ) Weathering of rock had caused huge granitic boulders which appeared as if there were lifted by human effort and placed on different boulders. ( See photograph no 19) Erosion due to water also suggested some kind of block weathering due to the presence of water. And exfoliation dome was observed and photographed. This was basically mass exfoliation where repeated heating and cooling of the rock surface. (See photograph No. ) caused this spoiling of the surface layer. The whole area is a matured area where weathering and erosion have occurred. Rocks are rounded and show a mature weathered phase. Decomposed debris and breakdown of rocks due to thermal causes provided the sediment change of a short duration in a fluvial system of erosion, transport and deposition. A Giant cleavage of rocks was observed at some places as shown in the photograph close to  $\Delta$  647. (See photograph). The cleavage was about 10 feet in height and about 20 feet in length. The rock would have experienced cleavage because of changes in temperature. The Kesaragutta once was surveyed weathering of rock due to Hydrolysis was observed. (See photograph No. ). The weathering of orthoclase crystals in granite due to the presence of water weakly undulated by the atmospheric carbondioxide was observed.



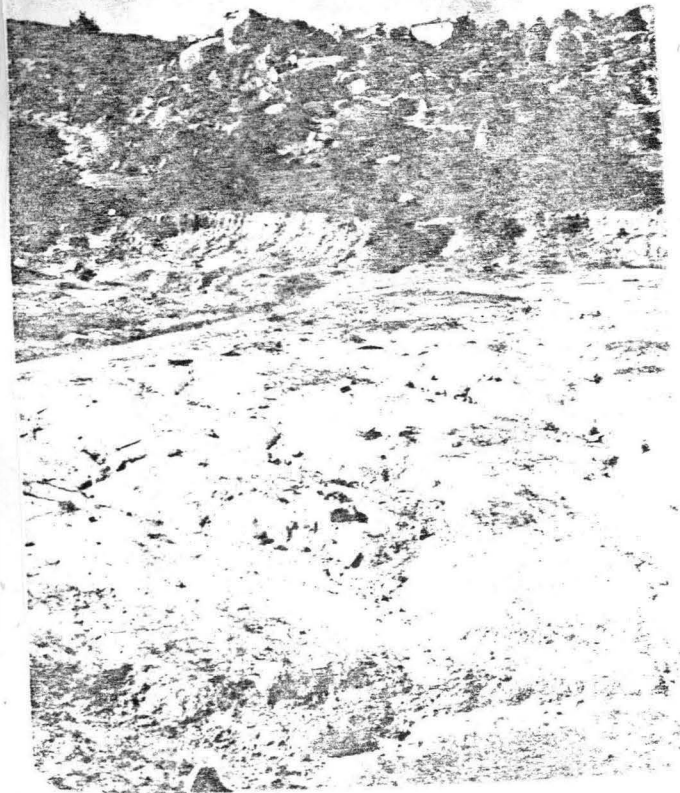


22 BELLY BUTTON



This led to a belly button shaped features in the rock(see photograph no 22 ). In the eastern part of the region biological weathering was also observed where growth of trees cause the rock structure to be shaped into a pothole. (See photograph No. ). Chemical weathering also causes exfoliation of dolerite rocks and this was observed in this region. Dolerite rocks experience the same exfoliation as granite rocks but to a minor extent as no huge boulders are present and here these are called Spheroidal boulders caused by spheroidal weathering. Granitic rocks experienced both mass exfoliation and spheroidal weathering. Spheroidal weathering in granite was caused by slow percolation of water into caves of the boulder parallel to the surface and this helps the surface to assume a roughly rounded surface. Due to chemical activity between the weekend zones saturated with water the disintegration of the outer layer forms a rock of more roundness. The indication for different fractional crystallisation zones around the centre of crystallation has been the cause for exfoliation as observed after breaking of rocks. Exfoliation is primarily a weathering feature. (See photograph No. ). In the southern part of the regions pits, hollows, and potholes were common depressions formed by eddy currents. Sand and Pebbles that serve as tools were found at the bottom of the depressions. In some of the large grained granite

46



GRAVEL & ALLUVIUM



(3) EROSION OF SOIL



the faster decomposing feldsparr formed a network of honey comb weathering. Due to the chemical weathering, granite exposed to water especially in wells disintegrated where orthoclase and feldsparr suffered Kaolinization as shown in the photograph. Algae and Mosess growing wildly as the rock surface was observed and photographs were taken. Chemical weathering of rocks was observed and photographs were taken. Potash Fetospar in the rock changes into quartz which is more stable. Except this very little chemical weathering is found in this region because the presence of quartz indicates the stability of minerals in the granite rock. Boulder controlled slope caused road side boulders in the south eastern part. A roadside erosion of soil was observed and this showed the instability of the road sides. (See photograph No. 24). Weathering of rocks near Peddagutta were observed and Tors weathered into solid rock which further turned into broken rock. This broken rock was further turned into soil and because of erosion of soil gravel alluvium was formed. (See photograph No. 23). River valleys formed by water flowing through gullies to the surrounding flat lying areas were observed and the general treads of some rivers along weak joint planes was observed and this was structure controlled. River valleys being formed because of springs and fracture zones within granite rock was seen. All through the valley leading to Loyapalli we find deposition of










Potkole

unconsolidated rock waste gotten from the surrounding uplands and deposited in the valley. Weathering and erosion between the Loyapalli valley and the Northern part and the southern part were observed because of hills with sloping sides. In the western part of the region was observed organic activity in the form of wedging by root growth cutting erosion jointed rocks. The rootlets penetrated deep into the substratum and cause disintegration of rocks (See photograph No. ). Smaller resistant mass were seen as tors while inselberg to the northwest were determined by haconants. Weathering pits in the form of potholes were formed and these were due to abrasion. Talus slopes or saree a few of the landforms observed and there could have been formed by weathering aided by mass waste. The erosive action of water pushes the debris down and the helps in the formation of scree.

Thus the geomorphic process included in this region the processes were basically degradational processes of weathering and erosion. Rock weathering included processes like thermal expansion and contraction unloading rocks, granular exfoliation and organisms of growth like plant roots. The chemical weathering has included because of the presence of wasted minerals hydrolysis and combination. Erosion was included because of streams characterised by much water and due to wind action in this region.

# LANDUSE

## LEGEND

-  FORESTS
-  WATER BODIES
-  FALLOW
-  CROPLAND + VINEYARD
-  BUILT UP LAND
-  BARREN ROCKY BOLDERS
-  UPLAND WITH OR WITHOUT SAND

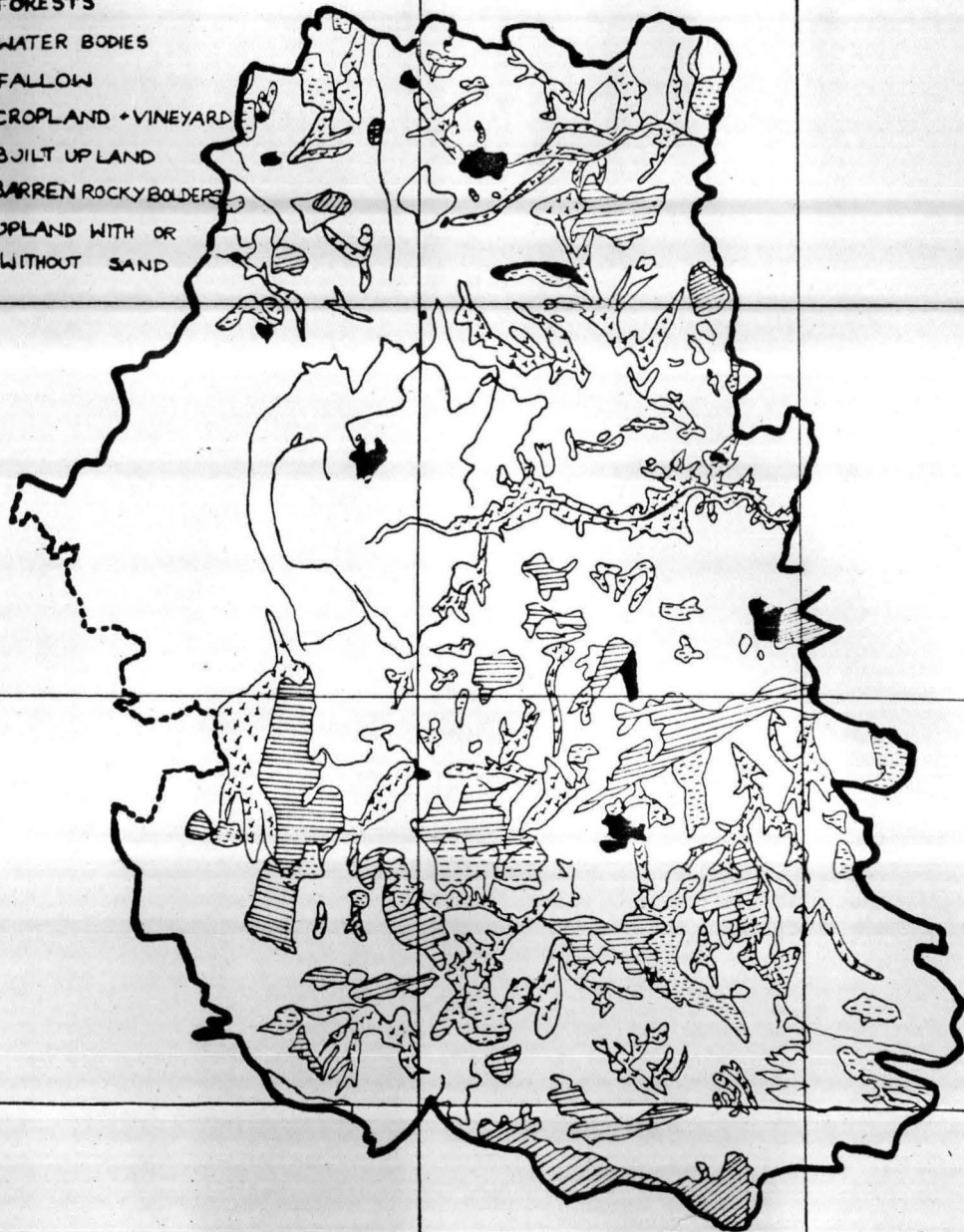
17° 30'

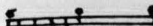
17° 15'

17°

76° 30'

78° 45'



SCALE   
1:2,50,000

Scale

49



LAND USE PATTERN

Land use pattern of an area describes the complex importance of cultural activities in a particular region. Landforms are not merely bare natural physical features. They are settings on which civilisation exists. The major landforms like mountains, plateaus and plains have different economic significance for man. The correlation of landforms and the land use pattern in this region was studied to understand the importance of landforms affecting various land use categories.

The importance of land utilisation in this region was studied and a land use map was prepared with the help of satellite imagery to understand how land is being used in this region.

Based on the map obtained from the satellite imagery a land use percentage was obtained by using the dot grid method. Here a graph paper was placed on the land use map prepared from the imagery and each square centimetre represented the number of square kilometres on 1:2,50,000 Scale. The percentage was obtained after measuring the area under various land use categories. As per the percentage of land obtained (given in the table in Page ). The following categories have been



LAND USE PATTERN IN MEDCHAL, VALLABNAGER, HAYATNAGER, IBRAHIMPATNAM AND MAHESHWARM TALUQS

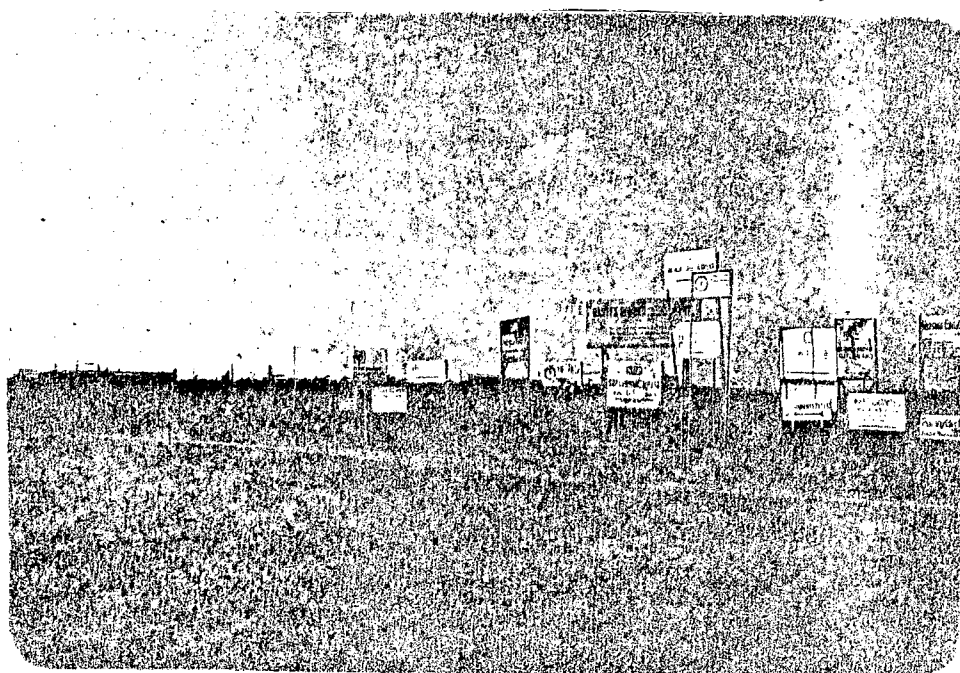
S.No	Land Use Category	Hyathnager	Ibrahimpatnam & Maheswarm	Medchal & Vallabnager
1)	Built up land	Not Available	Not Available	Not Available
2)	Agricultural land	5.99	17.79	5.75
	Cropland, Fallow	22.31	23.97	29.31
3)	Forests	5.91	32.91	8.81
4)	Upland with soils	16.11	11.39	11.71
5)	Grass land	14.22	15.36	21.01
6)	Barren rocky boulders	5.23	11.37	7.93
7)	Waterbodies	8.39	4.66	6.28

8) Data of Ibrahimpatnam and Maheswaram are given together and Medchal and Vallabnager together

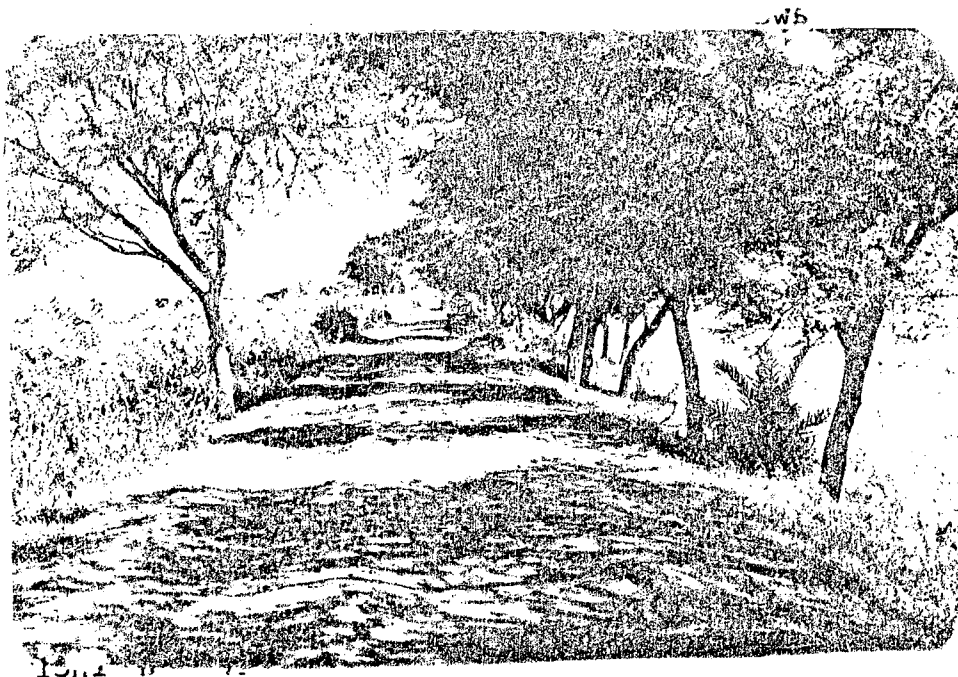
observed and are given as under: The fallow land was having highest percentage in this region. The next category consists of grass lands and other permanent pastures. Most of the grass is grown around the twin cities and this is being used as livestock feed. The third category is upland with or without scrubs. The next category consists of Barren rocky boulders. After this is the category of forests and quite a few of them are degraded forests and the forests are generally beginning to decline. Ibrahimpatnam & Maheshwaram top in the category of forests followed by Medchal, Vallabhnagar & Hayatnagar. The percentage of Cropland in Ibrahimpatnam is quite high because of the Ibrahimpatnam tank. Hayatnagar also has more of cropland because of the Musi river. Medchal has lesser quantity of cropland because of a high percentage of fallow land and upland with or without scrub.

The land use pattern in the area was mapped from the Satellite Image (TM - 144 - 048) dated 18-3-86. This consisted of eight sectors as given below:

- 1) Built up land which includes urban areas, rural settlements and transportation network.
- 2) Agricultural land which includes Cropland, Horticultural land in the form of vineyards which is red in colour in the image and fallow lands which are light green in colour.
- 3) Forests which include Reserve Forests and Degraded Forests were taken from the Toposheet of 56K in 1:2,50,000 Scale.



26 INDUSTRIAL LAND



27 CULTIVABLE LAND

- 4) Upland with or without scrub.
- 5) Barren rocky, Stone waste and Sheet rock area which is dark brown in colour.
- 6) Water bodies which include Rivers, Streams, Lakes, Reservoirs and Tanks which are blue in colour.
- 7) Other land which includes grasslands and other grazing land which is red in colour.

The land use pattern in this area has been studied as observed in three regions. The Northern region includes the land utilisation pattern in Medchal & Vallabhnagar Taluqs from the Taluq boundary of Medchal in the West to the road leading to Ghatkesar. The second region studied as the Eastern region includes the area passing between the road passing through Ghatkesar to Kazipet and the National Highway Number Nine leading to Vijaynada. This area includes the Hayatnagar Taluq. The third region includes the Hayatnagar Taluq. The third region includes the area to the South of National Highway Number Nine and covers the Ibrahimpatname & Maheshwaram Taluqs until the National Highway leading to Shadnagar in the West.

#### NORTHERN REGION:

There is an indication that at least a quarter of the area may be useful for residential, agricultural and other industrial use by man in this region. The region includes thorny bushes and shrubs along the slopes of hills and uplands.

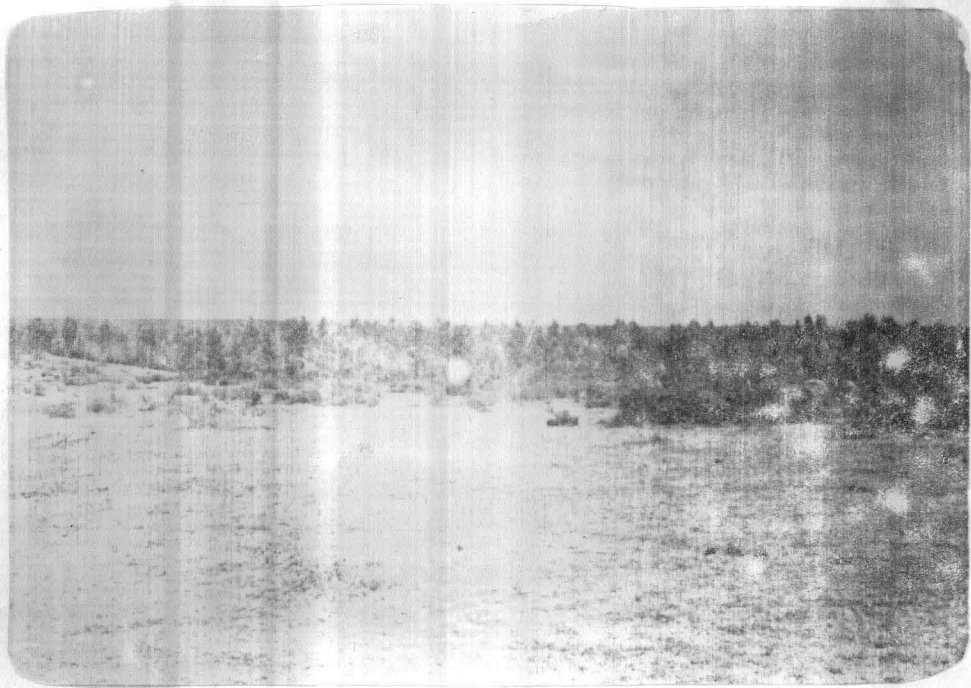
The whole area is generally an undulating tract with pediment which is dissected with some hills and dykes which are devoid of vegetation. Sheet, Rill and Gully Erosion at the foot of hills results in the removal of soil cover. An observation of the Toposheet and the data taken during field work in the form of limited ground truth study indicates that at least half of the colluvial fill and the alluvial fill area is utilised in the form of irrigated agriculture. Grape Vineyards have been raised in the pediplain. A lot of vineyards are found along the road leading to Medchal in the North and along the road leading to Shamirpet Lake wherever favourable ground water conditions are found. Much of the pediplain with thin soil cover is under dry agriculture while the higher areas of the dissected pediment are formed barren. Reserve Forest areas are found but these areas have been degenerated because of human interference and many areas which could be utilised for better land use purposes are being used for residential and industrial areas especially around twin cities of Hyderabad and Secunderabad. Atleast about 25% of the area is barren and unculturable.

Most of the barren and rocky area is found to the North and the North West of Hyderabad especially around Nizampet area. Another rocky area which is found to the North West is

No ..



close to Dundigul. A brick industry is seen close to Dundigul where a good mixture of silty clay and sand are found. (See photograph No 28 ). A part of the area close to the main road leading to Narsapur is rocky just after crossing the city ( see photograph ) but thereafter quite some area to the left side and right side of the road is suitable for dry cultivation. The stream leading to the tank near Baspalli in the South West of the region has wet irrigated agriculture. The Kotla Cheruvu close to Jeedimetla in the south provides for wet irrigated agriculture. Other tanks in the region include Kathva Tank in the Western part, the Dundigul Lake and Dablipur Lake. There are two small tanks near Medchal which help in cultivation around Medchal. The largest tank in this region is the Shamirpet Cheruvu which has a Vagu or a Stream running to the East. This provides water to the irrigable area on the Northern and the Southern side of the tank. The important forests in this region are Ellampet, Gaudavalli, Pochampalli Kalan, Dulapalle and Gajularamaram in the West. Lalgudi, Malkapalli, Turkapalli, Ponnal Keshavpur and the Shamirpet forest are slightly in the North. Besides these there are other forests which have open scrubs. A borewell at a foothill showed that water was available at a depth of 80 feet. Between Medchal & Shamirpet Cheruvu except for the area around Venkateshwarula Gutta the land is generally suitable for dry cultivation. A small area also has open scrub. The area on either side of the stream joining Shamirpet Cheruvu from the



29

SHRUBS

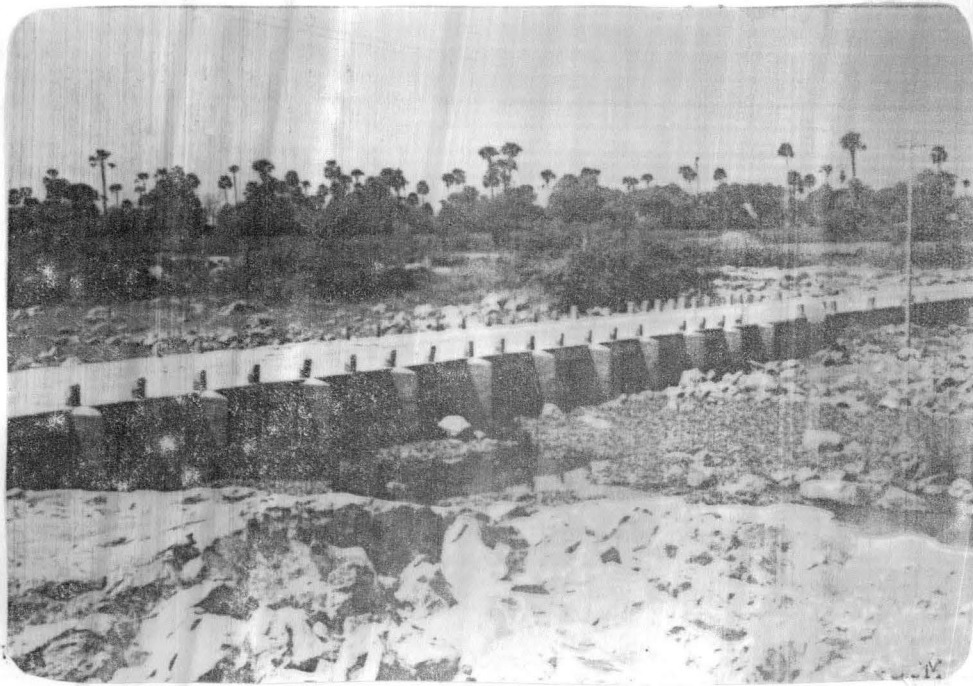


North West is suitable for wet cultivation and paddy is grown. A photograph of the Shamirpet water body was taken and another photograph of the fields at the far end being cultivated because of the Shamirpet Vagu was taken.

Most of the area has dry shrubs and bushes with tors. On the North Eastern side is a degraded forest at Polaran which has scrub. 29

On the Eastern side is Kesargutta which is a residual hill. This is a barren rocky area with boulders and some trees growing at the triangulation point of 635. There is a village called Keesara which is about 32 kilometres from Hyderabad City in the North East direction and 10 kilometers from Ghatkesar Railway Station on the Hyderabad-Vijayawada Railway line. There is a temple on the hillock and the peculiar feature is that it faces West. Below the hillock there is an old fort which reminds us of its glorious past.

To the extreme North , South West and the East is found upland with scrub and sometimes without scrub. The South Central Railway Metergauge Line runs via Medchal to Nizamabad in the South to North direction. The National Highway Number Seventh going to New Delhi goes via Medchal. Medchal town lies at a distance of 32 kilometers to the north of Hyderabad. It is a Railway Station on the Secunderabad-Manmad Line. It was



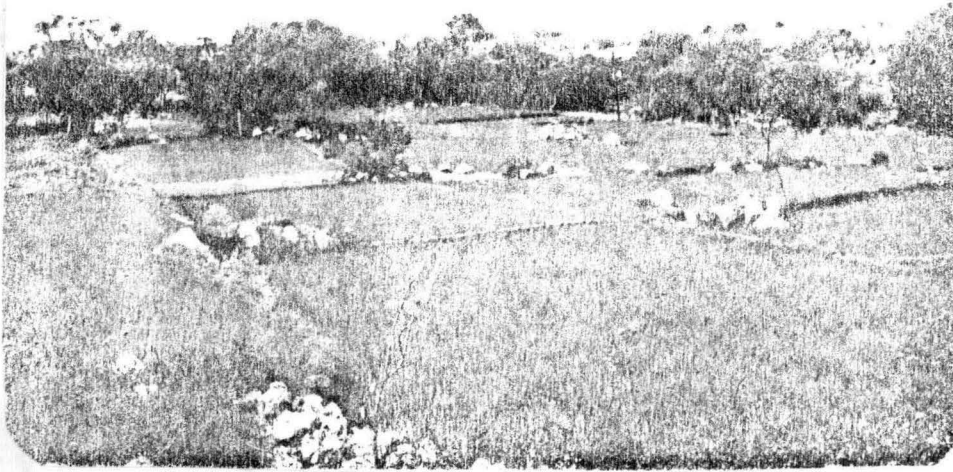
36 MUSI RIVER

originally known as Medichellamma (Medi means fig and Chellam means spring). The early Muslim rulers of Hyderabad constructed a beautiful mansion here. Just to the West of the village there is a hillock which is about 61 metres in height and has a temple. A lot of pasture land is found around the hill. Irriagutta, Peddagutta and Koyagutta are residual hills and have streams flowing to the South East and then to the South because of which a settlement Ahmedguda has developed. In this area as in the whole region a rural settlement is found beside every tank.

#### EASTERN REGION:

In the Eastern part is found the Musi river traversing in a West-East direction. The Musi river drains the undulating pediment like area with an average elevation of 500 metres along with Erimullavagu and Shamirpet vagu from the North and Chinna Musi from the South. Many tubewells were seen in this region. Just above the Chengicherla Reserve Forest close to the Railway track was found a Sheet Rock area. This region is filled with grass growing area both to the North and the South of the river Musi almost upto Chinnaravirala in the East. This is transported to the city as livestock feed. Slightly away from this the land is used for paddy cultivation. Between the interfluvial tracts a lot of land is left as Fallow land with dry grass growing. Some palm trees are grown in this area.

The forests in this region are Chengicherla, Narpalli, Medpalli in the North West and Adilabad in the North East. To the South of river Musi are Mansurabad, Kutbullapur, Kuntlur on the western side and Bacharam, Kawadpalli and Amberpet forests to the East. The latter two have trees besides open scrub. Between the Musi in the South and the Ghatkesar road in the North is the Adilabad Cheruvu which cuts a dolerite dyke which runs from the North to the South. This Cheruvu is the largest lake in the region and has paddy growing around it. Dry grass is also seen commonly in this region. Besides this scrub land is also found. Another noticeable feature is the presence of palm trees. The Maisamma gutta has boulders and is a sheet rock area. Abrasion is an erosional characteristic seen in this area. There is a dolerite dyke running in a northwest south east direction and cuts across the dyke running from the north to the south of a cheruvu. (See Photograph). Dense scrub area is found near Kachwani Singharan and an open scrub area near Pratap Singharan. To the south of river Musi quarrying of rock was observed at Chinnaravirala and Bundarayirala. These are sheet rock areas. The area close to Taramatipet has wet cultivation and paddy was grown because of the Taramatipet cheruvu. Pasmamla has two tanks and cultivable land was noticed around these tanks. The open scrub area at the height of the triangulation point 635 the



3) · CULTIVABLE LAND

east of Kawadipalli has some trees growing on the western slope of the hill. This has a boulder controlled slope. A Water body close to this hill helps in cultivation, washing of clothes and cattle grazing. Abdullapur is a small settlement close to which is a hill resort being developed by a private company. On the national highway are found Poultry Farms and Vineyards. Most of the land in this region is left as Fallow land. Whilst a part of it is upland with or without scrub. (See Photograph). a very few tanks are found close to rural settlements but these meet the needs of the settlements in terms of the daily usage as well as the cropping pattern. Fallow land is found in the south as well. The dolomite dykes are barren and rocky without any vegetation and not even with scrubs. These are dark brown in colour and may be used for ornamental purposes in interior decoration. Water percolates right through the dykes into the interior and these rocks get rounded very quickly.

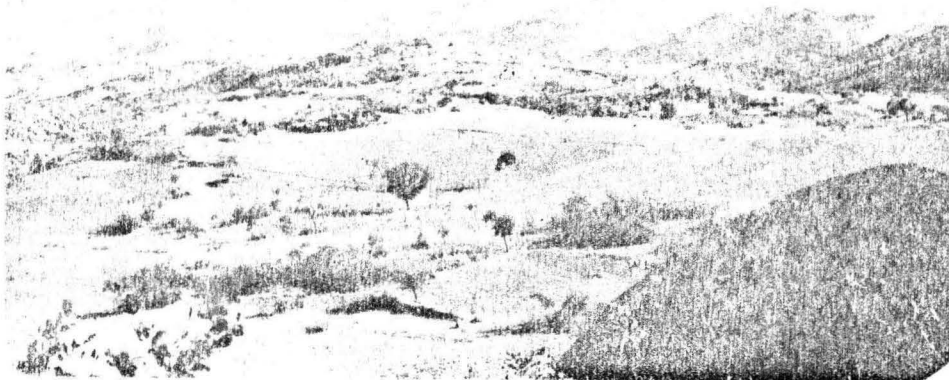
#### SOUTHERN REGION:

To the south of the National Highway Number Nine just near Batasingaran is a tributary of river Musi known as Chinna Musi. Crops and grass are grown very close to the river which has some amount of water and crosses the road going toward Nalgonda. The whole region to the North East of Ibrahimpatnam

Taluq is dry and has upland which is scrub. The Yapal and Polkampalli forests are almost degraded forests. The dolomite dyke running in the North South direction goes through the Yapal forests. The road leading to Ibrahimpatnam in the south has some eucalyptus plantations at Sahibnagar and Gurranguda. Teak wood plantation is found very close to the highway passing through Hayatnagar and Vineyards are found close to the roads leading to Nalgonda and Ibrahimpatnam. Ground water is utilised as water is pumped upto overhead tanks and supplied to the Grape Vineyards. There is a small water body known as Masab Cheruvu and crops are grown close to this tank as this is a perennial tank. Palm trees and other trees like tamarind trees are found in this area. The Ibrahimpatnam Reserve forest is a low land which is the end product of a Bajada. This is a fairly dense mixed jungle with dry shrubs and other trees. Nomul and Japal, Datpalli Reserve Forests are the other forests found in this region. Ibrahimpatnam Cheruvu is the largest tank in the area with paddy fields all round the tank. The Yelimineta Vagu joins the Ibrahimpatnam Cheruvu by flowing in a South West to northeast direction. The whole area from Madhapuram in the South West to Ibrahimpatnam Cheruvu is a cropland along the drainage lines and as we go away towards the interfluvial tracks we find fallow land. The area is a mature land with rocky remains even in paddy fields. From Ibrahimpatnam to Manchal in the



32 EUCALYPTUS PLANTATION



33 CONTOUR PLOUGHING



southeast a few eucalyptus plantations<sup>2</sup> were noticed near Japal at the triangulation point 697 borders were rolling down because of which the farmers had constructed a wall of boulders to protect the fields and the nearby houses from being disturbed as the boulders come down the boulder controlled slope frequently. A place of worship was also found on the hill. A Spring known as Bugga as seen after the Japal Reserve Forest. A temple was built around the spring as this provided water to the whole valley beyond. The Loyapalli valley in between Pandalemur in the north and Elegapalli in the south. The area to the north of the valley has a spur and valley topography where contour ploughing<sup>3</sup> was observed. Dry crops and Dry grass was grown in this region. At Rangapur which is on the north eastern side of Datpalli reserve forest an astronomical observatory has been set up by the Osmania University's department of Astronomy.

On the southern side of the valley a huge residual which are barren and have rocky boulders a dug well observed in this region was about 60 ft deep. This region is a highly weathered area with chemically altered rocks. The land use pattern seen generally in the whole region is made up of built up land in the twin cities of Hyderabad and secunderabad and a few towns in each taluq. This slope is very steep in the southeastern part of Ibrahimpatnam where springs provide water to a number of tribal settlements. Countour ploughing, grazing of sheep in pastures and a little of cultivation is done in this with the help of ground water and the biggest Bugga (spring) which provides water to the whole of Loyapalli valley. The western part of the southern region is generally a level land with land for agriculture and plantations. There are a few forests and a little of upland with or without shrub which is left for fallow. In the Hayatnager taluq the Musi river and a few tanks provide water for cultivation. Grass lands are found in this region close to the city especially in the southern part. Shepherds have some pastures to feed their sheep some of the residual hills are being quarried for the purposeses of construction in the twin cities. The nothern part in the region is made up of undulating topography. Streams are found and these help in wet agriculture. Vineyards are found in this region as ground water is being exploited. The shamirpet cheruvu provides enough water for paddy cultivation in nearby places. Barren and rocky areas are found in plenty. Shrubs and bushes dominate the land scape where uplands are found.

LAND USE AND LAND FORMSINTRODUCTION

It is imperative that land forms and processes natural parameters have a great influence over the land use. A detailed study would bring in marked correlation that exists between the two.

OPTIMUM LAND UTILISATION PATTERN

Geomorphic factors such as relief slope, weathering process and the amount of solar warming influence in the terms of temperature and rainfall and other factors like soil ground water places were surveyed and these factors were correlated to obtain an optimum land use pattern in Medchal, Vallabnager, Hayatnager and Ibrahimpatnam taluqs. By surveying the geomorphic map obtained from IRS data and land use obtained from T.M data and utilising the data obtained regarding the soils ground water potential and mapping the relief features to a terminal extent an integrated priority map was obtained for obtaining a optimum land use pattern in the eastern part of Ranga Reddy district consisting of the taluqs of Medchal, Vallabhager, Hayatnager, Ibrahimpatnam and Maheswaram taluqs.

As the geomorphic features and the existing land use pattern was

already described in the last two chapters a general outline of the soils changed and ground water .Potential and the relief is being discussed in this chapter before recommendation for optimum land use we suggested .

## SOILS

Red sandy soils, Red layery soils and Laterite soils charecterise this part of the region. The red soils are red or reddish brown in colour and are derived from granite and gneiss. These are developed on gently sloping sediments. The dominant clay mineral is Kolonite. These have been classified under Alfisols by the United States Department of Agriculture in its classification of the seventh Approximation. These soils are generally poor in nitrogen, phosphorus and Lumus. The red soils or chalkes or sandy loans locate at higher levels are used for the cultivation of Kharif crops. Excessive gravelliness surface crust formation and susceptibilty to erosion due to high solpes are the problems found in this region. However Alfsoils contain a moderate to high reserve of bases. The Alfsoils in this region one of the suborder itselfs. They have an ustic moisture region through which moisture moves through the soil to deeper layers only in occesional years. Soils comprise of mineral and organic particles while the sub soil or bedrock is composed wholly of minerals. Primary mounds found in this region are mostly quartz and feldsparr with relatively small proportions of pyroxenes amphiboles etc. The primary minerals are mostly concentrated in the basic fraction of the

GRAIN SIZE ANALYSIS OF SAMPLE (TABLE I)

Sl.No	Seive No	Quantity	Weight Of The Sample	Cumulative Weight of Sample	Grain Size in mm
1)	4	2.00	7.410	7.410	4.00mm
2)	6	1.50	7.465	14.875	2.80mm
3)	12	0.50	50.530	65.405	1.40mm
4)	18	0.25	18.110	83.515	850mm
5)	30	1.00	8.240	91.755	500mm
6)	60	2.00	2.705	94.460	250mm
7)	72	2.25	1.210	95.670	212.mm
8)	80	2.48	1.175	96.845	180mm
9)	120	3.00	1.810	98.655	125.mm

soil bends. Alfisoils are the utilised. Which are extremely weathered soils with very low retention of bases. These have experienced greater mineral alteration. It is believed by some reaserchers that with time and further weathering Alfisoils eventually degenarate into utisoils.

Borders the Alfisoils and the ultisoils are the Laterite soils. These are from the atmospheric weathering and several rocks Laterite soils are usually charecterised by acompact to vascular structure and the sub soil horizon composed esentially of amixture of hydrated oxides of Iron and Aluminium. This sometimes leads to honeycomb like structure. soil samples were taken from some profiles near road cuts in the southern region in the Ibrahimpatnam taluq. The first soil profile consisted of three horizons. The first layer was a pinkish layer measuring about 6 feet. The pink colour is from the pink granitic parent material. This was subjected to seive analysis to find the median grain size of the soil. 100 grams of the sample was taken and put into five seives which were fitted into the ro-tap and this was allowed to work for 15 minutes after this the material in the pan was put into another four seives. After ro-tapping the material in each seive was weighed in a physical balance, the following results were obtained :

This sample was sndy in texture and its structure was angular, blocky, platy, and crumbs were present in the soil sample the second layer was blackish in colour measuring about a foot. Likewise this sample was

**TABLE NO 2"**  
**GRAIN SIZE ANALYSIS 2ND SAMPLE**

S.No	Seives	Quantity No	Weight of Sample	Cummulative weight	Grain Size in mm & micron
1)	4	2.00	3.840	3.840	4.00mm
2)	6	1.50	8.250	12.090	2.80mm
3)	12	0.50	33.720	45.810	1.140
4)	18	0.25	31.870	77.680	850microns
5)	30	1.00	11.105	88.786	500microns
6)	60	2.00	7.605	96.390	250microns
7)	72	2.25	1.160	97.550	212 microns
8)	80	2.48	1.310	98.860	180 microns
9)	120	3.00	1.355	100.215	125 microns

seived and the following results were obtained :

The sample collected was loamy sand in texture and was angular blocky in structure. The results of the third Kaolinised weather droped horizon is as follows :

The Kaolinised material was whitish in colour and can hold water. This is columnar and blocky in structure. From the above analysis of the soil it was found that the soil was generally a very coarse sand. On the other hand it may be that the process of disintegration which yeilds products of varying grain size produce more of certain size and less of others. In other words the primary deficiency of certain sizes by observation it was found that the soil was angular, blocky and columnar showing very little evidence of wear. This suggested that the rock had disintegrated due to various weathering processes but it had not moved so much to have become rounded in shape. This almost the general feature in most of the area while rounded structure is found close to the Musi River. The porosity of the soil should be generally low but because of the grain size which is almost of the same size porosity is quite high and since the compaction of grain is quite low porosity is quite high. The permeability of the soils is quite high



TABLE NO 3

GRAIN SIZE ANALYSIS OF THIRD SAMPLE

S.No	Seive	Quantity	Weight of sample	Cummulative weight	Grain Size of the soil
1)	4	2.00	18.762	18.762	4.00mm
2)	6	150	9.510	28.272	2.80mm
3)	12	0.50	30.500	58.772	1.40mm
4)	18	0.25	26.350	85.122	850mm
5)	30	1.00	8.115	93.237	500mm
6)	60	2.00	3.110	96.347	250mm
7)	72	2.25	1.120	97.467	212mm
8)	80	2.48	1.150	98.617	180mm
9)	120	3.00	0.420	99.037	125mm

CLIMATE

The climate of this region is characterised by hot summer and is quite dry except during the southwest monsoon season. June to September constitute the southwest monsoon season and the season between December and mid February is cold. Mid February to May is summer season. This area is typically tropical climate. As with any other tropical region is a seasonality and the quantity of the rainfall that become more important than the temperature (it is always sufficiently high to promote growth of vegetation). The average annual rainfall in the region is 769.9mm the rainfall generally increases from the south towards the north. The rainfall during the southwest monsoon months i.e. from June to September constitutes about 78 % of the rainfall. September is generally the rainiest month since the rivers are mostly small and since the streams are annual and seasonal the ground water potential of the area was observed for its effective utilisation.<sup>10</sup>

GROUND WATER POTENTIAL

This region is drained by river Musi only and this part is covered by crystalline rocks. The ground water movement is confined to structural controls where dolomite dykes quartz, and pegmatite veins intrude into the

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10. Alam Manzoor S., Op. cit, p 12.

TABLE SHOWING GROUND WATER POTENTIALS

Statement Showing Probable Ground Water Potential Villages.-:

S.No	Name of Taluq	Probable Ground water Potential Villages
1)	Maheswaram	Mankhal, Arisguda, Ravidra, Kangava Peddakungara, Gotapalli, Masanpalli Maheshwaram, Gangaram, Dilwarguda Dharmawaram.
2)	Ibrahimpattanam	Konthanda Bodekonda, Sityaltanda Loyapalli, Yellamma thanda, Toolead Chetapalli.
3)	Medchal	Dundigal, Barkupalli, Poderu Antharam, Gagilpuram
4)	Vallabnager	Kapra
5)	Hyatnager	Bandaguda, Thummabowli, Lingo jiguda Kelavancha, Kuntaloor, Mathavalli- guda. Kinjia, Aliguda, Anasipur.

Courtesy : ( A.P.S.I.D.C. Ltd A.P.)

post rock. In general only the Maheswaram taluq can be certified as reasonably potential whilst Ibrahimpatnam next best. Hayatnager taluq has semi potential. In hard rock zones of this region due to concealed dykes and other cavities drilling is found to be time consuming. Exploitation of ground water from buried river channels of Ibrahimpatnam can be done by using rotary techniques. Due to the proximity of the Twin cities a number of gardens have come up in huge numbers in many parts. This has resulted in exploitation of ground water. Practically no norms are followed resulting in mushroom development of bore wells. If it is not checked the ground water regime of the region will be severely affected.

The ground water prospects of the region in general are not bright. More than two thirds of the region being hard rock area the recharging and the storage capacities of these aquifers are poor. Thousands of dug wells have been used for centuries to extract this undependable supply of water. Limited quantities of ground water is held in the weathered and fractured zones. Wells such as dug wells , dug come bore wells and shallow tube wells constructed in these regions yeild just sufficient water for one or two hectares only and are not reliable especially during summer and drought years. The Ph of water sample in Ibrahimpatnam taluq was found to be 7.50 when collected from a spring and hence the water in this area is potable.

GEOMORPHIC FEATURES SURFACE FLOW PATTERN

The flow pattern has heavy discharges during the monsoon and is followed by low discharges during the rainless months. There are innumerable tanks big and small in this region which occupy a very important place as a source of irrigation. An interesting feature of these tanks is that many of them exist in chains, one below the other in reducing contours, the surplus of the upper tank draining into the lower tank. and the ayacut of the upper tank almost tailing into the foreshore of the lower tank. This was an ingenious attempt of the ancestors to hold and use as much of the run off from the monsoon rains as possible locally in a spirit of co-operative effort.

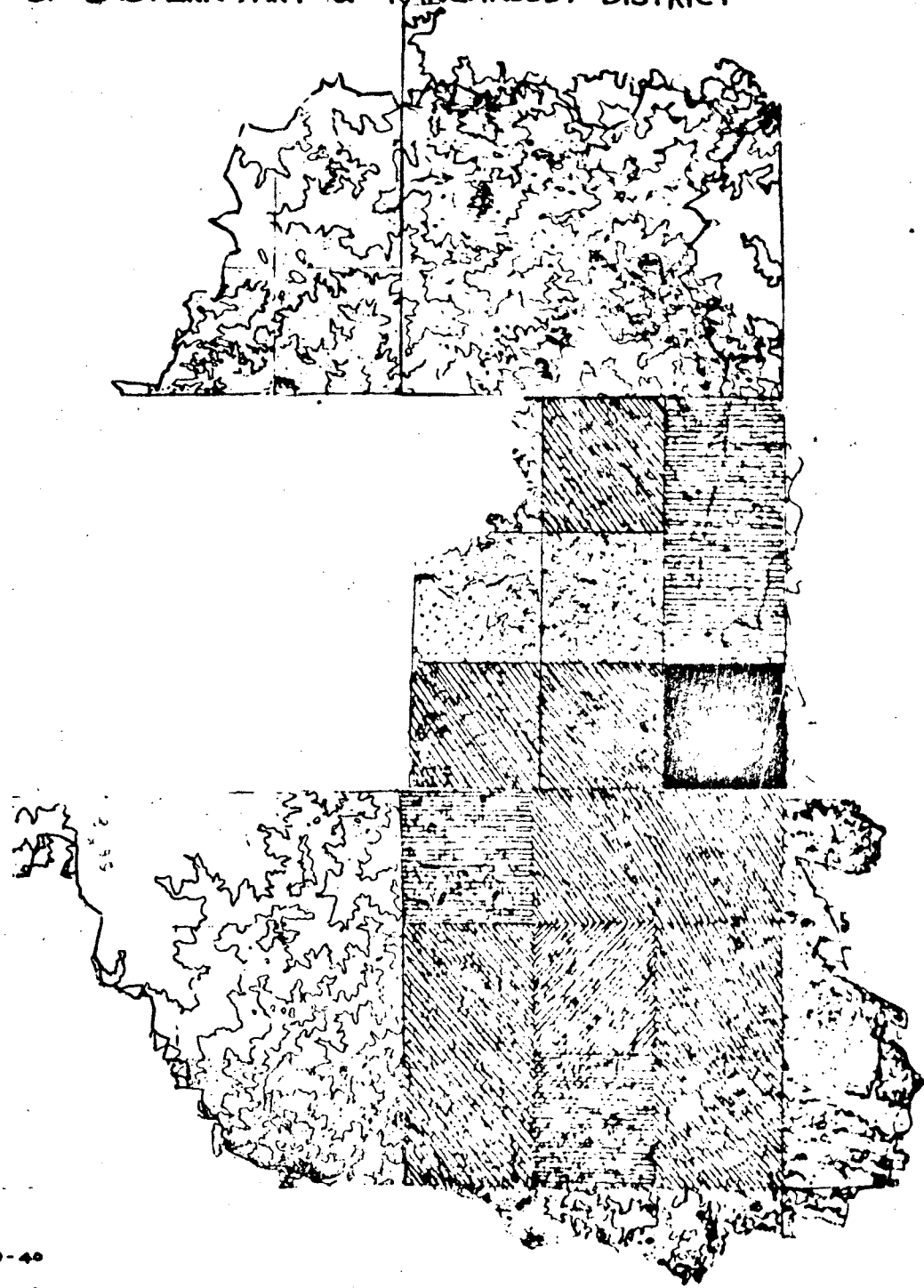
RELIEF.

Geomorphic factors such as relief, slope influence the formation of soils. Where the slopes are very steep as found in the southeastern and southern part of this area the rate of erosion is more and thus the soil profile does not have a chance to form making the soils thinner than on gentle slopes. On gentle slopes in this area new soil derived from parent material balances the soil which is removed by slow erosion. The relative

(see map)

# RELATIVE RELIEF MAP

OF EASTERN PART OF RANGAREDDY DISTRICT



	0 - 40
	40 - 80
	80 - 120
	120 - 160
	160 - 200
	200 & above

relief of the region. Contours were initially drawn based on 20 metre interval from a 1: 50,000 toposheet . The 40 metre contour intervals were taken and a legend was given whereby the highest and the lowest relief of the whole area was obtained. This gives us an idea of the nearly level region, the gently sloping region and the steeply sloping region. The toposheets 56K/6 56K/8 56K/10 56K/11 56K/12 56k/15 and 56K/16 were mapped. The western part of Medchal as seen in the toposheet 56K/6 was a nearly level region gently sloping to the south through which the river Musi flows. The Maheswaram taluq as seen in 56K/8 is a gently sloping region from the south to the north with the highest point reaching 706 metres in the south. The eastern part of Medchal taluq as noticed in the topo sheet 56K /10 were the contour of 580 metre dominates in the north and it slopes down to the river Musi. While in the southern part of the toposheet the 580 metre interval with rocky knobs and residual hills above 600metre are found in this region. It is nearly a level region as far as the slope is concerned. The toposheet 56K/11 also reveals a nearly level region with contour of 500 metres dominating with a steep slope in the southeastern part of the toposheet. The area found in the toposheet 56 K/12 slopes gently towards the northern side, whilst steep slopes are found in the southeastern part of the map. A small area on the western side of the topo sheet has increasing contours towards the north and the south from the course of river Musi in the middle. The contours in the toposheet 56 k/16 shows steep slopes with the loyapalli valley in the southeastern part of

the whole region. The topo sheets L5 L9 and L13 in the southern part of the region shows steeper slopes in the southeastern parts, speaking of the region as a whole .

### RECOMMENDATIONS FOR OPTIMUM LAND UTILISATION

The geomorphology as described in the previous chapter has a bearing on the environment. The features described are constantly metamorphosing into new features and thus there is a constant move towards stability which is never attained because of the interference of man. Impact of this environment on man who assumes a constant horizon for area is costly and even disastrous. Most important of these is running of seepage water. The force is unbelievably large and accounts for majority of the losses accounted in road repairing and sometimes even as building collapses in urban and rural areas. Any man made force is a threat to natural environment. Unless built to account for the hydrostatic force. The building of bridges and culverts on the roads and sufficient foundations for roads should prevent water from undermining the road and causing numerous potholes. The foundation if accounting only for the dry season may support the weight of vehicles but in wet season is bound to saturate many weak points and may cause disaster by weakening the





foundations. The course of a river or stream should not be disturbed unless absolutely necessary and even then sufficient precaution should be taken by building bridges and culverts wherever they are necessary.

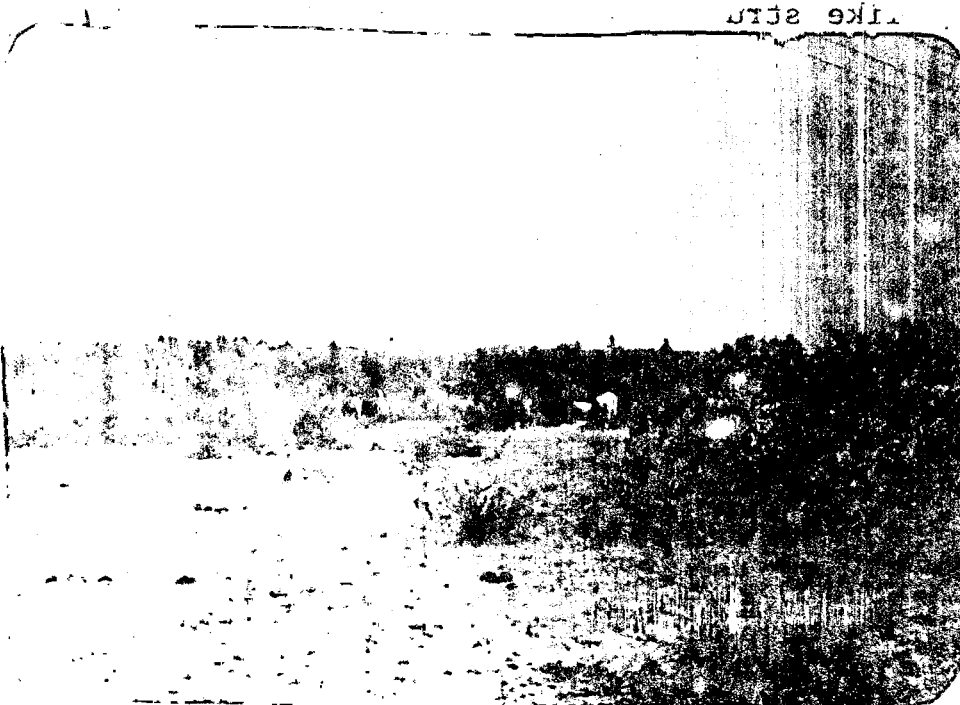
An integrated priority map was prepared by superimposing the land use map upon the map of geomorphic features. Besides this the soil conditions, ground water potential, relief, climate and rainfall were considered. The following recommendations were suggested after analysing the various factors. The western part of Medchal taluq has colluvial fills and a part of it can be used for the manufacture of bricks especially where a good mixture of silty clay and sand are found. The younger alluvial fills of various streams are useful for construction purposes as a source of gravel and sand. The granitic hills near and away from the twin cities provide a good source of gravel and sand. However quarrying has to be done in a planned manner. Extensive quarrying especially of the underground nature found on the road at Medchal may give rise to subsidence. Obviously the outlook is for increased drainage without which public health can be affected due to accumulation of water during monsoon season and the subsequent breeding of mosquitoes. This however can be used for recreation spots and for accommodating heavy structures in the near future. After reaching the ground level they can be used for residential purposes if ground water can be pumped from a nearby area. However destruction of geomorphic features imbalance the environmental stability.

of the area. By analysing the available geological and geomorphological data which has been possible to determine areas with ground water potential. The probable potential as and moderately protected village for ground water exploitation have been identified as shown in the table. The ground water can be tapped by digging or drilling shallow or deep wells and can be lifted by mechanical devices for irrigating crops. The areas around

the colluvial and alluvial fill zones with a thick soil cover are suited for irrigated agriculture. Shallow restricted water bodies which are commonly occurring and periodically replenished during monsoons may be utilized as water storage tanks/reservoirs for use in irrigation during the drier months. These areas can also be developed as tourist spots or fish ponds. The major soil group in this region is red earths comprising of loamy sands (Dubha) and sandy loams (Chalka). The red loamy soil in this region with provision of surface drains is suitable for cultivation of paddy. It is also suitable for dry crops like Bajra, Jowar, Maize, Ragi and groundnut under rainfed conditions. As the soil is highly permeable and excessively drained the application of organic manures like farmyard manure, green manure, tank silt and compost is recommended to improve its water holding capacity as well as productive capacity. Nitrogenous fertilizers at regular intervals in small doses is also recommended for high yield of crops. Farmyard manure considered to be very valuable is prepared from farm wastes and the sweepings of farms, by preserving them in the corner of a farm. Compost is prepared from household wastes, street wastes and cowdung and are generally prepared by Municipalities and major Panchayats and is of a very low cost. Utilisation of seeds belonging to hybrid varieties is very specially needed in this region. Afforestation of the bare hill slopes may be useful in the development of a green

belt. New methods of irrigation like the sprinkler irrigation system or drop by drop irrigation system should be adopted after exploiting the groundwater potential. The colluvial and alluvial area should also be set apart for the development of green belts or for farming of fruits and vegetables. The pediplain and the lower parts of the dissected pediment with moderate soil cover is suitable for dryland farming. This will also meet the problems of and enhance rain water percolation. The area around the dissected pediments will have more groundwater to sustain pastures and livestock. The vegetation of the area has been reduced to shrubs and bushes and thereby conservation of soil is not possible. Due to its sloping and undulating topography the problem of soil erosion is very serious. The steep slopes and the marginal lands bordering hillocks face acute erosion in times of heavy rains. This is found throughout the region. The deforested areas are open scrubs forest areas especially in the upland regions. The foot slopes of granitic and gneissic denudations should be brought under intensive afforestation with adequate protective measures. Investigation reveals that 6% of the excessive run off will be available to induce recharge into the depleted aquifers by checkdams, afforestation. Soil forestry is in fact necessary to meet the increasing demands of growing population. Plantation of trees would generate local employment also.

Slope stabilisation by grass plantation along the steep slope of the repose should be taken up. Other remedial measures which can be adopted to prevent or reduce surface run off are contour bunding, contour trenching gully reclaiming, terracing, regulated forestry, controlled grazing, revegetation, crop rotation and strip cropping. All necessary steps should be taken to clothe the land with natural vegetation and preserve its growth gully erosion and Rill erosion were noticed in this region. Gullies in this region are very small gullies which are about 3 metres deep and with bed width which was about 4 to 5 metres. Small gullies with a depth of 3 metres and a bed width of about 18 metres was also observed at higher places. Rill erosion was observed on the way to Loyapalli. Small incisions were found at higher places. Rill erosion was observed on the way to Loyapalli. Small erosions were found which were plowed over and almost forgotten. This was found in a place where the slope was about 5 to 6 percent. These gullies and rills can be reclaimed by composite check dams a with minor levelling with bull dozers. It is suggested that gullies and drains may be properly widened, deepened and hide to cope with the run off. Vegetation, in the form of Acacia spceies will help there to get back to normalcy. Slope stabilisation can be obtained by grass plantation also. In the Loyapalli region a highly weathered region was identified. Although



34. Pasture

the process of weathering is found in the whole region. Tors and boulders were observed a top these residual hill. Weathering is the natural phenomenon of taking rocks into stability. Due to this a big boulder came down the hill to accommodate itself beside the road. These rocks and boulders normally comedown at various intervals and therefore a residual hill at Japal was found with a small wall structure made with rocks to protect the villagers from such rock falls. The government is urged to take suitable steps for exclusion of agricultural activities in the pediment zone. The pediment area which is often covered by a apron of sandy light soil is recommended for pasture development which would support dairying. Allocation of land for further optimum utilisation should be made after studying the area.

Plantations may be raised on the Piedmont zones and the terraced pediment. The flat granitic hilly areas could be developed into beautiful towns. Urbanization or settlements should be restricted to the elevated flat or gently undulating terrain occupied by residual soils. Some of the uplands close to the twincities could be used as wild life parks. Because of the low rainfall and inhospitable soil conditions aggravated by ever increasing biotic interference the forests have been degraded. The soils have very little plant nutrients and so they support only a



inferior type of forest. Added to this unrestricted grazing puts an end to natural conditions. These forests yielding only thorn, fuel and small timber are mostly restricted to isolated hills or on the slopes of hillocks. Eucalyptus and Teak plantation can be encouraged in this region. Eucalyptus is a fast growing species. Vineyards growing Anab-e-Shahi grapes should be provided the necessary encouragement. The principle difficulty in reclamation and utilisation of all these lands is the lack of irrigational facilities. A master plan for the exploitation of the irrigational potential of the region must be made. This will enable cultivable waste land to be reclaimed and utilised.

SUMMARY & CONCLUSION

An area of about 1823 square kilometres belonging to the Eastern part of Ranga Reddy District consisting of the taluks of Medchal, Vallabhnagar, Hayatnagar, Ibrahimpatnam and Maheshwaram taluks included in the Toposheets 56 K & 56 L on 1: 2,50,000 has been studied in detail. Geomorphic details were studied with the help of an IRS Satellite Image taken in April 1988. Land use map was prepared with the help of the TM Satellite Image of March 1986. With the help of field work, ground truth details were checked. Other data regarding soils, ground water potential, relief and climate were obtained and the geomorphic map and the landuse map were superimposed upon one another to obtain an integrated priority map for optimum land utilisation. The work done has resulted in the following conclusion:

The area consisted of Pink and Grey granites with pegmatite veins and a few epidote and quartz veins found here and there and a few geological structures like joint planes and mineral lineations. The region consisted of one river, River Musi flowing from west to east with tributaries joining it and streams joining various tanks. There is one major dolerite dyke traversing in a North-South direction in the Eastern part and a few dykes in the East-West direction in the North and the

South. Several other dykes traverse in a South West to North East direction in the southern part.

✓The whole region basically has undulating topography in the form of a pediment with Tor and inselberg complexes and Residual Hills scattered here and there. Pedestal rocks are found indicating semi arid topography. The region has a typically tropical climate which aids in weathering. The drainage pattern is radial and dendritic flowing out on all sides.

Soils are red sandy soils and are Alfisols and Ultisols according to the U.S.D.A classification. The sieve analysis showed that the mean size of soil particles is 1.4mm indicating it as coarse sand. PH of a water sample in Ibrahimpatnam taluq was found to be 7.50 when collected from a spring. Hence the water in the area is potable. Geomorphic features are disappearing due to human interference especially in places close to the twin cities. Ground water potential study indicates that only Maheshwaram taluq can be certified as reasonably potential whilst Ibrahimpatnam is next best and Hayatnagar taluq has semi potential character.

✓The land use pattern in the region consisted of built up land, agricultural cropland, orchards and fallow land, forests, upland with or without scrub, barren rocky land, water bodies

and other land which includes grassland and other grazing land. In general the twin cities of Hyderabad and Secunderabad have been spreading out into Medchal, Vallabhnagar, Hayatnagar, Ibrahimpatnam and Maheshwaram Taluqs. Thus the built up land is generally increasing. The agricultural cropland has been increasing in percentage through the years because of better knowledge of ground water potential, and thereby the increase in utilisation of ground water. Dry crops are cultivated in this region wherever water availability is not much. There are a lot of uplands with or without scrubs and this wasteland is generally left without any specific use except for the development of colonies close to the twin cities. A number of vineyards close to the city on the northern and the southern side provide the famous Anabeshahi grapes known all over the country. A number of poultry farms are being developed on the road to Vijayawada and on the road leading to Warangal. Because of the dependence of the farmers on rainfall, the monsoon pattern determines the agricultural output each year. A lot of land is put for fallow in the interfluvial tracts. The tor and inselberg complexes and residual hills are left as barren lands with the few temples and sanyasis finding them as a place of recluse. Many of the forests in the region are undergoing a change with a lot of them being degraded by the local population. The upland region is left with or without scrubs and where ground water can be utilised, these are also being converted into colonies and settlements. Barren rocky

outcrops are left without any use. While some of them are being quarried for building material. The tor and boulder terrain is seen almost everywhere. Large smoothed spherical domes or huge exfoliation domes or tors are seen everywhere. These are susceptible to a slow process of mechanical weathering in the northern part and chemical weathering in the southeast. Grassland is found on the northern and southern part of river Musi. Grasslands are found in many places and these pastures are being used by cattle breeders and shepherds for cattle and sheep grazing. The soils in this region are generally the red soils and lateritic soils. Water and nitrogenous fertilizers make the soils productive. Morphogenetically this area is a semi arid region with morphological characters of medium to strong action of running water and strong wind action. Monsoon brings in heavy rainfall around 1st week of June. Radial and dendritic pattern of drainage is found with streams flowing out on all sides of the outcrops. The drainage is approximately controlled by the structures of the area. Correlation between the geomorphology and the landuse pattern was drawn by superimposing the landuse map on the geomorphic map. An integrated priority map was drawn and it was found that a master plan should be made to exploit ground water. Hybrid varieties of seeds and different feasible irrigation systems like sprinkler irrigation system were suggested. Rocky outcrops should be made use for building and construction purposes keeping the area and the problems in

mind. For tackling the problems of soil erosion levelling and afforestation was suggested. Acacia species of plants could be grown in this region for meeting with the problems of soil erosion. Finally it is suggested that necessary planning of the whole region, area by area should be undertaken keeping the problems in mind and it is recommended that the region should be studied at the micro planning level.

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