

PART - II

Chapter VI

THE CHALTHAN BRANCH COMMAND AREA

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CHAPTER 6

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INTRODUCTION

As it has already been stated in the preceding chapters that introduction of canal irrigation although has benefited to the agricultural development of the South Gujarat area; on the other hand it has generated adverse effects on groundwater regime viz. waterlogging and water quality deterioration, and on soil regime through the development of soil salinization and/or alkalization. The Chalthan Branch Canal Command Area, which constitutes a part of Kakrapar Left Bank Canal Command, is one such command area where in, canal irrigation has caused high order of adverse effects. Therefore, the author has selected the Chalthan Branch Command Area to carry out in-depth studies on causes, pattern and magnitude of the negative impacts on soil and groundwater regimes. Later, based on qualitative and quantitative studies terrain appropriate management strategies have been proposed, to mitigate the various geoenvironmental hazards.

LOCATION AND EXTENT

The Chalthan Branch Canal Command Area sprawl in about 31,460 ha area and administratively constitutes a part of Bardoli, Palsana, Kamrej and Choryasi Talukas of Surat District. The command area is bounded by Kankra Khadi (rivelute) in the north and west, Gangadhara Khadi and Mindhola River in the south and Bardoli branch in the east. Geographically, the study area lies between the $21^{\circ} 01''$ and $21^{\circ} 12''$ N latitude and $72^{\circ} 44''$ and $73^{\circ} 11''$ E longitudes. Owing to the urbanization and development of industries in the western side of the command area (i.e. west of N. H. No. 8); the author has restricted his study up to the N. H. No. 8, covering about 10,900 ha area i.e. the command area having irrigation practices at the acme (Fig. 6.1). The salient features of the Chalthan Branch Command Area are given as under:

Location : Area lies between National Highway No. 8. (west) & Bardoli Branch (east); Kankra Khadi (north) & Gangadhara Khadi (south).

Total Geographical Area : 10900 ha. (109 sq.km)

Climate

Average Annual Temperature

Mean Maximum : 34° c

Mean Minimum : 20° c

Average Annual Rainfall : 1200 mm

Topography and Drainage : Alluvium plains with no evident drainage system

Communication : State highway and other numerous village roads

Power Supply : Main grid

Major Occupation : Farming

Land Use

Reappraised C.C.A. : 8719.86 ha.

Total irrigable command area by flow and lift irrigation: 7562.02 ha.

Water

Primary Source : Surface water

No. of tanks (appx.) : 20

No. of wells (appx.) : 450

Canal Network

Length of Existing	
Canal Network	: 174.78 km.
No. of Canal Structures	: 195
No. of Outlet Blocks	: 417
No. of Village Benefited	: 27

Prominent Crops

a) Kharif	: Sugarcane, Paddy
b) Rabi	: Sugarcane, Wheat, Vegetable
c) Hot	: Sugarcane, Hot-paddy

Total Population (appx.) : 50,000 [25521 (Males) & 24479 (Females)]

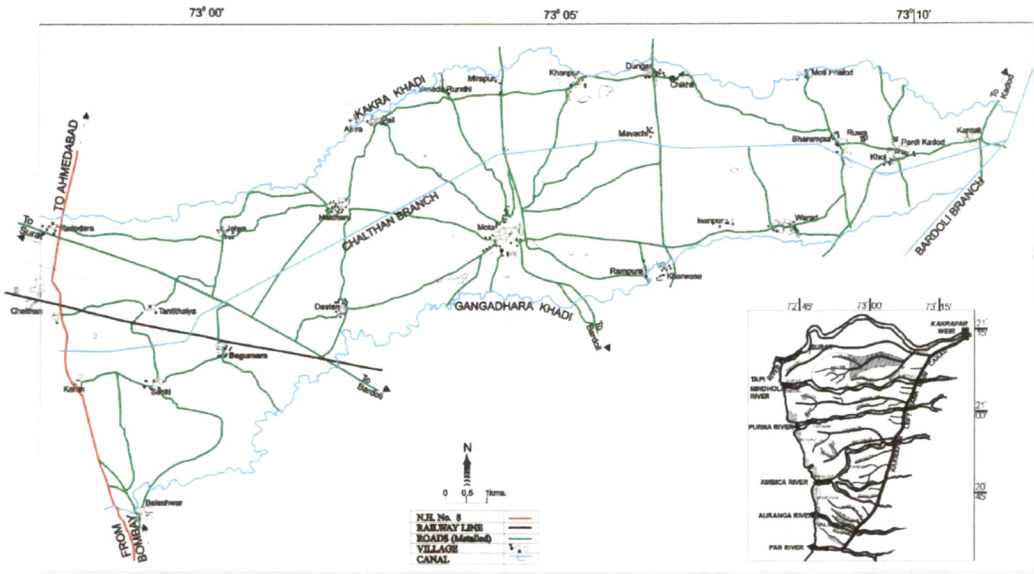


Fig. 6.1 Geographical Distribution of Chalthan Branch Canal Command Area with Communication Network.

TERRAIN CHARACTERISTICS

The study area constitutes a part of the fertile alluvium plain of South Gujarat with an average altitude ranging from 16 to 37 AMSL. The ground is slopping with an average gradient 1:1333 towards west, therefore signifying terrain to be nearly leveled land (Fig. 6.2).

Although the Chalthan branch command area does not have any significant drainage system, the command area comprises a few ill-defined rivulets viz. Kankra Khadi and Gangadhara Khadi (Fig. 6.3), constituting a part of Mindhola River drainage system. Chalthan Branch acts as a major divide with a few 1st and 2nd order streams flowing to Gangadhra and Kankra Khadi.

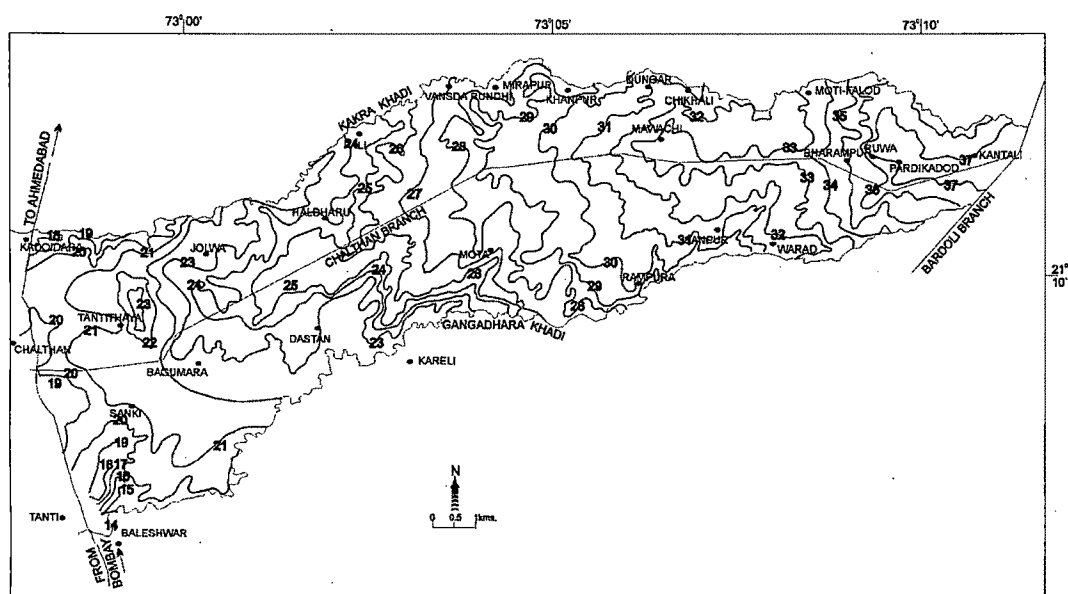


Fig. 6.2 Ground Contour Map of Chalthan Branch Canal Command Area.

The various entrenched drains/rivulets belonging to Kankra Khadi viz. Jolwa drain, Pali-Haldharu drain, Pali-Mota drain, Chikhli drain etc. in northern parts of the study area, while the southern part of the command area is drained by numerous entrenched drains/rivulets viz. Dastan drain, Mota drain, Warad drain etc belonging to Gangadhara Khadi. The overall drainage density is extremely low i.e. 0.46 km/sq.km. These major streams i.e. Kankra and Gangadhara exhibit tight to very tight bends and winding loops.

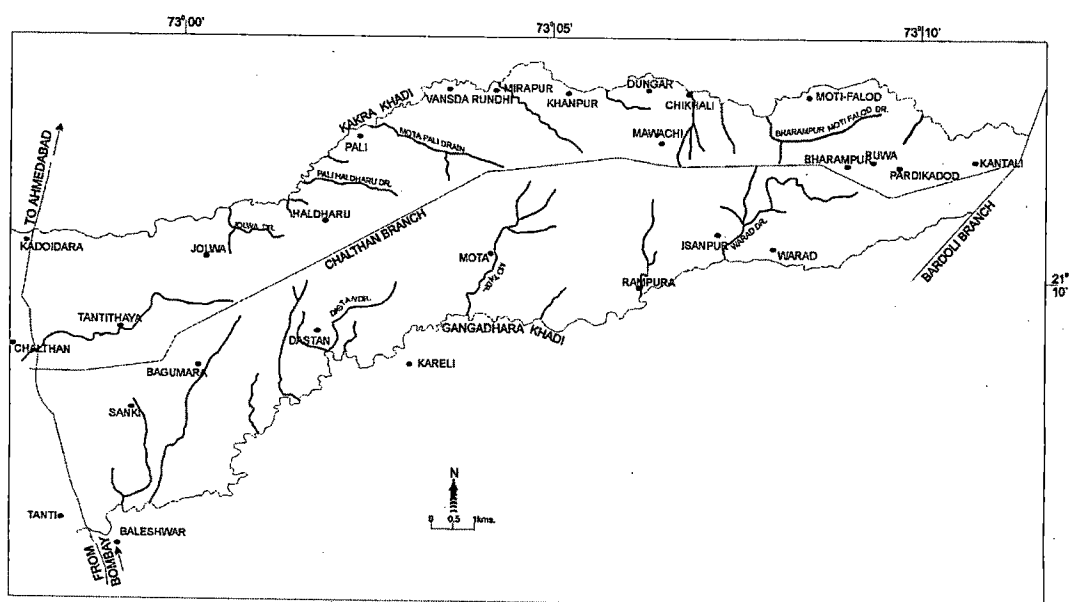


Fig. 6.3 Drainage Map of Study Area.

CLIMATE

The climate of the Chalthan Branch and its surrounding area (based on Indian Meteorological Department) is characterised by a hot summer and general dryness except during the southwest monsoon season. The area experiences a short winter season i.e. December-February, which is followed by the hot season from March to June. The period from June to September is the monsoon season. An average rainfall of the command area is 1250 mm. The mean maximum temperature in the area is 34 °C in summer while mean minimum temperature is 18 °C in winter.

SOIL AND SUBSOIL CONDITIONS

The soils of the study area consist of montmorillonitic clays. These soils initially formed as residual deposits from the disintegration of basalt, latter on transported by river waters and laid as flood plain deposits. During transportation these soils have intermixed with granular material therefore soils of the study area vary in their texture and physico-chemical properties (Bapat, 1993). A command area soil represents a part of alluvial deposits as stratified layers of residual clays intermixed with sand and silts. Owing to the presence of montmorillonite clay mineral in appreciable percentage, soil crack on drying usually to 1-meter depth and swell on wetting.

GEOLOGICAL CONDITIONS

Geologically the study area is covered by Quaternary alluvium having thickness more than 100 m, a solitary outcrop of Deccan Trap basalt occur near a place Dungar village. The bore hole data of the study area suggests that these Quaternary sediments are mainly composed of intercalated sequence of clay-silt-sand layers, deposited under varied environments, underlain by Tertiary or Trappean rocks as basement.

CHALTHAN BRANCH

The Chalthan Branch off taking from Bardoli Branch at 5.70 R.D. (Plate 3) with capacity of 606 cusecs provides the irrigation to the study area with its canal network (Fig. 6.4). The various hydraulic data of canal are given in Table 6.1.

Table 6.1 Hydraulic Data of Chalthan Branch Canal System (Designed).

(Source: SIC, Surat)

Detail	At 0 R.D	At 82.136 R.D.
Length (main canal)	82136 ft	
Capacity (cusecs)	606	213.41
Bed width (feet)	35	12
F.S.D. (feet)	6.0	5.2
C.B.L. (feet)	118.92	61.3
F.S.L. (feet)	124.92	61.3
Top of Bank Level (feet)	126.92	63.5

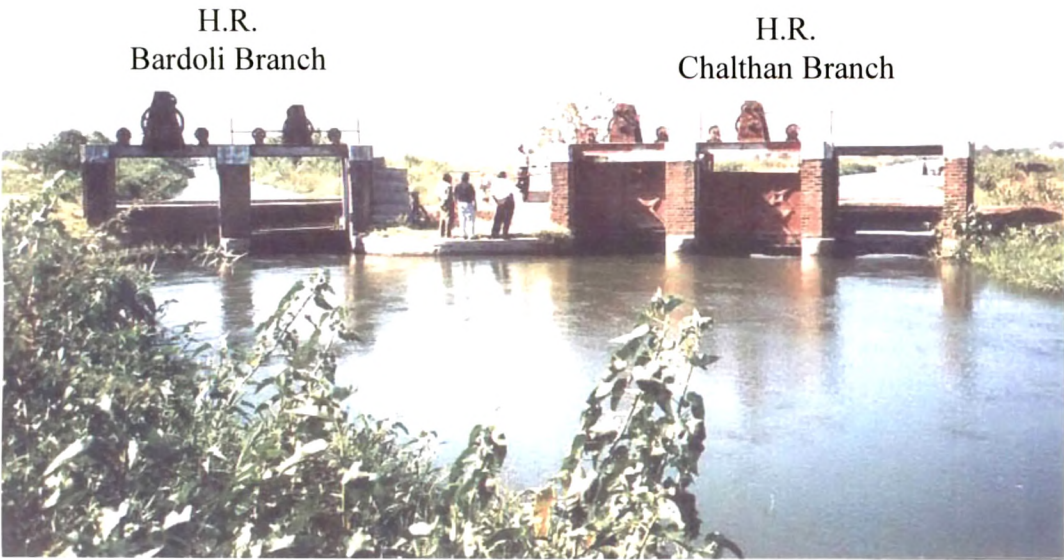


Plate 3 Head Regulators of Chalthan & Bardoli Branch Canals.

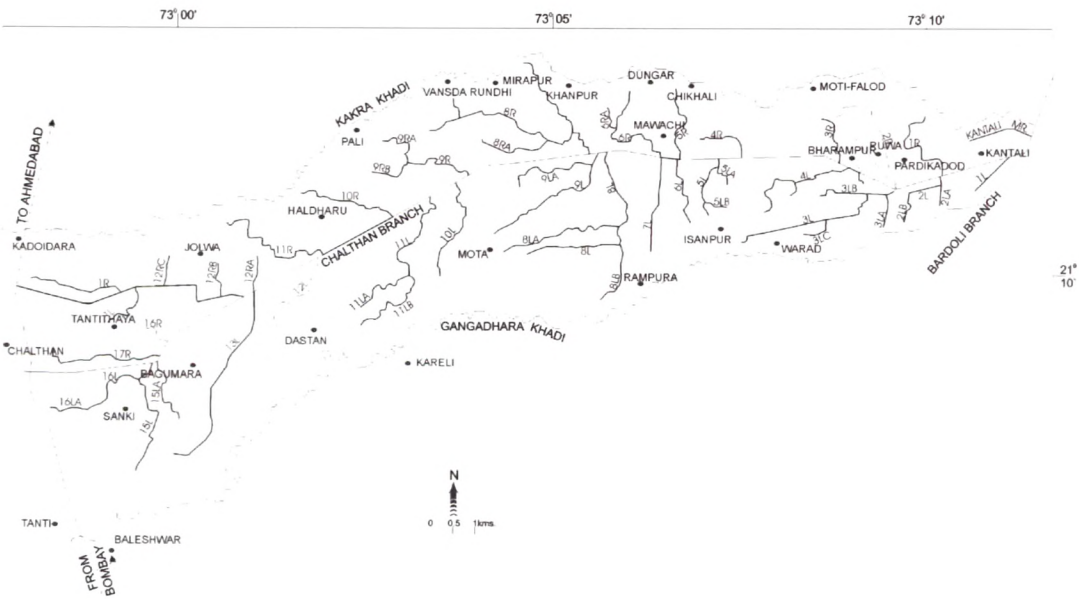


Fig. 6.4 Chalthan Branch Canal Network.