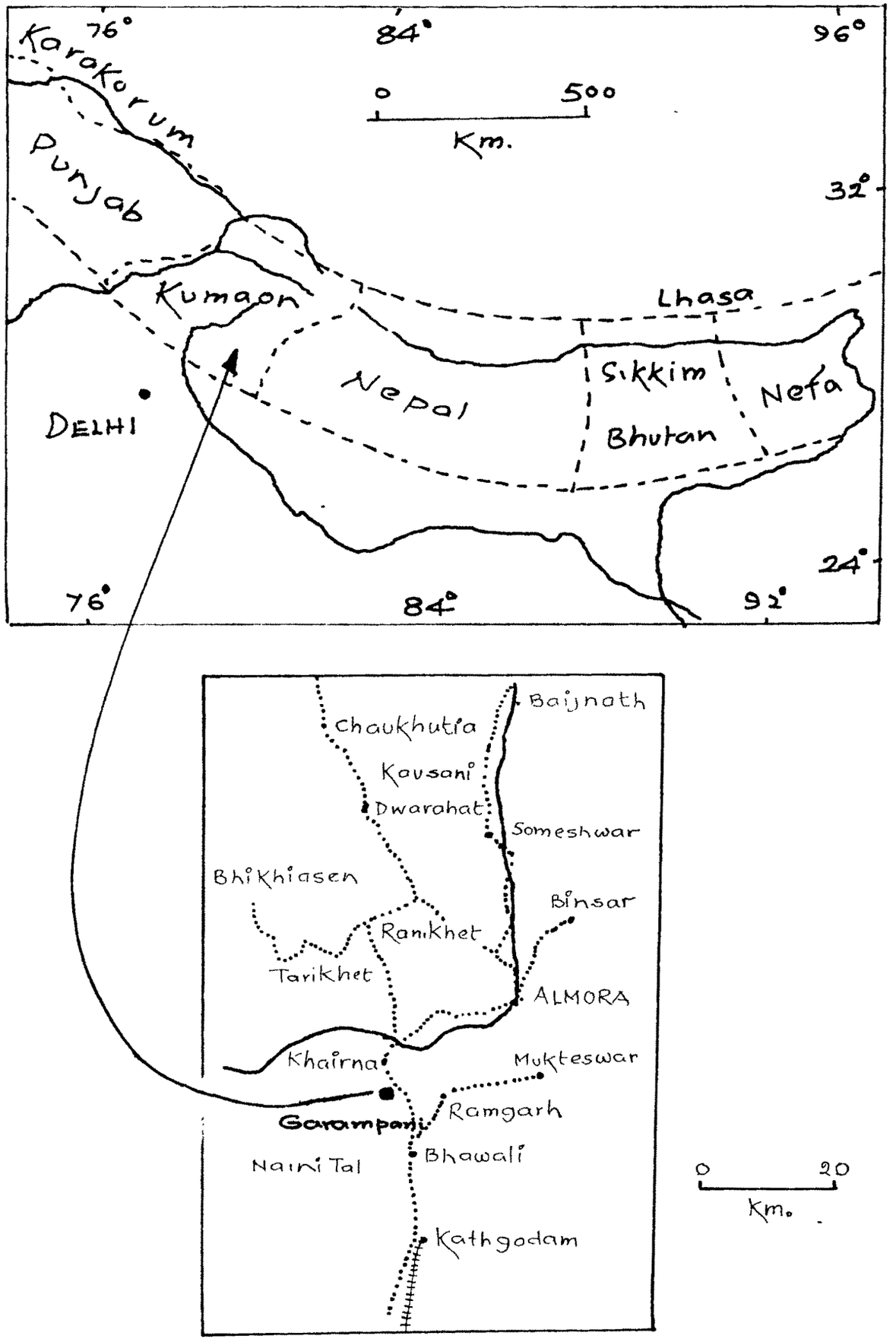
CHAPTER I

I N T R O D U C T I O N

GENERAL

The Garampani area is geologically one of the crucial and important terrains of the Kumaon Himalaya (Fig. 1.1). This area has not been mapped and investigated properly in the past, may be due to the inaccessibility of the most of its western part. Though the road from Bhowali to Ranikhet passes through Garampani, and has been visited by a number of workers, none has attempted to map the area to the west of this road. Due to this lack of information, the correct picture of the stratigraphy and structure of this area

Fig.1.1 LOCATION MAP



was till now, not available. As a result, a number of problems related to the geology of the Kumaon region as a whole has remained unexplained. The present investigation and the results thereof have amply established the stratigraphic and structural importance of the area and the data collected by the author has provided for the first time, coherent and convincing details of the hitherto unexplored ground.

The investigations in Garampani area by the author formed a part of the programme of detailed mapping of the central Kumaon Himalaya by Professor S.S. Merh and his colleagues at the M.S. University of Baroda. The reader will find that the subject matter of this thesis which is a faithful account of the author's investigations and interpretation, fully justifies the need and scope of the present study.

THE STUDY AREA

Location

The study area comprises roughly a rectangular terrain of about 75 sq km enclosed by E. Longitudes 79°23' to 79°30' and N. Latitudes 29°28' to 29°33' (Survey of India, Topo sheet Nos. 53 0/6 and 0/7), and within its limit lie the

villages of Garampani, Khairna, Bhujan, Bardau Malla, Ratura, Lodiakhan, Chadula, Basgaon, Dhaniakot and Simrar.

The western extremity of the area is marked by the NS line passing through west of the village Bellekh, and the NS line east of the village Bamsyun marks the eastern limit. In the north, the area is bounded by the EW line along the villages Matela and Chadula, while the EW line a little north of Ratighat marks the southern boundary of the study area.

Physiography

The area forms a part of the Nag-Tibba ranges of the Lesser Himalayas and shows a highly undulated terrain. The physiographic features of the area, expressed as imposing ridges of varying heights, dissected by a number of valleys and gorges of rivers, rivulets and streams are related to and controlled mainly by the lithology and structure.

Mechanical erosion has played an important role in the evolution of the landscape. The action of frost aided by rain and running water is the dominant agent of denudation in carving out the ravines.

Physiographically, the area can be divided into four parts. The river Kosi separates the northern from the southern in almost two equal halves. The northern portion itself is separated into two by the NS trending Kuchgarh stream. Similarly the southern half is also divided by the NS trending Khairna stream. Each of these four portions, are characterised by lofty, rugged and linear ridges. The dominance of quartzite and limestone has contributed much to the ruggedness and height. The ridge to the east of Garampani, is almost of NS trend with a steep almost vertical western slope. It is 1980 m high. The terrain to the west of Khairna, forms the heighest ground of the area, and consists of five linear hilly masses of diverse trends. The stream Gharatgad flows due N across this portion. The tallest part of the Benaik Dhora ridge lies in the extreme west and has an altitude of 2060 meters.

The eastern portion of the northern half (to the east of Kuchgad stream) forms a gradually sloping ground rising eastward.

The terrain to the west of Kuchgad, forms the hill of Lodiakhan. This 1750 m high feature comprises a NW-SE ridge with quite steep slopes to the NE and SW. Its north eastern slope marks the Ramgarh thrust.

Kosi is the principal river of the area. Flowing SW from Almora, it enters the area near Khairna and then flows northwestward along a valley flanked by the lofty ridges of Binaik Dhora and Lodia Khan (Plate 1.1). From Bhujan to Haroli, it flows along a steep EW gorge; further NW, its valley becomes quite broad and terraced.

In the eastern part of the area, two NS trending streams meet Kosi near Khairna, the Kuchgad flowing from north and the Khairna from south (Plate 1.2). There are two more streams in the southern part, Simarar gad and Gharatgad, flowing due NE and meeting the river Kosi.

In addition, there are numerous smaller streams and springs which are only seasonal and go dry during summer months.

Climate and Rainfall

The climate of the area is pleasant and healthy. The seasonal variation in temperature is well marked, being 27°C during summer (Mid. April-June) and 5°C during winter (November-January). The area receives occasional snowfall in the month of January. The monsoon by westerly winds breaks earlier than the plains and lasts from the middle of June to the end of September. The area receives about 1500 to 1700 mm of rainfall annually.

PLATE 1.1

Panoramic view of Kosi valley.
from Dhanfakot

PLATE 1.2

Panoramic view of Kuchgad stream
from Patli Malla

Flora

The vegetation varies according to the altitude. The sal, the sain etc. grow upto the elevation of 1700 meters. Beyond this, the chirs and banj oak are common. Among the fruit trees, apple, apricot, orange, lemon, peach, walnut, plum, strawberry are very common. Besides these, fig and Kaphal are the common local fruits. Potatoes, onions, tomatoes, cabbage, peas, cauliflower and other tropical hill vegetables are usually grown by the villagers. Among small shrubs "Vichhu" is the characteristic one, justifying its name by stinging like a scorpion on touching it.

Fauna

The forested portion of the area is frequented by wild animals like panther, leopard and black bear. Spotted deer, jackals, pigs and langurs are also quite common. The forests also abound in various types of birds and snakes. Fish are abundant in the flowing rivers. The domestic animals confined to the villages are cows, buffalows, goats and ponies.

Agriculture

The land available for agriculture is confined to the flat hill tops, terraced fields made on the slopes of the

hills and river valleys. The higher portions of the hill slopes contains relatively thinner soil cover, while the seirra lands near the bottom of the slopes have thick soils and are extremely fertile. Also, the broad valley of river Kosi with its terraces, provides excellent land for cultivation.

During the year, two crops are obtained, the 'Rabi' and 'Kharif'. Wheat, barley and mustard are the principal Rabi crops while rice and madua are the chief Kharif crops.

Flat tops of hills and ridges have been extensively utilised for growing fruits like apples and appricots. In addition to the river water, the irrigation is mainly accomplished by means of small canals, called 'guls' cut along the contours of the hill and fed by springs and hilly streams.

Habitation

Being rugged and mountainous, the terrain is thinly populated and not much organised. The main settlements are confined to the valleys and valley slopes. The major part of the population comprises Hindus - both Brahamins and Non-Brahamins. A small percentage is that of Muslims and Christians. Most people speak the local dialect

Kumaoni, while others speak Hindi. In addition to agriculture, the other main source of earning is the army employment. Practically every family has its representative in the army. The Garampani Bazar has grown into an important place providing good meals and shelter to the travellers proceeding to the interior in the north.

Communication

The communication facility is rather poor. There are only two roads that are worth mentioning. The one is the road from Bhowali to Ranikhet and beyond. It connects Garampani Bazar with the nearest railway station of Kathgodam, which is 53 km to the south. Ranikhet, further north is 25 km away. A cart road along Kosi from Bhujan to Betalghat is the only means of communication with the villages in the west. Of course, there are numerous foot-tracks, criss-crossing the entire area, but one has to know the terrain quite well to follow these tracks.

SCOPE OF THE PRESENT WORK

The author mapped the area by spending an aggregate period of 20 weeks in the field during the summer and autumn months of the years 1969,1970,1971 and 1972. The area forms a part of the One-Inch Survey of India Topographical sheet Nos. 53 O/6 and O/7. The mapping was carried

out on an enlarged map of 4" to a mile (RF 1:15825) scale.

The rock types of the study area belong to the Krol nappe. Earlier workers thought that the entire terrain was occupied by the quartzites of Nagthat age, but the author found that the rocks belonged to the Nagthat, Blaini and Infra-Krol formations (please see Chapter III). The constituent rocks are quartzite, slates, slaty phyllites and limestones. An attempt was made to visit almost all parts of the area, but many portions, being forested or inaccessible, could not be reached. So the author followed a combination of traverse and outcrop mapping.

In addition to the tracing of lithological boundaries and the trends of bedding of the various formations, the author recorded as many structural elements as possible. Linear structures are on the whole scarce, but the author could collect adequate number of readings from the different parts to arrive at conclusions in respect of the structural pattern of the area. Minor structures recorded were mostly axes of small folds and puckers.

The structural data obtained was analysed stereographically to elucidate the structural complexities. Thin sections of 180 selected samples were examined under the microscope.

With the help of the field and laboratory studies, the author could successfully work out the correct stratigraphy and structure of the study area. His study when considered together with similar studies by his colleagues in the Bhowali-Bhim Tal and Nainital areas, has turned out to be of much regional importance.