CHAPTER - 1

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INTRODUCTION

PREAMBLE

The local natural resource is the base of the developmental activities. The pace and intensity of the development is generally governed by the local geo-environmental setting. However, many a times it has been observed that the proper balance between the resource potential and developmental stress is not maintained. As a result the environmental dynamics get adversely affected and the developmental processes are paid heavily. Unfortunately, the factors and parameters of the geo-environments of the given area have not been evaluated in its appropriate perspective. Many a times some or the other factors are either not recognized at all or not adequately given due importance in the developmental planning process. The present study, taking a case of the Ahmedabad-Gandhinagar a twin city urban complex having a multi dimensional development of infrastructure, industry and commerce and the relative load as well as carrying capacity of the relevant geo-environment and its natural resource base like the land, water, climate, soils, etc. has been carried out. The twin city complex provides a good ground to under take such investigation. The area has been endowed with a reasonably good fabric of geo-environmental factors and associated natural resources.

The area forms a significant part of the Sabarmati river basin of Gujarat Alluvial Plains. The basin has been mainly evolved during Quaternary age and is comprised of a 400 to 600 m thick succession of continental Quaternary deposits. These Quaternary processes were responsible for the geological environments in the area and are still active, leaving important signatures on the present terrain configuration.

An accelerated growth of urban areas in the absence of advance planning has played a major role in degrading the natural resource potential. Thereby, the natural ecosystem has been considerably disturbed and modified which calls for an exhaustive and precise study of the environmental geological aspects of the area.

LOCATION

The area under investigation comprises the Ahmedabad Urban Development Authority (AUDA) limits and the state capital taluka-district of Gandhinagar as shown in location map, fig 1.1. The area is bounded within N latitudes 23° 30' to 24° 45' and E longitudes 72° 15' to 72° 45', covering an area of approximately 2000 km^2. It is included in the Survey of India Toposheet Nos. 46 A/8 & 12, and 46 B/5 & 9. The AUDA area covers the entire City and Dascroi talukas and parts of the adjoining talukas of Sanand, Dahegam and Dholka of Ahmedabad district, while the entire taluka-district of Gandhinagar is included in the limits of the study area. The limits of the area are shared by the different talukas of Mehsana, Ahmedabad, Kheda and Sabarkantha districts.

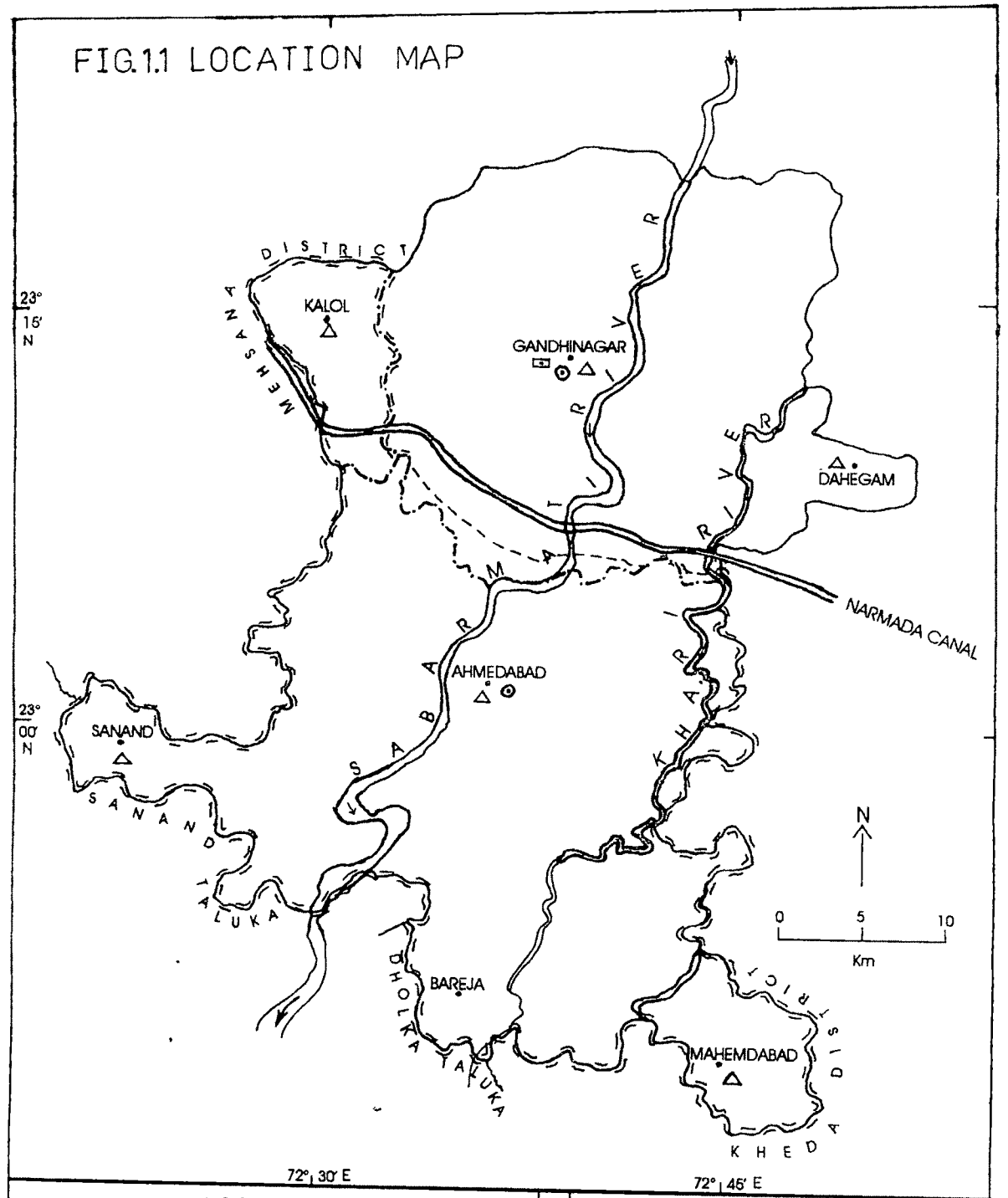
FIG.1.1 LOCATION MAP
MEHSANA DISTRICT
KALOL
GANDHINAGAR
DAHEGAM
RIVER
NARMADA CANAL
AHMEDABAD
SANAND
SANAND TALUKA
SABARMATI
KHARI
BAREJA
DHOLKA TALUKA
MAHEMDABAD
KHEDA DISTRICT
23° 15' N
23° 00' N
72° 30' E
72° 45' E
N
0 5 10
Km
LOCATION KEY
THE STUDY AREA
POPULATION - 50 LAKH(1996)
AREA - 2000 KM2
STATE CAPITAL
DISTRICT H.Q.
TALUKA H.Q.
AUDA BOUNDARY
DISTRICT BOUNDARY

AHMEDABAD-GANDHINAGAR URBAN COMPLEX

The modern urban complex of the Ahmedabad-Gandhinagar twin cities is unique in its character from the viewpoint of history of growth and development. Ahmedabad is a historical city grown over centuries preserving the various phases of anthropogenic interaction with the environs. While the city of Gandhinagar having no historical background presents an example of modern township grown within a period of just less than three decades. During this period both the cities have simultaneously expanded but have maintained their own characteristic styles. Till the birth of Gandhinagar, the Ahmedabad had enjoyed the privilege of being the capital seat of the state. It's inter woven fabrics exhibit a strong influence of local and regional geo-environmental facets with the anthropogenic aspects like administration, culture, religion, trade and commerce. The city in its early thirties had 90 sq km area with a population of 9 lakhs. Till late seventies, it was known for its textile industries. After this its character changed to chemical based industries. Presently, it has grown into one of the major Metropolitan urban complexes and presents a complex case of human-nature interaction. Gandhinagar city has been developed as a purely administrative capital of the state. It has a well designed modern plan of urban centre. It spreads over 30 sq km with present population of 1.16 lakhs, provided with practically all modern amenities of life. However, a healthy interaction of human-nature relationship is yet to develop. Given the present situation, the twin urban complexes present an interesting case

of impacts of geo-environments over fast growing urban-industrial complex and vice versa.

COMMUNICATION

The area has a well developed communication linkage within state, country and the world outside (Fig 1.2). The area is well communicated with the major cities of the country by air and railway routes. The twin cities are also fairly well connected with the major countries of the world through the recently developed Sardar Patel International Airport. Almost all the major cities of the country are well connected by broad gauge railway. The area has good direct linkage with the major cities and towns in western India by broad and meter gauge railways. The two cities are located on the National Highway No. 8 (Delhi-Mumbai). The networks of the state highways provide close roadway connection to all the district and taluka headquarters of the state. The area has been on a good Telecom and Internet links with outside world.

PHYSIOGRAPHY AND DRAINAGE

The study area forms part of the central alluvial terrain of Gujarat. The southerly flowing Sabarmati passing through the area breaks the general monotony of the tract and divides it into two distinct parts as eastern and western. Along the river banks typical ravine cuts have also been formed. Local elevations and depressions have obscured the general flatness of the two parts. The elevated mounds represent the ancient sand dunes. The average ground level is around 65 m above MSL.

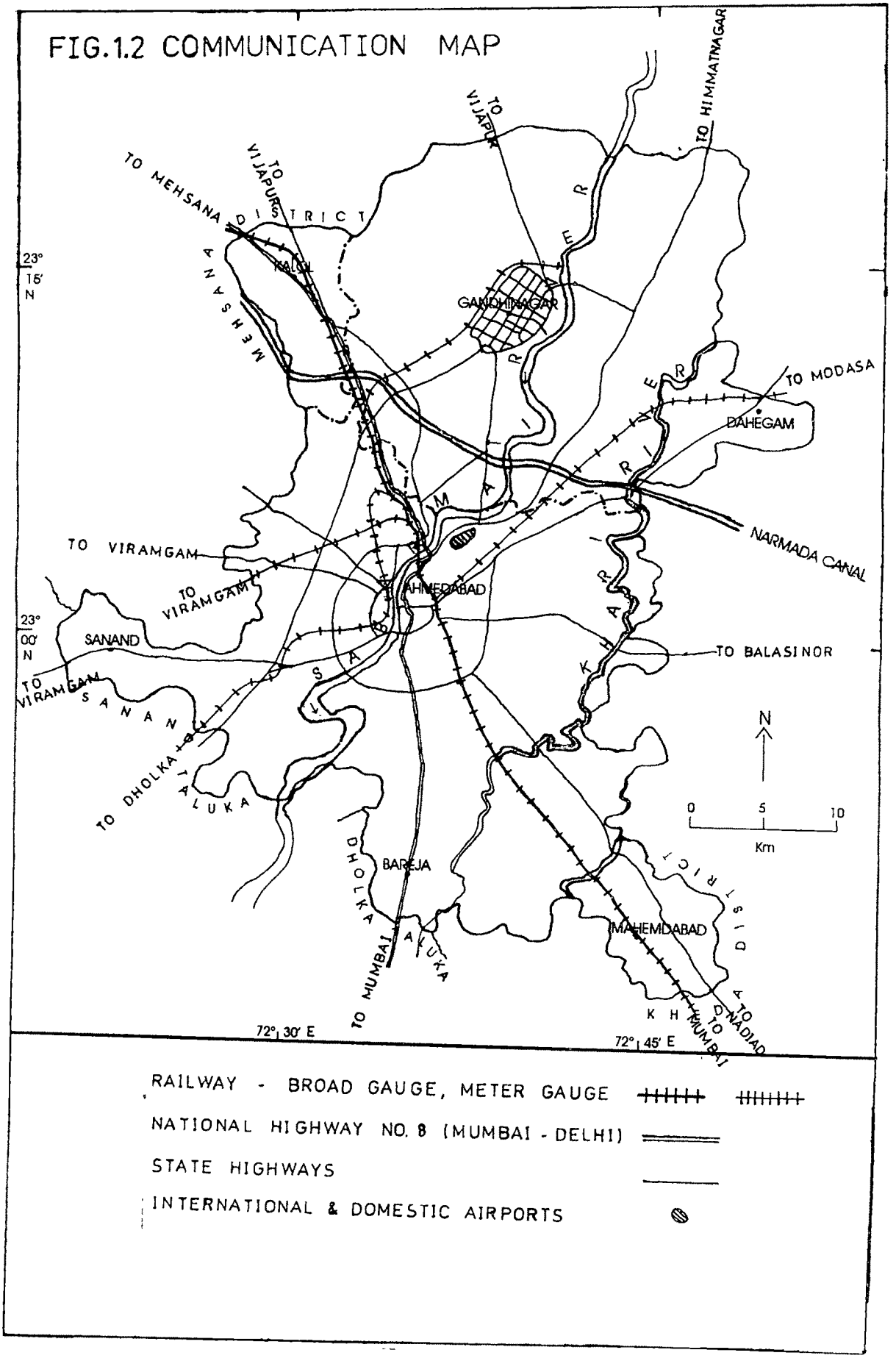
FIG.1.2 COMMUNICATION MAP
TO HIMMATNAGAR
TO VIJAPUR
TO MEHSANA DISTRICT
TO VIJAPUR
MEHSANA DISTRICT
KALOL
GANDHINAGAR
SABARMATI RIVER
23° 15' N
TO MODASA
DAHEGAM
NARMADA CANAL
TO VIRAMGAM
TO VIRAMGAM
AHMEDABAD
SABARMATI RIVER
23° 00' N
SANAND
TO BALASINOR
TO VIRAMGAM
SANAND
TO DHOLKA TALUKA
DHOLKA
BAREJA
DHOLKA TALUKA
TO MUMBAI
MAHEMDABAD
KHEDA DISTRICT
TO NADIAD
TO MUMBAI
72° 30' E
72° 45' E
N
0 5 10
Km
RAILWAY - BROAD GAUGE, METER GAUGE
NATIONAL HIGHWAY NO. 8 (MUMBAI - DELHI)
STATE HIGHWAYS
INTERNATIONAL & DOMESTIC AIRPORTS

However, the maximum elevation difference is about 40 m within the area. The area forms a part of the Sabarmati drainage basin. Khari river, a major tributary of Sabarmati flows almost along the eastern boundary of the area. The other major tributaries of Sabarmati river include Harnav, Hathmati, Vatrak and Meshwo.

CLIMATE

Climatically the area falls within the semi-arid tract of the state and is characterized by three well defined seasons viz. summer, monsoon and winter. Normally monsoon starts from last week of June and continues up to last week of September. The average rainfall of the area is 765 mm. The winter season extends from November to February. The mean daily temperature during winter varies from 12° C to 30° C. Summer starts from March to June. It is quite hot recording daily minimum temperature of 26° C and remains well above 40° C.

AIMS AND OBJECTIVES

The increasing stress and consequent degradation of the replenishable and non-replenishable natural resources of the area between Ahmedabad-Gandhinagar urban and industrial complex has tempted the author to make an attempt to understand the geo-environmental factors of the area. The study has been carried out keeping in mind the following objectives:

1. To collect and synthesis the data on the geo-environmental factors like geology, geomorphology, geohydrology and climate.
2. Identification and evaluation of terrain resources and natural hazards.
3. Appraisal of the urban and industrial growth and related aspects.

4. To evolve an appropriate strategy of maintaining a balance among the geo-environmental dynamics, natural resources and developmental stress.

APPROACH AND METHODOLOGY

Various geological parameters were studied using Survey of India topographical maps, aerial photographs and satellite imageries. Systematic field traverses were also taken to collect data on relevant aspects. Based on the data collected, an evaluation was done on the geological, geomorphological and hydrogeological setup of the study area. Various maps such as lithological, structural, geomorphological and hydrogeomorphological have been prepared. A consolidated environmental geo-scientific appraisal has also been attempted.

Stratigraphic successions were examined in different localities by measuring exposed sections in river cliffs, stream beds, in open fields, in building foundations etc. Sources of data were used to create geo-environmental setup of the study area including landforms and land use, soil types and agricultural and engineering uses, water resources and development. The scenario generated has been evaluated to understand the inter-relationship among the geo-environment, resources and development. The text matter has been adequately supported by figures, maps, photographs, tables, references etc.

PRESENTATION

The study has been presented in to four broad parts:

The part – I: Concept and strategy: It is presented in chapter 2. It deals with geo-environmental systems specifying the important factors and identifying the natural resource base. It further indicates a strategy for maintaining the balance and interaction between nature and human.

The part – II: Parameters of the geo-environments: It provides a status review of the specified factors in three chapters. Chapter 3 briefly describes the geological setting giving lithology, structure and tectonics. Chapter 4 describes climatic conditions with special reference to hydrometeorology and Chapter 5 deals with geomorphology and related landform features.

The part – III: Natural resource and hazards appraisal: It is divided into three chapters. Chapter 6 deals with water regime (surface and sub-surface water potential). Chapter 7 discusses about the soil and land resources. Chapter 8 briefly describes other natural resources under the general title of minerals and related resources.

The Part – IV: Human – Nature interaction: It is divided in to two chapters. Chapter 9 is on anthropogenic growth of Ahmedabad-Gandhinagar area. It provides an overview of the growth and development of the urban and industrial complex and deals with the developmental load and the related stress on resource potential.

Chapter 10 is on Geo-environmental Evaluation. It discusses the opportunities, constraints and issues and envisages the near future scenario. An attempt has been made to indicate the primary and governing role of the geo-environments in any of the anthropogenic activities. The author has tried to present a sketchy model of evaluation of geo-environments and related natural resource base in sustainable development.