

Harka Gurung

# MAPS OF NEPAL



White Orchid Books

# White Orchid Books



Harka Gurung

# MAPS OF NEPAL

INVENTORY AND EVALUATION

White Orchid Press  
Bangkok 1983

Published by White Orchid Press,  
487/42 Soi Wattanasilp, Pratunam, Bangkok, Thailand.  
Printed by Craftsman Press, Bangkok.  
Design by Kai Gjelseh, Oslo.



# TABLE OF CONTENTS

PREFACE.....	1
INTRODUCTION.....	3
CHAPTER I      HISTORICAL PERSPECTIVE.....	5
CHAPTER II     POLITICAL MAPS.....	23
CHAPTER III    TOPOGRAPHICAL MAPS.....	31
CHAPTER IV    REGIONAL AND RELIEF MAPS.....	39
CHAPTER V     GEOLOGICAL, GLACIOLOGICAL AND GEOMORPHOLOGICAL MAPS.....	47
CHAPTER VI    ECOLOGICAL MAPS.....	57
CHAPTER VII   TREKKING MAPS.....	65
CHAPTER VIII   TOWN MAPS.....	71
CHAPTER IX    PANORAMA AND PHOTO MAPS.....	77
CHAPTER X     RELEVANT PUBLICATIONS.....	83
APPENDIX      HIGHT OF PEAKS ALONG NEPAL'S NORTHERN BOUNDARY.....	87
AUTHOR INDEX .....	97
ABOUT THE AUTHOR .....	100

# LIST OF ILLUSTRATIONS

1. Routes of early explorers . . . . .	6
2. Detail of Kircher's map (1667) . . . . .	8
3. "Pouwa" map of South-Eastern Nepal (1860). . . . .	10
4. Detail of "pouwa" map showing Sanguri fort, Bijayapur fort and Pindeswar temple near Dharan . . . . .	16
5. Detail of "Kathmandu No. 57" map (1879-84). . . . .	17
6. Kirkpatrick's map (1811) . . . . .	18
7. Hamilton's map (1819) . . . . .	20
8. Nepal (Survey Department, Nepal, 1980). . . . .	24
9. Lamjung (Govt. of India, 1941) . . . . .	26
10. Eastern Development Region (Survey Department, Nepal, 1975-77) . . . . .	27
11. Detail of Nepal-China Boundary map (1961) . . . . .	28
12. Detail of Nepal-China Boundary map (1979) . . . . .	29
13. Index to Survey of India, One inch: 1 mile map (1957-) . . . . .	32
14. Phoksumdo Tal – detail of one-inch map. . . . .	35
15. Taulihawa – detail of one-inch map. . . . .	36
16. Marsyandi River – detail of one-inch map. . . . .	36
17. Index to regional and relief maps. . . . .	40
18. Map of Kathmandu Valley (Landon, 1928). . . . .	42
19. Index to geological, glaciological and geomorphological maps. . . . .	48
20. Moraines of Imja Basin (Muller, 1956) . . . . .	50
21. Pokhara Valley (Dolfuss, 1971). . . . .	53
22. Index to ecological maps . . . . .	58

23. Ethnographic map of Nepal (1915) . . . . .	62
24. Round Annapurna map (Gurung, 1980) . . . . .	66
25. Patan map (Snellgrove, 1961). . . . .	72
26. Panoramic view of Nepal Valley (Kirkpatrick, 1811). . . . .	78
27. Pokhara Valley (Gurung, 1970). . . . .	80
28 <i>Landsat Imagery, 1981</i>	<i>at end</i>

# PREFACE

The Nepal Geographical Society arranged in July 1980 an exhibition of Nepal maps from this writer's collection. The expression of general interest as well as evidence of information gap in relevant quarters convinced the writer of the need for a more permanent record. Therefore this monograph.

It is encouraging that there has been increasing awareness regarding maps in Nepal since the initiation of regional planning in national development. However, as referred in the introductory chapter, a fuller expression of cartographic potentials still faces the twin constraints of inaccessibility and non-availability of official maps. A more liberal approach with regard to maps would contribute to a better appreciation of the Nepalese landscape and its resources.

The first chapter is a broad survey of mapping efforts until the close of the last century. The next three chapters deal in turn with political, topographic, regional and relief maps. Then follow thematic chapters dealing with geology, glaciology, geomorphology, ecology, trekking and town maps. Chapter nine dwells on panoramas, photo-maps and satellite imageries. The last chapter refers to some important publications that include numerous maps of Nepal. The appendix provides an inventory of peaks along the northern border of Nepal.

The author would like to acknowledge the cooperation provided by the Department of Survey, National Museum of Nepal and the Ministry of Foreign Affairs. Hallvard Kuloy, Barbara Aziz and Rene de Milleville helped with illustration materials.

# INTRODUCTION

A map is a representation of the features of the earth or some part of it and cartography is the art, or now science, of making maps. A map, whether drawn schematically in strips or circular charts as in the past, rectangles or squares as at present, is an expression of world view depending on the perception of the cartographer or the purpose of the map. In other words, "Maps, like language select certain features and ignore others: and like language, maps are cultural expressions of elements significant to society."<sup>1</sup> It is also obvious that known places are better mapped than the *terra incognita*, just as it is easier to represent cartographically a level area than rugged terrain. Nepal provided a challenge on both of these aspects: it had a long tradition of closed-door policy<sup>2</sup> and there are numerous great peaks within its territory. And thus the country was early on the agenda of British surveyors in India.

This monograph is an attempt to classify and describe various published maps of Nepal. It does not purport to be an exhaus-

sive enumeration but the variety and range of maps discussed should provide some idea on the state of the country's cartographic coverage. A few of the older maps in manuscript form are mentioned in the section on historical perspective. Each map has been classified according to its broad category and those that serve more than one purpose have been given cross reference. Topographical maps representing a limited area have been included in the regional section. Maps in each section are described in chronological order by the date of publication in order to suggest sequential development over time. Duality in expression of measurement scale was deliberate as the author followed the measurement system, metric or otherwise, as given in the original map.

Two problems deserve special mention relating to maps of Nepal. One is regarding their availability and the other pertains to their accessibility. First with regard to availability, particularly in Nepal. Most of the maps concerning Nepal whether historical or modern ones were compiled and published outside the country. There is therefore the difficulty of locating many maps in the country even for reference purposes. It would be of much benefit to researchers and other map-users if a systematic collection of Nepalese maps were to be made by some native institution. The comprehensive series

<sup>1</sup> Barbara Nimri Aziz. "Maps and the Mind", *Human Nature*, vol. 1, no. 8, August 1978, p. 50-59.

<sup>2</sup> Marco Polo (1254-1324) is credited with the following a statement on Nepal: "The country is wild and mountainous, and it is little frequented by strangers, whose visits the king discourages."

of Nepalese maps catalogued by L. Boulnois<sup>3</sup> could be a valuable basis for such a venture. As a practical proposition, the National Museum of Nepal should commence with an archive for old manuscript maps and historical maps including the 19th century documents and publications of the Great Trigonometrical Survey of India. This could be complimented by establishing a depository of modern maps and more recent aerial photographs at the Topographic Survey Unit of the Survey Department. Similarly, other specialised and academic institutions should maintain collection of thematic maps relating to their specific field of interest.

Now to turn to accessibility. Most users of maps of Nepal are familiar with the disclaimer on the authority of international boundaries as well as the emphasis on their restriction in use. These cautionary notes range from 'This map must NOT be considered an authority on the delimitation of international boundaries' (in red print) of the U.K. War Office maps to that of 'The delineation of international boundaries on this map must not be considered authoritative' in the series produced by the U.S. Army Map Service. In addition, the Survey of

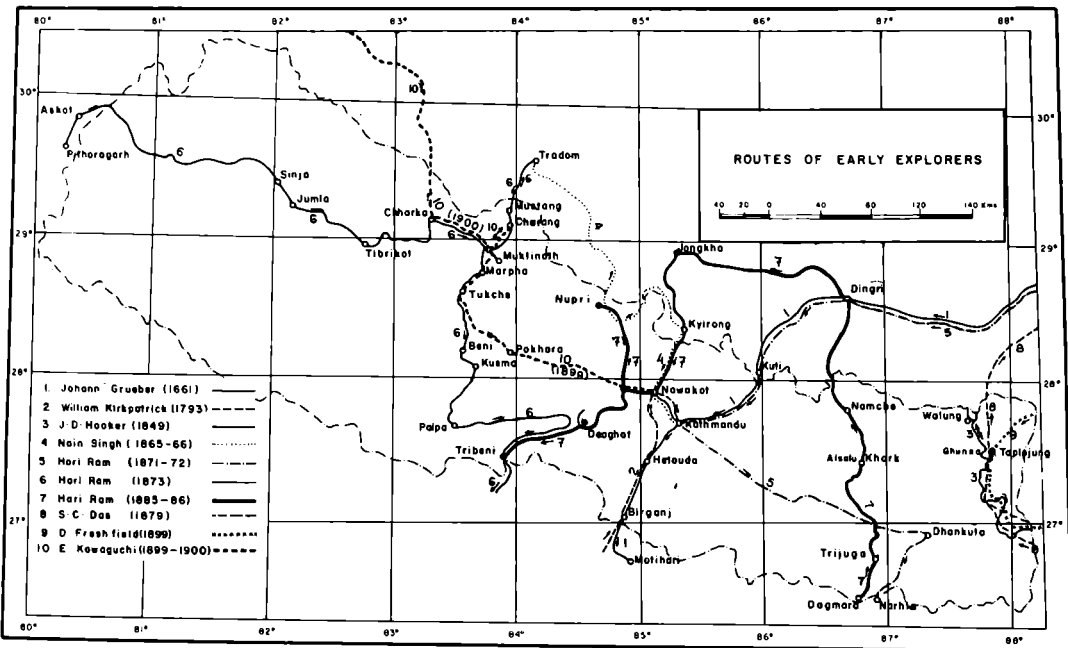
India has the terse term 'RESTRICTED' imprinted on most of their maps while on One Inch maps there is a further proviso in a box: 'This map is NOT to be published, copied, or reproduced in part or in whole either by photography or by other means, should be kept in safe custody and handled by authorised persons only.'

The so-called undefined northern boundary of Nepal was surveyed and defined by joint teams over two decade ago and was further demarcated on detailed maps in 1979. It is therefore now necessary that the Nepalese authorities should publish and make available authoritative and reliable maps of the country. Perhaps in order to affect this, there is need to do away with a certain myth. There is still a strong hang-over from the past that consider maps of any shape or form as a secretive tool that can be detrimental to national security. However, such an attitude has become irrelevant in the context of recent technical advances in aerial and satellite photography. In fact, satellite imageries taken from long distances are now capable of detecting and depicting a wide variety of elements on the ground with the aid of multi-spectral scanners. Maps are essential tools for education, development planning and scientific research. The more beneficial will it be to make them readily available and accessible.

<sup>3</sup> L. Boulnois. *Bibliographie du Nepal, Volume 3: Sciences Naturelles, Tome 1: Cartes du Nepal*. Centre National de la Recherche Scientifique, Paris, 1973.

# CHAPTER I

## HISTORICAL PERSPECTIVE



1. Routes of early explorers



When the Newar king Jayasthiti Malla (1382-1395) first introduced caste system in Kathmandu Valley, the people were categorised into 64 castes or rather sub-castes according to their traditional occupation. It is interesting to note that one of the castes then recognised was of Kschetrakara or 'land measurer'<sup>1</sup> which in modern parlance may be termed as 'surveyor'. We know not whatever happened to this caste group related to geographers since it does not appear in modern surnames. There is however another current Newar caste known as Dangol which Petech interpretes as 'measurer of land'.<sup>2</sup> Whether these traditional caste groups were engaged merely in cadastral work or drew other maps is a matter of conjecture. That there was some tradition of map-making in Nepal is suggested by a distant evidence. This refers to the authority of Tsio Ying-k'i, a Chinese officer who participated in the 1720 campaign of Tibet and reported in a Chinese geography of Tibet that in 1734, the Malla King of Bhaktapur sent to the Chinese emperor a letter and some presents. Among the presents were included a geographical map of Ngo-na-k' e-t'e-k'e (India) and Pa-eul-po (Nepal).<sup>3</sup>

Nepal had begun to appear on European maps and atlases by the 17th century and their source material seemed to be the account of Jesuit missionaries, particularly Johann Grueber who visited Kathmandu in

early 1662.<sup>4</sup> In an inventory prepared by Clements Markham in 1875 of the maps of Tibet, Nepal, Sikkim and Bhutan in the collection of the Geographical Department of the India Office, he mentions the map of Central Asia of 1706 by Guillaume de l'Isle as the first published for the region.<sup>5</sup> On this map appear Couti (Kuti), Nesti (Listi), Patan, Catmeduour (Kathmandu) and Necbal (Nepal). He makes special reference to the map of Tibet by Jean-Baptiste Bourguignon d'Anville (1737) with a reproduction in facsimile that shows Tchiron (Kyirong) and Nialma (Nyalam) facing the frontiers of the three Kathmandu kingdoms of Palpou Yampou (Kathmandu), Palpau Honhonc (Bhadgaon) and Palpau Idrim (Patan). In enumerating manuscript maps of Nepal, Markham included those of Kirkpatrick's routes (1793), Crawford's map of Nepal territories (1811) and Lindesay's route map showing Gen. David Ochterlony's advance to Makwanpur (1816) and also stated, 'Dr. Buchanan-Hamilton, during his residence at Kathmandu, obtained five native maps of parts of Nepal and Sikkim, which he deposited in the library of the East India Company. They have since unfortunately been lost, previous to the organisation of the Geographical Department of the India Office.'<sup>6</sup>

A most comprehensive survey on the early appearance of Nepal on Asian maps drawn by westerners is to be found in L.

<sup>1</sup> Luciano Petech, *Medieval History of Nepal (c. 750-1480)*, Serie Orientale, X, Roma, 1958, p. 182.

<sup>2</sup> Petech, *op. cit.* 188.

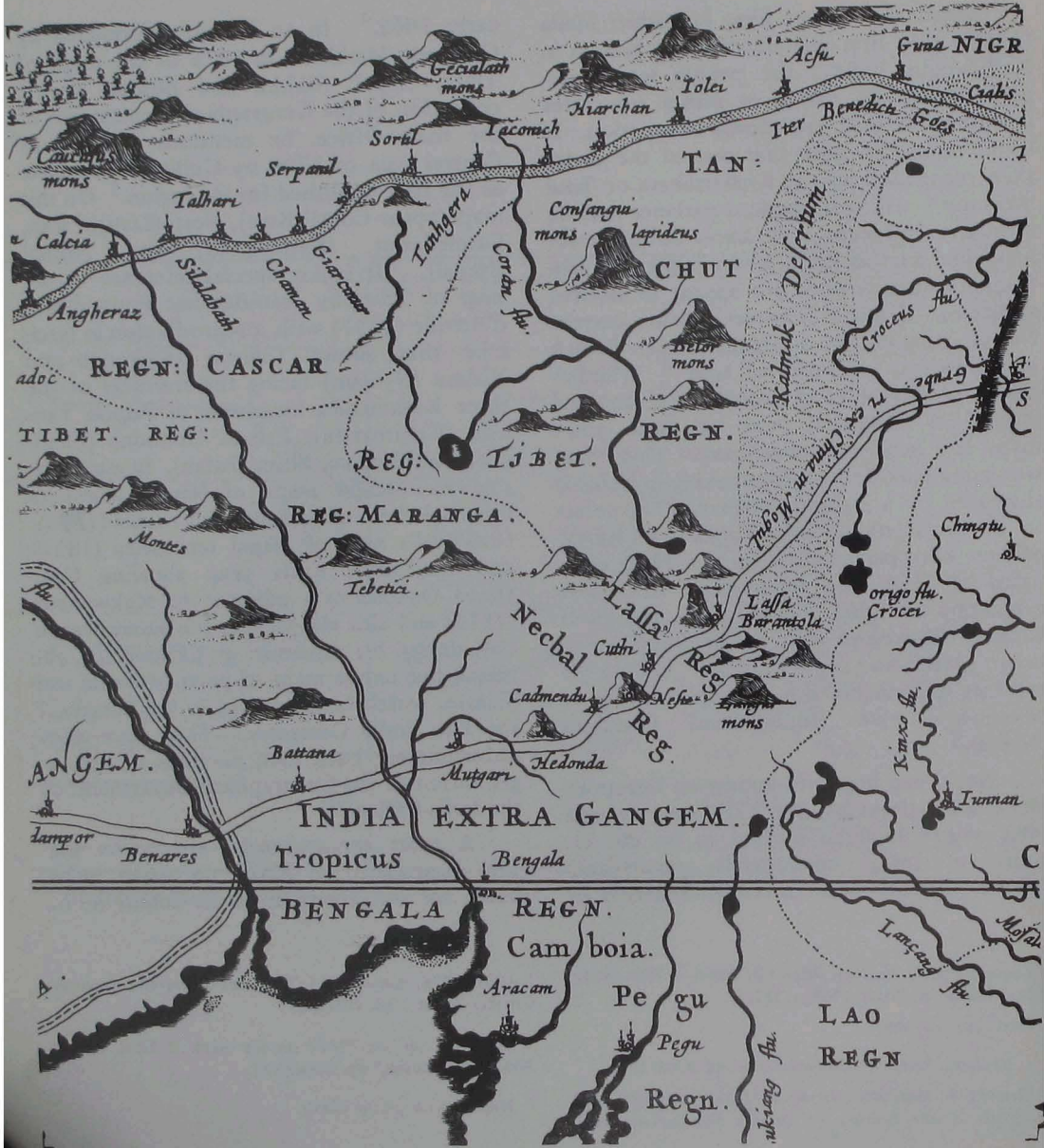
<sup>3</sup> L. Boulnois, Personal communication, 2nd March 1981.

<sup>4</sup> Clements R. Markham, *Narratives of the Mission of George Bogle and of the Journey of Thomas Manning to Lhasa.*

London, 1876, Appendix I, "Account of Travels of Johann Grueber, Jesuit," pp. 295-302.

<sup>5</sup> Markham, *op. cit.* "Note on the maps of Tibet, Nepal, Sikkim and Bhutan," pp. cxxx-cxxx.

<sup>6</sup> Markham, *op. cit.*, p. cxxvii.



2. Detail of Kircher's map (1667)

Boulnois's *Cartes du Nepal*.<sup>7</sup> The essay is supplemented by reproductions of some important maps such as Purchas' map of Mughal India drawn by Thomas Roe (1625), Kircher's map of China (1670), Cantelli's map of India (1683), de l'Isle's map of India and China (1706), d'Anville's map of Tibet (1733), Jefferys' map of East India (1768) and Crawford's map of Kathmandu valley (1802-1803). There are also given extracts of accounts on Nepal by Grueber, Kircher and Tavernier from rare books.<sup>8</sup>

The earliest reference I have been able to find on map-making in Nepalese history goes back to the first decade of the 19th century. It is a brief letter dated Vikram Era 1864 (A.D. 1807) of Rana Bahadur Shah, the then ruler of Nepal, addressed to Kaji Bhimsen Thapa, Kaji Ranadhoj Thapa and cashier Uday Giri. The content of the royal order is as follows:

"Welfare to Kaji Ranjit Pande. Out of the income of Rs. 2,500 from that area, pay a sum of Rs. 325 to Kesav Gurung\* as a reward for drawing a map of Kangra . . . ."<sup>9</sup>

The National Museum of Nepal has only one specimen of manuscript map. It measures 84 cm. wide and 495 cm. long and is a hand-

drawn map on Nepali paper with cloth background. The date of the beginning of the work is given as "17 sal Phagun vadi 10 roj dekhi" and probably corresponds to February 1860. The map covers parts of Mahabharat Lekh, Chure range and Tarai tract between Hetauda and Morang. Forest areas are shown with trees in green, rivers in blue with their names at the lower margin. Routes are shown in red with staging-points and other cultural features such as settlements, religious sites and forts are pictorially represented in black and white. The museum has catalogued the map as a "pouwa" (No. 31) or scroll painting. Indeed, inspite of the basic structure of a macro ground plan, the hills are drawn in profile while natural features like trees and all cultural features are drawn in terrestrial perspective. The composite mosaic of individually painted trees gives an impression of dense forest both in the hills and Tarai where-in settlements and cultivated areas appear as discontinuous pockets. The Tarai landscape is well-distinguished between forest area and grassland east of the Kosi River. Although houses both in the hills and plain are given in a uniform symbol of a single-storeyed hut to represent settlements, Fort representation is more realistic and individualistic. For example, Makwanpur has separate complexes of a walled fort and another walled camp, Udayapur has quadrature-cross plan while Hariharpur, Chaudandi, Sanguri and Bijayapur all have a hexagonal plan. Such details regarding fortifications and reference to mileage between staging-points suggest that the map was prepared for military purposes.

There is yet another native map drawn in multi-colour referring to Patan district. Since it has been itemised as "Kathmandu No. 57", it may be part of a map series

<sup>7</sup> L. Boulnois, "Apercu historique sur les cartes Europeennes du Nepal," in *Carte du Nepal*, Paris (1973), p. 13-41.

<sup>8</sup> Athanasius Kircher's *China Illustrata* first published in 1667 has been reprinted in 1979 by Bibliotheca Himalayica, Kathmandu.

<sup>9</sup> Yogi Naraharinath. *Itihas Prakashma Sandhipatra Sangraha* (Collection of treaties and documents in the light of history), Benaras and Dang, 1963. Part I p. 97-98.

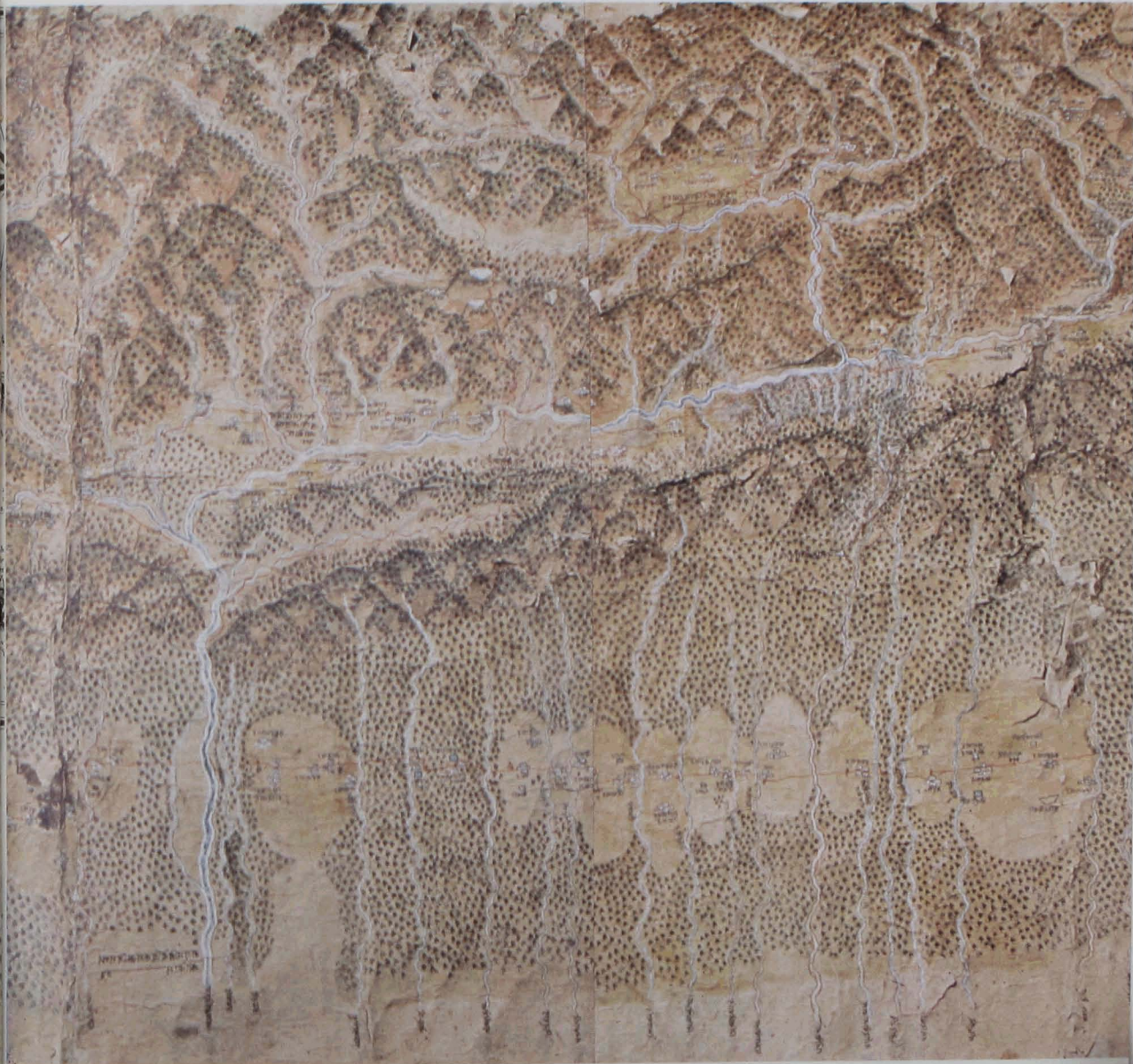
\* Kesav Gurung of Riban Village in Kaski was related to Narsingh and Prahlad Gurung, commanders in the western front during the Gorkhali campaign.



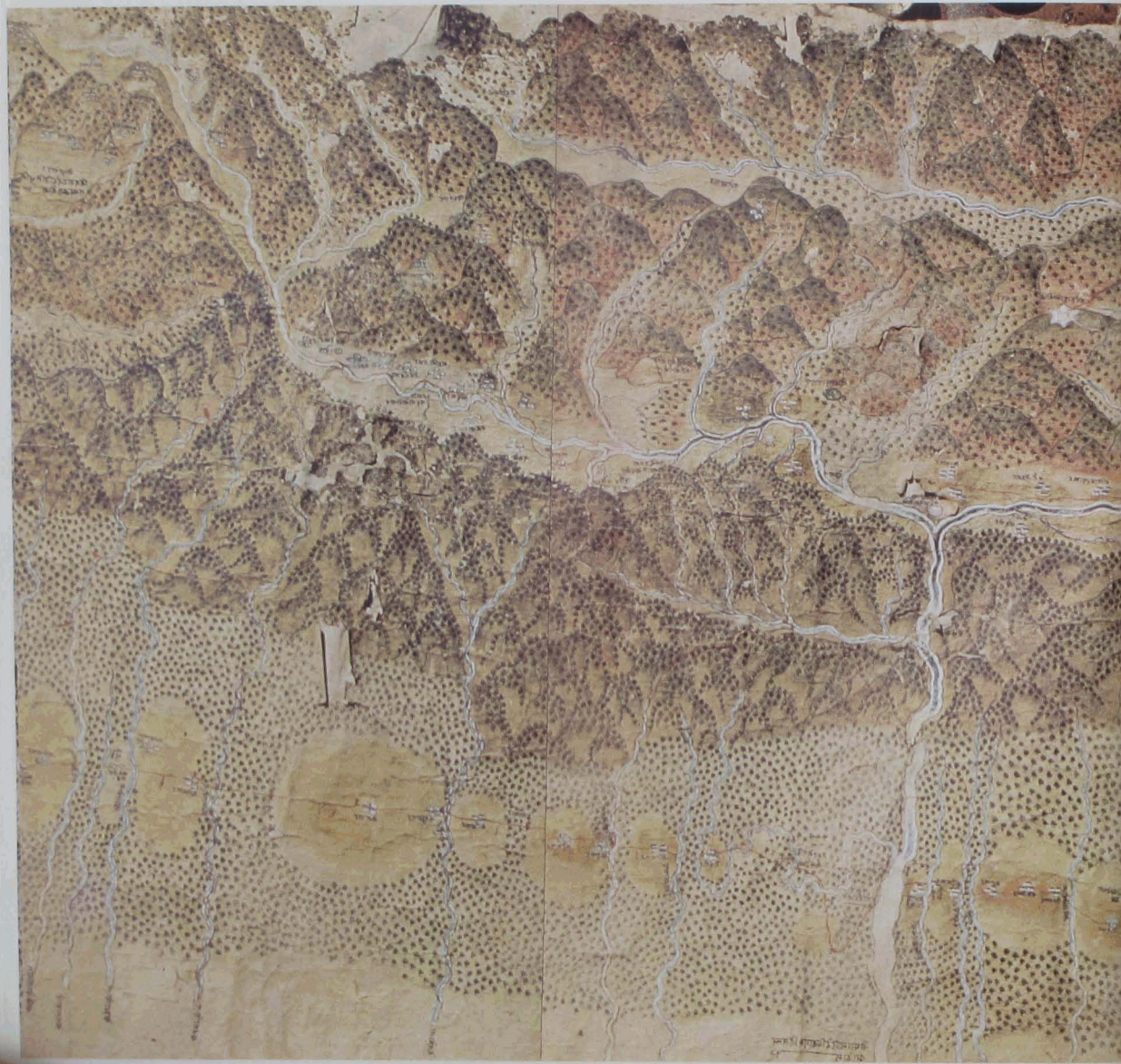


3. "Powwa" map of South-Eastern Nepal (1860).

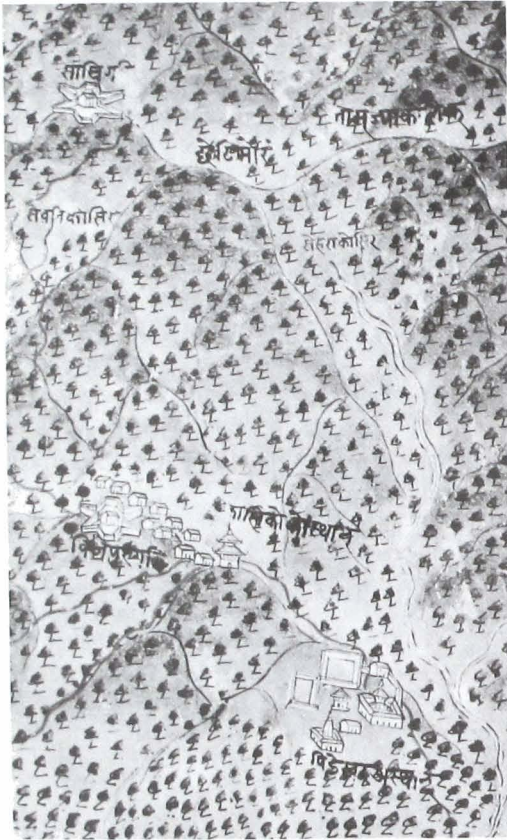












4. Detail of "pouwa" map

introduced in Nepal. The map is in a large rectangular format of 92cm by 118cm and represents the area of Patan bounded by Hanumante-Bagmati in the north, Bagmati river to the west, Phulchoki ridge to the east and Mahabharat Lekh to the south. Detailed grid lay-out, directional compass and scale symbol are on modern lines. However, the representation of elements in the landscape is of traditional style and perspective. The map combines terrestrial and vertical view-points. Thus, while the wooded hills and homesteads representing villages are in pictorial profile, streams and fields are laid-out according to the ground plan. Of the numerous ridges that dominate the southern and eastern horizon, only Phulchoki is identified by name. In contrast, the streams shown with arrow as to their direction of flow have their names. Numerous villages are indicated with group of homesteads and the fields surrounding them are shown in a variety of patterns. Patan city appears as a square block with streets extending to the Bagmati bridge and Sankhamul Ghat. Other features shown on the map are temple, bridge, wire-bridge, water-mill, pond, parade-ground, dry field, irrigated field and field channel. On the left-hand margin is a list of places with distances from Patan Dhoka (gate). The right-hand margin has an alphabetical list of 167 places and their extent in yards.

of the time. The two insignia on top corners of the map, one of Prime Minsiter Rana Udip and the other of Commander-in-Chief Dhir Shumsher, help to date the map for the period 1879-1884 and when militia was first

Most of the early maps of Nepal are of British origin and were inspired by strategic considerations as well as the curiosity of high snow peaks. It is said that Capt. Kinloch's expeditionary force that was repulsed from Sindhuligarhi in 1767, brought back sketches of a section of the country's southern border. The earliest map from ground surveys was drawn by ensign Gerard who accompanied



5. Detail of "Kathmandu No. 57" map (1879-84).



William Kirkpatrick's mission to Nawakot and Kathmandu in 1793 and Kirkpatrick devoted the preliminary chapter of his book to 'Construction of map'.<sup>10</sup> Soon after, Charles Crawford, commanding the first Resident's escort in Kathmandu, produced the earliest reliable map of Kathmandu valley<sup>11</sup> and also of the extent of the Nepal territories. About the same time (1802-03), Hamilton visited Kathmandu and his published map of the 'Dominions of the House of Gorkha' shows Nepal at its most extensive from rivers Ravi to Tista.<sup>12</sup> Foothills and high mountains are brought into relief by hachures and there is less information on Baisi area or the Karnali region. Most of the maps from the early half of the 19th century that deal with the boundary between the British and Nepal dominions are in manuscript form.<sup>13</sup>

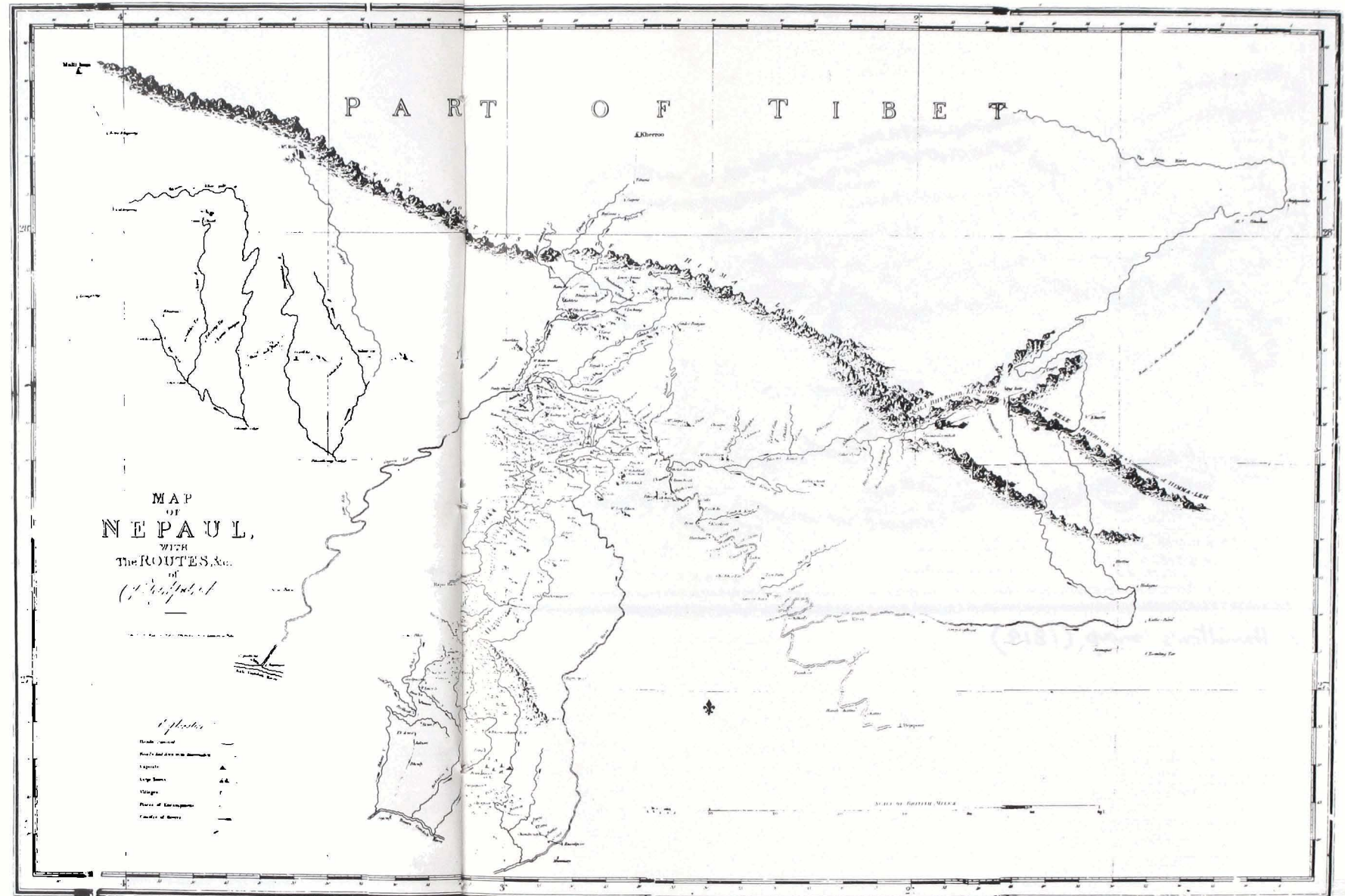
Another area that much engaged the interest of early surveyors in India was geographical exploration in search of trade routes and knowledge of the Himalaya. While Charles Crawford was the first to take note of

<sup>10</sup> "Map of Nepal with the routes, etc., of Capt. Kirkpatrick." Scale 1/574 753. In William Kirkpatrick, *An account of the kingdom of Nepal being the substance of observations made during a mission to that country in the year 1793*. London, W. Miller, 1811.

<sup>11</sup> Crawford's Kathmandu map is reproduced in L. Boulnois, *Cartes du Nepal*, Paris, 1973 and Association for Comparative Alpine Research, *Kathmandu Valley Maps*, Munich, 1977.

<sup>12</sup> 'Map of the Dominions of the House of Gorkha,' Scale: 1/2,219,737. In Francis Buchanan-Hamilton, *An account of the Kingdom of Nepal, and the territories annexed to the dominion of the House of Gurkha*. Edinburgh, A. Constable, 1819.

<sup>13</sup> L. Boulnois, *op. cit.* lists seven such boundary maps for the period 1817-40.



6. Kirkpatrick's map (1811)





7. Hamilton's map (1819)

the great height of mountains in Nepal, William Webb established as early as 1809-10, the height of Dhaulagiri from the plains at 26,862 feet. Until then, the Andes were considered the highest mountains of the world. By 1852, theodolite measurements had established seventy-nine of the highest peaks in the Himalayas.

The phase of triangulation and surveys (1845-68) was soon followed by extensive travels in the Himalayas and Tibet by the so-called *pundit* explorers. The first pundits to enter Nepal were Nain Singh and his cousin Mani Singh (Bhotias from Kumaon) in 1864. While Mani Singh returned from Kathmandu, Nain Singh reached Kyirong via Rasua Garhi. He recrossed into Nepal at the head of Buri Gandaki, proceeded north to Tradom and reached Lhasa on 10th January 1866.<sup>14</sup>

However, the most extensive traverses in Nepal were made by another *pundit*, Hari Ram. During 1871-72, he set out from Darjeeling, went up the Tamur to Walungchung and then Shigatse and entered Kathmandu via Kodari. He then turned east along the Sun Kosi to Dhankuta and returned India at Narahia south of Rajbiraj.<sup>15</sup> He started his second journey on 1st July 1873 from Pithoragarh, passed Jumla and Chharka and reached Muktinath in nine weeks. He then turned north to Mustang town and Tradom. He retraced his steps back to Kagbeni and continued south along the Kali Gandaki all

the way down to Tribeni.<sup>16</sup> Hari Ram's last incursion into Nepal was in 1885-86 when he went up Trijuga Khonch to Chaunri Kharka and reached Tingri after crossing the Nangpa La. From Tingri he turned west and re-entered Nepal via Kyirong. He then visited Nawakot and upper Buri Gandaki and finally followed down the Trisuli to Devghat and Tribeni.<sup>17</sup>

There was much exploration activity in the extreme north-east around Kanchenjunga during the last quarter of the 19th century. In 1879, Sarat Chandra Das visited Taplejung and entered Tibet across the Kang La.<sup>18</sup> During 1885-86, Rinzin Namgyal explored several side-valleys of Tamur and was the first native surveyor to map the circuit of Kanchenjunga.<sup>19</sup> Later L.A. Waddell visited Yalung glacier<sup>20</sup> while Douglas Freshfield<sup>21</sup> made a 'high-level tour' round Kanchenjunga in 1899 and these expeditions produced early maps of the area.

<sup>14</sup> 'Route survey from Nepal to Lhasa by Pandit Nain Singh, C.I.E. (The Pundit) 1865-66.' Scale: 1/2 000 000. *Records of the Survey of India*, vol. VIII, Part I, 1915.

<sup>15</sup> 'The Dingri Maidan & Upper Arun River with the Eastern and Western sources of the Kosi or Kosiki River, the great eastern tributary of the Ganges; also part of Great Tibet . . . .' Scale: 1/1 013 760. *Records of the Survey of India*, op. cit.

<sup>16</sup> 'Map Illustrating the report on the explorations -- Trans-Himalayan and in Nepal -- Made by Hari Ram in 1873.' Scale: 1/1 013 760. *Records of the Survey of India*, op. cit.

<sup>17</sup> 'Sketch map illustrating the route of explorer Hari Ram from Dagmara thana via the Dudh Kosi to Tingri, and thence via Jonkha Fort and Kiron. to Tribeni.' Scale: 1/1 013 760. *Records of the Survey of India*, vol. VIII, Part II, 1915.

<sup>18</sup> S.C. Das, *Journey to Lhasa and Central Tibet*, 1904.

<sup>19</sup> *General Report on the operations of the Survey of India Department*, 1884-85. Appendix.

<sup>20</sup> 'A map of Sikkim and adjoining territories.' In L.A. Waddell, *Among the Himalayas*. Westminster, Constable, 1900.

<sup>21</sup> E.J. Garwood, "Notes on the Maps." In Douglas W. Freshfield, *Round Kanchenjunga, a narrative of mountain travel and exploration*. London, E. Arnold, 1903, Appendix B, 300-307. Reprinted in 1979 by Bibliotheca Himalayica, Kathmandu.

# CHAPTER II

## POLITICAL MAPS



8. Nepal (Survey Department, Nepal, 1980).

Political maps are concerned with international boundaries of a country as well as the internal administrative divisions. As indicated in the preceding section on historical perspective, most of the early maps drawn during the first half of the 19th century were related to delineation of boundaries between British India and Nepal. This was particularly evident immediately after the conclusion of Anglo-Nepal War in 1816. These maps were drawn at fairly large scale, of about 1 inch to 2 miles. The last important manuscript map on boundary was done for the Nepal-Oudh border between the Gandak and the Sarada rivers in 1861, following the return of this Tarai territory to Nepal that had been annexed under the Treaty of Sugauli, 1816.

The first comprehensive map of Nepal was attempted in 1855 at a scale of 16 miles to an inch.<sup>1</sup> It was however only a preliminary effort and to which the then Surveyor-General Sir Andrew Waugh commented: "This tract of mountainous country has never been surveyed, and the map has been compiled from various discordant materials and rough information. The Nepal boundary from Kerong to Mount Everest seems to me wrong, as according to all rule it should follow the watershed. The boundary north of Moostang also appears to me doubtful, and the mountain features corresponding to it are decidedly unnatural. A thorough trigonometrical survey of this tract is a desideratum."

The earliest published map of Nepal delineating the internal administrative framework of the country was issued in 1915 in the

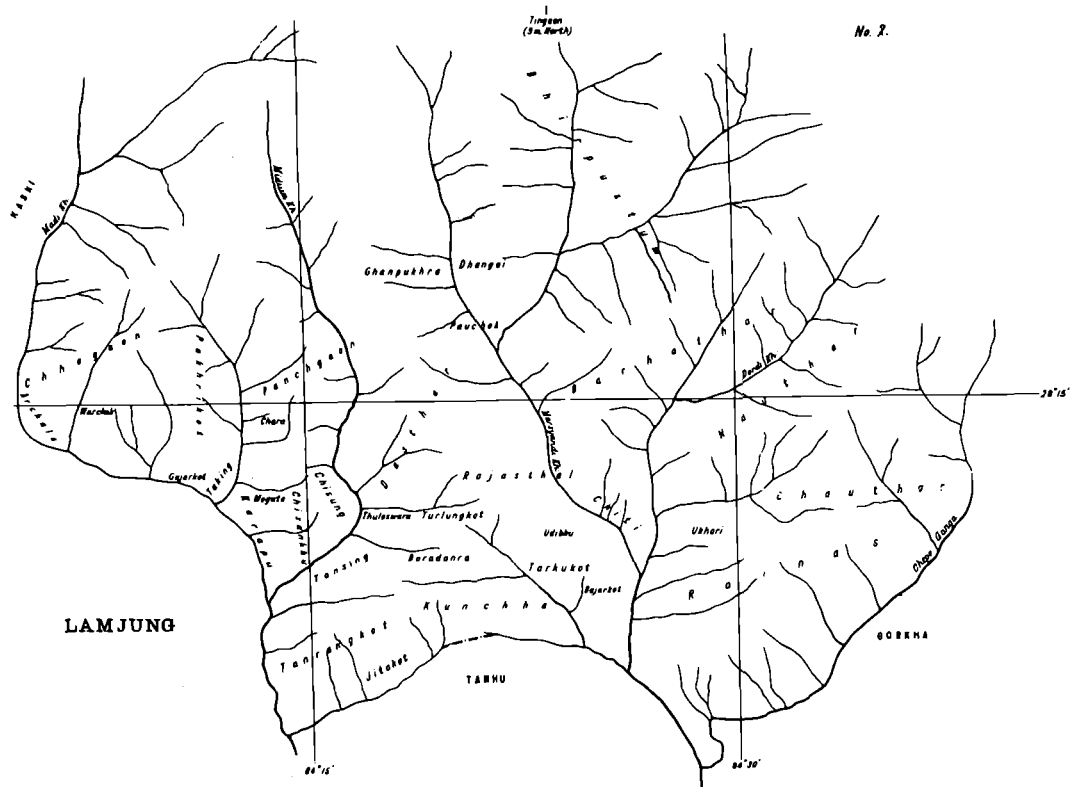
revised edition of *Gurkhas*, a handbook for the Indian Army.<sup>2</sup> The book was revised by B.U. Nicolay and reprinted in 1918 with the reproduction of the 1915 map. The preface of the book states. "The map attached to this book was obtained through Lieutenant Colonel W. Ravenshaw, Resident in Nepal, who induced the Nepalese Durbar to very kindly mark off thereon the various divisions of the country". The map has the international boundary in bold red and further shows five main regional divisions (Eastern Hills, Nepal Valley, Central Hills, Western Hills and Tarai) and 28 Tehsil divisions in the Hills and 13 Tehsil divisions in the Tarai. Tehsil headquarters are indicated with white flag and Kacheris (all in Tarai) with red flag. Of the then 11 Tarai Kacheri locations only Birganj, Parasi, Butwal and Banke have continued to maintain their administrative importance.

The next important map of Nepal is to be found in Perceval Landon's official history of Nepal.<sup>3</sup> Although the book also includes the first reliable map of Nepal as the result of regular survey of 1924-27, it was only a posthumous insertion. The map of Nepal in two sections was drafted by the Survey of India on the basis of available information including all the materials at the disposal of the Prime Minister Chandra Shumsher. Landon in his introductory remarks vouchsafes for the accuracy of the southern, western, and eastern frontiers of Nepal and on the

<sup>1</sup> 'Preliminary sketch of Nepal and the countries adjoining to the South, West and East,' Scale: 1/1, 013, 760. Office of the Surveyor General of India, Calcutta, 1856.

<sup>2</sup> 'Nepal, showing the approximate position of Amini, Kacheris and headquarter stations of Tehsils.' Scale 1/1, 013, 760. In Eden Vansittart, *Gurkhas*. Calcutta, 1915.

<sup>3</sup> 'Map of Nepal (western section + eastern section).' Scale: 1/1, 788, 122 In Perceval Landon, *Nepal*, Vol II, London, Constable, 1928. See "Notes on the maps of Nepal," *Nepal*, Vol I, pp. xiv-xvi.



### 9. Lamjung (Govt. of India, 1941)

boundary in the north-western half he comments: "This is a matter which may cause some uneasiness to the cartographers of the world, but does not effect the local inhabitants." He further asserts that "The map as it stands represents a vast improvement on anything that has hitherto appeared, and must remain the only trustworthy geography of Nepal until the survey by the Indian officers of the Indian survey which has been arranged by the Maharaja has been completed." The maps are in grey tone and show the topography by hill-shading and most

known routes and important passes. The names of administrative districts are shown in capital letters.

In 1941, the Government of India published two volumes of *Gurkhas* in the series of handbook for the Indian Army.<sup>4</sup> The main purpose of the volumes was to provide up-to-date information to simplify expeditious

<sup>4</sup> India (Government of), *Gurkhas*, Part I (List of villages in Western Nepal Recruiting Area), Part II (List of villages in Eastern Nepal Recruiting Area). Simla, Government of India Press, 1941.



communication on travel allowances for all leave, furlough men and reservists. The volume on western Nepal has 24 district maps. The district maps included are Gorkha, Lamjung, Dhor, Kaski, Rising, Tanahu, Bhirkot, Garhung, 4,000 Parbat (No. 4 West), Nuwakot, Payung, Sataun, Argha, Dhurkot, Galkot, Gulmi, Isma, Khanchi, Musikot, 4,000 Parbat (Gulmi), Palpa, Piuthan, Sallyan and Dailekh. The maps drawn at a scale of 1 inch to 2 miles are shown with *thum* or sub-district oboundaries. The district names are printed in capital letters, *thum* names in small type and river names in small italics. The note on maps in the preface mentions that, "These maps will be found to be of assistance when selecting recruiters (*galla-wala*.) Small markers placed on *thums* will show where ground is being too thickly covered or where areas are being left untouched."

The first example of maps prepared in Nepal is to be found in *Maps of Nepal* published by the Statistics Department in 1958.<sup>5</sup> The volume includes maps showing census districts divided into *thum*/parganas. According to the preface, the supervisors during the Census of 1952/54 were provided with area maps based on Survey of India, 1 inch to 4 miles. These maps were checked by them as to the *thum* and district boundaries. The volume includes 37 maps at a scale of 1 inch to 8 miles (1:506, 880) covering the then 33 administrative districts. Each map is marked with district boundaries in continuous line and *thum* or pargana (sub-district) boundary in dotted line with their name.

<sup>5</sup> Statistics Department, Nepal, *Nepal ko Naksa* (Maps of Nepal, Census districts subdivided into Thum/Pargana). Kathmandu, 1958.

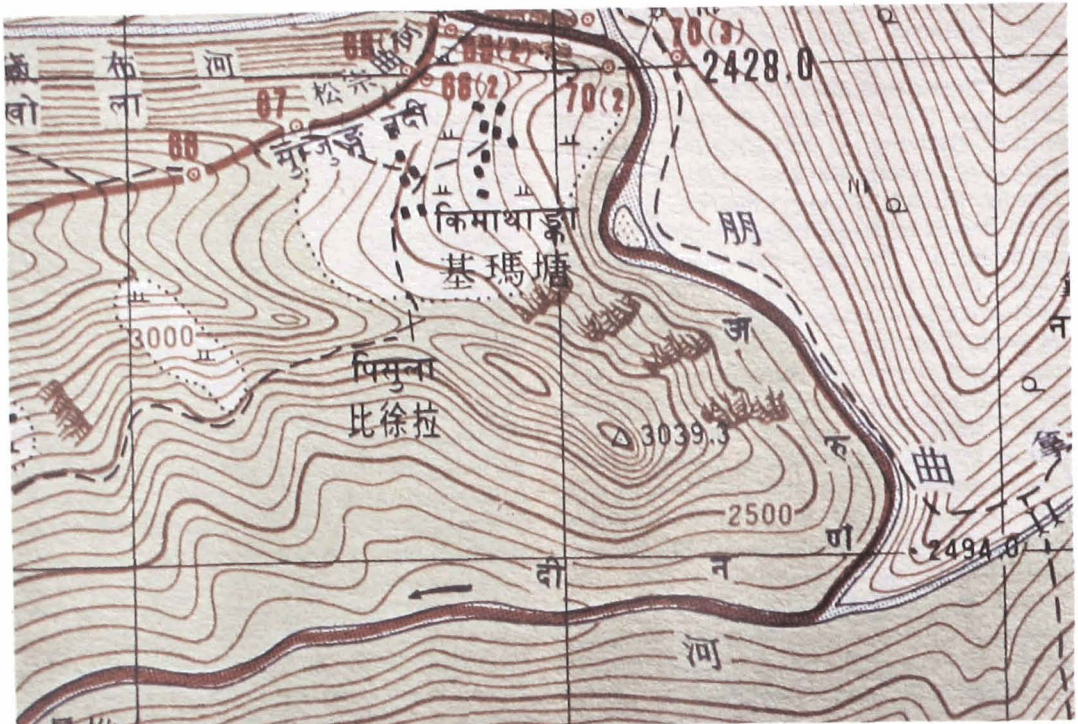


10. Eastern Development Region (1975-77)

This publication was soon followed by the first comprehensive volume on the geography of Nepal by P.P. Karan.<sup>6</sup> Of the numerous maps, the most detailed one was 'Nepal: Administrative Units' with district and *thum* (country) boundaries. This map is based on the *Maps of Nepal* of the Statistics Department and on the reverse side are given

<sup>6</sup> 'Nepal, administrative units', Scale/500 000. In Pradyumna P. Karan, *Nepal, A cultural and physical geography*. Lexington, University of Kentucky, 1960, back pocket.





11. Detail of Nepal-China Boundary map (1961)

area, population and density of each district and sub-divisions therein. In recent years, numerous administrative maps on smaller scale have been published commercially. One of such maps published by Sahayogi Press shows rivers in blue, zonal and district boundaries in red and prominent peaks in black.<sup>7</sup> Zonal headquarters are shown in red square and district headquarters in small black circle. This was the first map that showed the northern boundary of Nepal according to the Sino-Nepal boundary agreement of 1960 with a

prominent apex in the north-west corner.

Although the Survey Department was established much earlier it was preoccupied in cadastral survey work to support the land reform programme during the 60's. The Department was later strengthened by establishing a topographical survey section with the aid of a United Nations technical assistance program. Its attempt to produce series of administrative maps was, however, cut short by changes in zonal and district boundaries as a result of the constitutional amendment in 1975. The series included development region maps (1:500,000), zonal maps

<sup>7</sup> 'Outline map of Nepal.' Scale: 1 inch to 18 miles. By Harka Gurung. Kathmandu, Sahayogi Press, 1969.



12. Detail of Nepal-China Boundary map (1979)

(1:250,000) and district maps (1:125,000). Some of these maps printed during 1975-77 show selected contours, rivers, roads, administrative boundaries and important settlements in modest colours.

Maps dealing with international boundaries also fall under the category of political maps. Unlike the southern boundary of Nepal that had been defined by the first quarter of the last century, the northern boundary remained a sketchy area for a long time. Therefore, recent maps that delineate the northern boundary of Nepal with China also constitute a cartographic contribution

in an area of challenging terrain. The first series appeared as an atlas with seven maps as a part of the Sino-Nepal Boundary Treaty of 1960.<sup>8</sup> The two sheets at a scale of 1:500,000 show the entire 1111.4 kilometers length of Sino-Nepal boundary alignment. The western sheet extends from Lipudhara (81°E) to Gya La (85°38'E) and the eastern sheet extends from Lugula Himla (84°15'E) to just east of Chabuk La (88°8'E). The contours in brown are at 500 meters interval with stressed contours at 2,000 meters.

<sup>8</sup> Foreign Ministry, Nepal, *Atlas of Sino-Nepal Boundary Treaty 1960*. Peking, 1961.

Rivers and streams are in blue and snow areas in blue stipples. Tracks are shown in broken black lines with details on bridges. Place-names in black are in Nepalese and Chinese while territorial name of countries, boundary line and border pillars are shown distinctly in red.

The five regional maps at a scale of 1:50,000 refer to (i) Urai Bhanjyang to Nalakankar, (ii) Point 6,215.1 m. to Chaklo, (iii) Gya La to Thaple Bhanjyang, (iv) Yangra Himal to Chosumdo and (v) Point 6,208.8 m. to Nyule bridge. The contours in brown are at 100 meters interval with stressed contours at 500 meters. Snow-fields are in blue stiples and streams and lakes in blue. Other topographic features indicated are scarp faces in brown and scree in black. Tracks and trails and bridges are in black and passes in cross sign. The maps also indicate general land use: woodland in green, and scrub land, bamboo thicket, pasture and cultivated area by different black symbols. Cultural features shown include settlement, water mill, honey cliff, *chaitya*, *mani* wall, *gompa* and shrines. The international boundary is shown in bold red and marked with triangulated point numbers at intervals. In the last section are given detailed maps at a scale of 1:20,000 of the 78 localities with boundary pillars.

Another series of maps of the Sino-Nepal border area was completed in 1979 as a result of joint surveys.<sup>9</sup> The set of 57 maps included in the atlas, cover the entire northern border of Nepal. Prepared on the basis of aerial photographs, these maps at a scale of

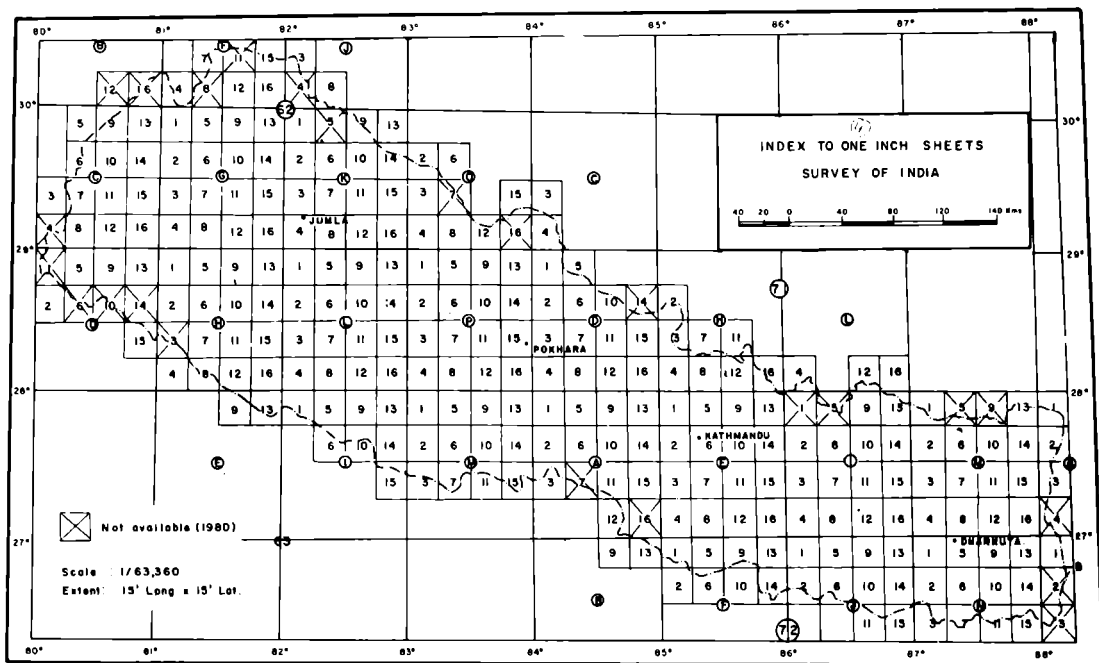
1:50,000 represent detailed topography of the area within four to five kilometers on either side of the boundary line. Colour scheme and conventional signs are similar to the 1961 series. The contour interval is 20 meters with stressed contours at 100 meters interval. The closely-spaced contours provide an effective impression of the terrain without the aid of hill shading. A high frequency of spot-heights further aid topographic control.

All place-names are in Nepalese and Chinese. In the snow-field area appear glacier in blue stiples, bergschrund in blue hachures and ic towers in blue triangles. Lakes, river sources, streams and swamp areas are also in blue while intermittent streams are shown in brown. Fine dotted line indicate land use boundaries and woodland is coloured light green. Different symbols represent other land use categories such as scrub-land, pasture, bamboo thicket and cultivated area. Roads are categorised as highway, track and trail using variety of black lines while river crossings are classified as solid bridge, suspension bridge and log bridge. Other cultural features indicated on the map are settlement, homestead, tent site, animal shed, cave, ruins, *chaitya*, *mani* wall, *gompas* and shrines. The most prominent feature in the map is the boundary line with triangulated points in red. These maps established for the first time the topographic details of many areas as well as exact height of numerous border peaks.

<sup>9</sup> Foreign Ministry, Nepal, *Nepal Chin Simanako Pratham Nirikchhanama Adharita Mul Lipisita Sanglagna Naksaharu* (Maps included in the Main Text and based on the First Joint Survey of the Sino-Nepal Boundary). Peking and Kathmandu, 1979.

# CHAPTER III

## TOPOGRAPHICAL MAPS



13. Index to Survey of India, 1 inch: 1 mile map (1957- )



Topographic maps show in varying detail both the physical and cultural features. Their purpose is to represent a general picture of a given area. They are normally of large to medium scale although in areas of less intensive survey, some are drawn in smaller scale.

The first regular survey of Nepal was done during 1924-27 by the Survey of India. The country was surveyed at a scale of one inch to four miles with the help of native surveyors. During the first season (Nov 1924-25), about 16,925 square miles was covered and further 33,045 square miles in the 1925-26 season. The area surveyed during the last season (1926-27) was 14,025 square miles and when the field-work was finally closed in March 1927, a total area of 55,000 square miles had been surveyed. Three areas left uncovered were; 150-square miles north of Jagdula, 60-square miles north of Manang and the area east of Rasuwa Garhi.

The result of the reconnaissance survey was first published at a reduced scale in the Survey of India General Report of 1926 to 1927.<sup>1</sup> This map titled as the 'Skeleton Map of Nepal' and published at a scale of 1:1,500,000 or 23.6 miles to 1 inch shows watersheds in red and rivers in blue. Contour intervals of 5,000 feet are shown along with selected spot-heights in decimals. This map was also included in Landon's *Nepal* as well as in the *Gurkhas* handbook revised by C.J. Morris in 1933<sup>2</sup>.

A widely used topographic map of

small-scale compiled from medium scale maps was the one-in-million (1:1,000,000) or one inch to 16 miles map. The million scale map was published in two series: the earlier India and Adjacent Countries series in which each map sheet extended over 4° of longitude and 4° latitudes and the International Series in which each sheet extended over 4° of latitudes and 6° degrees of longitudes. Nepal is covered by the following four sheets in the International Series:

- (i) Manasarovar (NH-44), 78° E to 28° E – 28° N to 32° N
- (ii) Tsangpo (NH-45), 84° E to 90° E – 28° N to 32° N
- (iii) Allahabad (NG-44), 78° E to 84° E – 24° N to 28° N
- (iv) Bihar (NG-45), 84° E to 90° E – 24° N to 28° N

These maps have graduated layers of colours to show altitude and heights are given in meters and feet. The latest million map prepared from available sources is the Operational Navigation Chart published by Aeronautical Chart and Information Centre, US Air Force.<sup>3</sup> The map has a contour interval of 1,000 feet with hill-shading and spot-heights. Rivers are shown in light blue and roads and tracks in brown. The map is superimposed with aeronautical information regarding airports, obstructions and radio navigational aids in deep blue.

Then come the maps of Nepal at a scale of 1 inch to 8 miles based on the reconnaissance survey of 1924-27. These were first published as preliminary edition in 1928 and the revised edition in 1934.<sup>4</sup> Nepal was covered in three sheets:

<sup>1</sup> 'Skeleton map of Nepal.' Scale: 1/500,000. "The first survey of Nepal, 1924-27" in *General Report of the Survey of India*. Calcutta, 1927. Appendix II, p. 92-95.

<sup>2</sup> C.J. Morris, *Gurkhas*. Delhi, Manager of Publications, 1933.

<sup>3</sup> 'Operational Navigation Chart', ONC H-9 (Bhutan, China, India, Nepal Pakistan, Sikkim)', Scale: 1/1,000,000. St. Louis, U.S. Air Force, 1978 (Revised Edition).

<sup>4</sup> 'Nepal.' (Three sheets). Scale: 1/506, 880, Calcutta, Survey of India, 1934 (2nd edition).

Sheet 1: 80° E to 83° E

Sheet 2: 83° E to 86° E

Sheet 3: 86° E to 88° E

Although international boundaries were approximate, topographic features were well represented by contours at intervals of 1,000 feet and hill shading. Water bodies were shown in blue and tracks in red. Many settlements were shown along with administrative towns. In 1953, the Geographical Section of the General Staff, War Office (U.K.) published another series of one inch to eight mile maps on the basis of Survey of India revised edition of 1934.<sup>5</sup> These were however produced in two sheets:

West Sheet: 80° E to 94° E

East Sheet: 84° E to 88° E

Topographic and other information are the same as in the original edition of the Survey of India with modest use of colour. Hill-shading is in brown and contour interval is 1,000 feet with stressed contours of 5,000 feet, 10,000 feet, 15,000 and 20,000 feet. Rivers and lakes are in blue while major and minor tracks are in red. Administrative centres appear in black square and villages in small open circle. Although there is a boundary disclaimer note in red, the most prominent feature of the map are the bold administrative and international boundaries in bright pink. The maps were reissued in 1967.

Just as the eight mile map of Nepal has been popular as a wall map, the Quarter Inch maps have remained the most used ones

for their reliability.<sup>6</sup> The Quarter Inch or 1 inch to four mile maps were published between 1925-1932 in the original scale of reconnaissance survey of 1924-27. There are 16 sheets (numbered A to P) in a million scale map of 4 x 4 degree sheet.<sup>7</sup> They are also called degree sheets as each Quarter Inch map sheet is one degree square. The following 28 Quarter Inch sheets cover entire Nepal.

	62 B	62 J	62 J						
	62 C	62 C	72 K	62 D		71 C			
	62 D	62 H	62 L	62 P		71 D	71 H	71 L	
28 N									
		63 E	63 I	63 M		72 A	72 E	72 I	72 M
						72 B	72 F	72 J	72 N
									78 A
									78 B
						84° E			88° E

The Quarter Inch map has heights in feet with contour intervals of 250 and 500 feet. District boundaries are indicated and inhabited areas are well-represented with village names. The most distinctive feature of this map series is the representation of general land use in colour: forest (green), cultivated area (yellow), settlement and route (red), water bodies (blue) and waste and rocky area (brown).

The Quarter Inch map series has two variants, one British and the another American. The British version published by the War Office in 1953 follows the degree division of the original Survey of India maps as well as in basic details.<sup>8</sup> It however makes use of

<sup>6</sup> 'Nepal' (Quarter Inch series). Scale: 1/253,440. Calcutta Survey of India, 1925-32.

<sup>7</sup> Survey of India, *Survey of India Map Catalogue*. Calcutta, 1945 (Provisional edition).

<sup>8</sup> 'Nepal' Scale: 1/253 440. London, War Office, 1953.

<sup>5</sup> 'Nepal.' (Two Sheets). Scale: 1/506,880. London, War Office, 1953 (Reprinted 1967).



14. Phoksumdo Tal – detail of One inch map

three colours only blue for glaciers, brown for contours and black for rivers and other cultural features. In the American version, the scale has been changed to 1:250,00 and the map co-ordinates cover one degree of latitude and one-and-half degree of longitude.<sup>9</sup> Thus each map covers 1° latitude and 1°30' of longitude and Nepal is represented by the following 19 sheets:

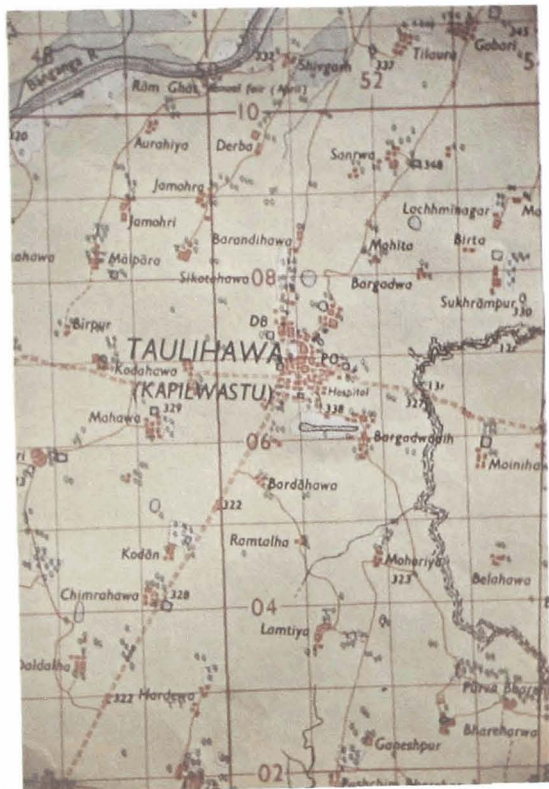
NH 44-6	NH 44-7						
NH 44-10	NH 44-11	NH 44-12					
NH 44-14	NH 44-15	NH 44-16	NH 45-13	NH 45-14			
	NH 44-3	NH 44-4	NG 45-1	NG 45-2	NG 45-3		
			NG 45-5	NG 45-6	NG 45-7		

The contour interval of 500 feet has been supplemented by contours of 250 foot interval. Contours are in brown, water bodies in blue, forest area in green and staging-points with distances on the main tracks are shown in red.

The best and most reliable topographical maps of Nepal covering the entire country is

<sup>9</sup> 'Nepal.' Scale: 1/250 000. Washington, U.S. Army Map Service, 1955.





15. Taulihawa – detail of One Inch map.

at a scale of 1:63,360 or 1 inch to a mile.<sup>10</sup> The One Inch maps are based on vertical aerial photographs at a scale of 1:40,000 taken between 1956 and 1958. Rigorous ground surveys were made during 1958-65 at a scale of 1:50,000. However the first sheet (72 E/6) of Kathmandu Valley was issued as early as 1957. Nepal is covered by 274 One Inch sheets and to-date 250 sheets have been



16. Marsyangdi River – detail of One Inch map.

issued. Of the remaining 24 sheets, all refer to small pockets in the border areas.

Each One Inch map represents an extent of 15 minutes longitude and 15 minutes latitude. Thus there are 16 such maps within One Quarter Inch sheet of one degree dimension. They are numbered in the following order:

<sup>10</sup> 'Nepal.' (One Inch series). Scale: 1/63 360. Dehra Dun, Survey of India, 1957.

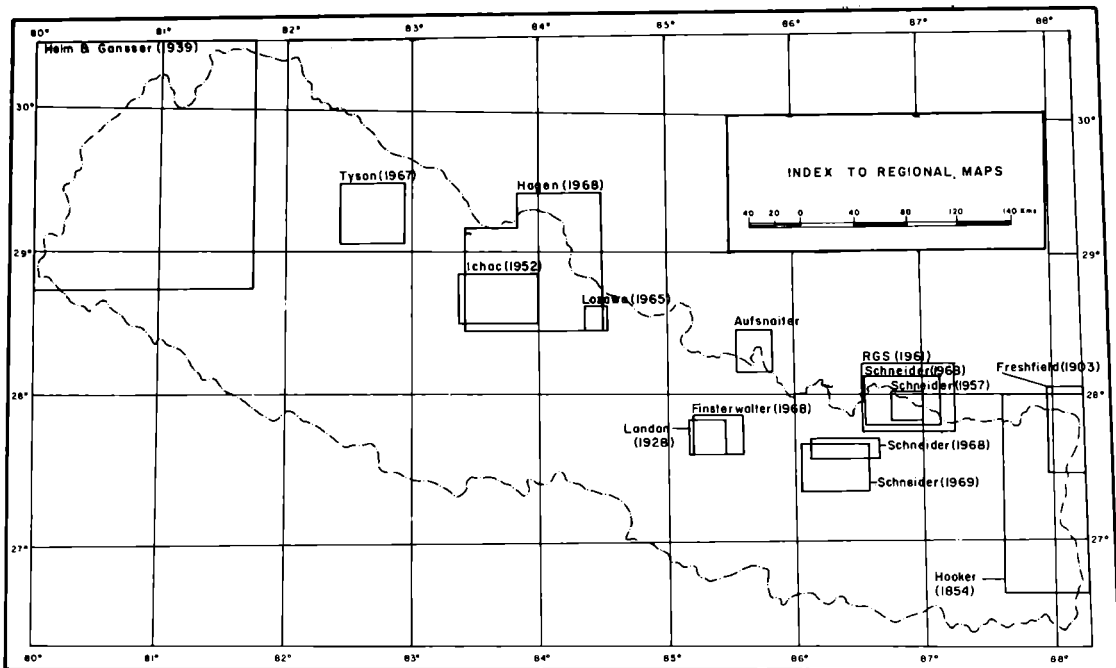
- (i) Million map number, followed by
- (ii) Quarter Inch letter, with its
- (iii) 1/16 square number as the denominator.

For example sheet No. 71 D/4 covering the eastern half of Pokhara valley, indicates 71 as the million map number, P as the quarter inch letter and numeral 4 as the square in the degree sheet.

The One Inch maps give a detailed information about the area. Terrain representation by contours in brown are at an interval of 100 feet with hill-shading. Spot-heights are distinguished into triangulated station, point, and approximate. At places, relative height between the top and bottom of a steep slope are also indicated. Contours in glaciated fields are in blue. Water features are also shown in blue but seasonal streams appear in black. Wooded areas are coloured green while cultivated areas appear yellow. Cultural features such as roads, tracks and settlements are shown in red. Ferry-points and sites of festivals and weekly fairs are indicated according to their seasonality and frequency.

# CHAPTER IV

## REGIONAL AND RELIEF MAPS



17. Index to regional and relief maps

Regional maps deal with an area of limited extent. In some cases they try to define an unknown area or attempt to improve on previous maps while in many cases, the objective is to bring out better detail. They are normally at a larger scale but the exploratory ones may be of small scale. In this section are also included relief maps since some of the best relief maps of Nepal are of regional or local extent.

One of the early regional maps of Nepal showing relief was drawn by J.D. Hooker indicating his routes in Tamur valley in the mid-19th century.<sup>1</sup> Relief representation is by hachures along with some prominent spot-heights. The map covers most of Sikkim and the north-eastern section of Nepal. In Nepal, he assigns a height of 5,616 ft. for Lungthung (present Taplejung), 11,600 ft. for Kangbachen, 19,590 ft. for Walungchung Gola and 16,756 ft. for the pass at the head of Walungchung.

The first published regional map of Kathmandu valley is to be found in Landon's NEPAL.<sup>2</sup> It covers a larger area than that of Crawford's manuscript map and incorporates the entire valley. The catchment area of the upper Bagmati is well-established by contours at an interval of 100 ft. All the passes leading to the capital are indicated and so are most streams that drain the valley. Rural settlements are shown in dots while larger settlements and towns are represented with their street lay-out plans. Among the interesting cultural features are the representation of the firing range at Chhauni, the rope-way extend-

ing due south of Kisipidi and location of residences of some Rana generals.

Two maps published during 1930-31 relate to high mountains on the northern and eastern border of Nepal respectively. In 1930, Survey of India published the first comprehensive map of the Everest environ drawing on the sources of early British expeditions from the Tibetan side as well as the Nepal Survey of 1924-27<sup>3</sup> The following year, Marcel Kurz, who accompanied the 1930 International Himalayan Expedition, published a map of Kangchenjunga massif including the extreme north-east corner of Nepal.<sup>4</sup> Both maps emphasise topographic details on higher altitudes.

An early map of the Himalaya drawn in the techniques of Alpine maps was that of the Central Himalayas covering parts of Nepal, Kumaon and western Tibet.<sup>5</sup> The relief is represented both by contours at 600 metre interval and hill-shading with natural illumination from the south-west. Glaciers and water bodies are in blue, contours and shading in light grey and rock drawings in black. International boundary between India and Nepal are shown only in the plains and in extreme north-east. The Nepalese area shown on the map covers west of the longitude connecting Dailekh and Kholchhi.

When Nepal was first opened to foreign visitors in 1949, the early expeditions made

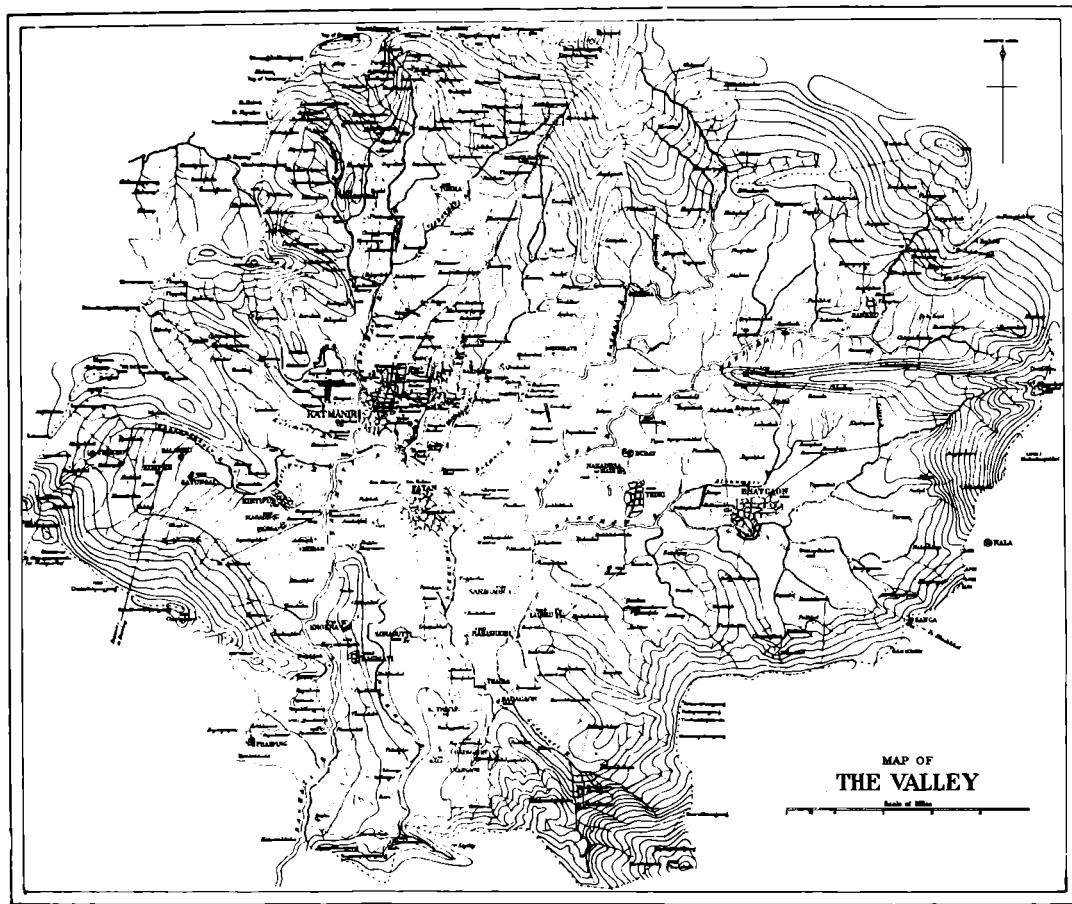
<sup>3</sup> 'Mount Everest and Environs.' Scale: 1/126, 150. Dehra Dun, Survey of India, 1930.

<sup>4</sup> 'Das Massiv des Kangchendzonga (Himalaya)'. Scale: 1/1000,000. by Marcel Kurz. Berne, Kummerly and Frey, 1931.

<sup>5</sup> 'Central Himalayas'. Scale: 1/650,000. In Arnold Heim and August Gansser, *The Throne of the Gods*. London, Macmillan, 1939.

<sup>1</sup> 'Map of Sikkim and Eastern Nepal.' Scale: 1/684, 812. In J.D. Hooker, *Himalayan Journals*, London, J. Murray, 1854.

<sup>2</sup> 'Map of the Valley. (Kathmandu)'. Scale: 1/73, 150. In Perceval Landon, *op. cit.*



18. *Map of Kathmandu Valley (London, 1928).*

sketch maps of their areas of exploration. The first on the scene was a British expedition to Langtang in June 1949. They reached six high cols for plane-table survey but their small-scale map of Langtang region<sup>6</sup> varies

widely with that of the later survey by Peter Aufschnaiter. Soon after, the French expedition to Annapurna prepared a sketch map of Dhaulagiri and Annapurna massifs in 1950<sup>7</sup>. The sketch is in bold relief with blue for snow

<sup>6</sup> 'Sketch map of the Langtang glacier.' Scale: 1/253, 440. In H.W. Tilman, *Nepal Himalaya*. Cambridge, University Press, 1952.

<sup>7</sup> 'Sketch map of the Dhaulagiri and Annapurna massifs.' Scale: 1 inch to 2 1/2 miles. In Maurice Herzog, *Annapurna*. London, Jonathan Cape, 1952.

and ice and black for rock, scree and moraine. The exploration routes of the expedition are shown in red and so are important heights and passes. This map shows for the first time Tilicho lake which they called the "Great Ice Lake." The sketch map was prepared by climber Marcel Ichac and drawn by Lucien Dubresson.

Other local maps prepared by mountaineering expeditions about the same time were that of Sikkim Himalaya including north-east Nepal<sup>8</sup> by the Swiss Foundation for Alpine Research in 1952, a revised map of the extreme north-west Nepal Himalaya<sup>9</sup> by the Welsh Himalayan Expedition and a plane-table survey of Rolwaling area<sup>10</sup> by the Merseyside Himalayan Expedition in 1955.

One of the best and detailed relief maps of a Nepalese region was 'Chomolungma-Mount Everest'<sup>11</sup> published in November 1957. It was based on terrestrial photogram-

metric survey done by Erwin Schneider in 1955. The overall tone is one of dark black on rocky terrain, blue of ice fields and light ochre in lower valleys. The contours are at an interval of 20 meters with stressed contours at 100 meters intervals and they are continued even over the rock faces. Similarly, lakes do not appear as an opaque blue but rather with blue contours in finer lines. In the lower valleys appear some forest areas in green and settlements are shown with field enclosures. Chukhung at an altitude of 4,873 is indicated as the highest summer settlement in the region.

Another regional map of Mount Everest region was published by the Royal Geographical Society.<sup>12</sup> It covers a much larger area than in the Mahalangur Himal map but the imprint of the former map is clearly evident in the greater density of rock drawing and detailed relief corresponding to the area of the Schneider map. The contours are at an interval of 100 meters with stressed contours at 500 meters interval with spot-heights given in both meters and feet. The contours are brown in known areas, blue in snow fields and grey in less reliable areas.

A regional map covering a large area of East Nepal was published in Japan.<sup>13</sup> It covers Khumbu, Rolwaling and parts of eastern hills as far south as the Mahabharat Lekh between longitudes 86°E and 87°E and latitudes 27°5'N to 28°15'N. It is a simple map with ridges in bold lines and drainage

<sup>8</sup> 'Sikkim Himalaya.' Scale: 1/150,000. Berne, Kummerly and Frey, 1951.

<sup>9</sup> 'Revised map of the West Nepal Himalaya.' Scale: 1/253,440. In Sidney Wignall, *Prisoner in Red Tibet*. London, 1957.

<sup>10</sup> 'A plane table survey of the Gauri Shanker.' Scale: 1/67,504. *Alpine Journal*, vol. 61, 1956.

<sup>11</sup> 'Mahalangur Himal. Chomolungma-Mount Everest.' Scale: 1/25,000. Surveyed by Erwin Schneider, drawn by Fritz Ebster, supplementary data by Fritz Müller and Peter Aufschneider. Wien, Kartographische Anstalt Freytag - Bernt and Artaria, 1957. (Fritz Ebster also drew the 'Relief Map of Nepal' in Toni Hagen's *Nepal*, Berne, 1960). See also Erwin Schneider. "Foreword to the map of the Mount Everest area," *In Mount Everest: Formation, Population and Exploration* by Toni Hagen, G.O. Dyhrenfurth, Ch. von Furer-Haimendorf & Erwin Schneider. London, Oxford University Press, 1963, p. 182-91 and Carl Troll. "Die Karte des Chomolungma-Mount Everest 1:25 000 and Photogrammetrische Hochgebirgs-Kartographie," *Erdkunde*, Band xix, Lfg. 2V, 1965, S. 301-11.

<sup>12</sup> 'The Mount Everest Region.' Scale: 1/100,000. Compiled by G.S. Holland. London, Royal Geographical Society, 1961. A revised edition at the same scale was published in 1975.

<sup>13</sup> 'Map of Nepal Himalaya.' Sheet No. 2 Eastern Part, Kosi Region. Scale: 1/250,000 Japan, Gakujin, 1967.

in thin line. Spot-heights are in meters, and passes, routes and selected settlements are shown and no colour has been used.

Two British expeditions that visited the Far West Nepal in 1961 and again 1964, surveyed part of the Kanjiroba Himal.<sup>14</sup> While the southern approach was surveyed during the earlier expedition, the area immediately close to Kanjiroba Peak (22,580 ft.) was surveyed with photo-theodolite in 1964. The map published by the Royal Geographical Society in 1967 has reliable form lines near the Jagdula-Garpung Khola confluence and in the neighbourhood of the main Kanjiroba. Much of the area including the deep gorge of Jagdula is left blank.

In the north-east, the Japanese expeditions to Nupchu (1962) and Sharphu (1963-64) produced a sketch map of a little-explored area.<sup>15</sup> Another cartographic product of a series of mountaineering expeditions was the detailed map of Himalchuli.<sup>16</sup> The map drawn at a scale of 1:50,000 was the work of Tomoya Iozawa using a new technique of shading and symbols. Contour interval is at 50 meters while index contour line of 200 meters is also given. The colour of the contour lines of the ground surface is brown and that of snow and ice in cobalt blue. Contour lines are over-printed with symbols to show terrain features in detail. Darker and

more contrasting shading has been used for the higher elevations.

Peter Aufschnaiter, who had done some preliminary work in the 'unsurveyed' area north of Langtang in 1945 as a fugitive, visited Langtang valley in the 1960's and produced the first reliable map of the area.<sup>17</sup> The map shows Langtang as a right-angled valley and Langshisa as the turning-point in its alignment.

The finest relief maps of Nepal have been produced by Research Scheme Nepal Himalaya. The first of the series was the map of Khumbu Himal<sup>18</sup> published in 1965. The basic field-work was done by Erwin Schneider and his collaborators during 1955-63 while terrain and rock representation was the work of Fritz Ebster. Tibetan place-names are according to the way of spelling by Peter Aufschnaiter. The map area is much larger than in the Mahalangur Himal map of 1957 and the scale is 1:50,000. Contour interval is at 40 meters with stressed contours at 200 meters on the Nepalese side while on the Tibetan side, the contour interval is 200 meters and stressed contours at 1,000 meters. In contrast to the earlier Mahalangur Himal map by the same team, rock drawings are in brown instead of black and moraines are drawn in greater detail. Forests appear in light blue and since the altitude of Chukhung

<sup>14</sup> 'Kanjiroba Himal'. Scale: 1 inch to 2 1/4 miles. Surveyed by the Kanjiroba Himal Expedition 1961 and West Nepal Expedition 1964 led by John Tyson. *The Geographical Journal*, September, 1967.

<sup>15</sup> 'Map of the North-Eastern part of Nepal Himalaya.' Scale: 1/100 000. *Sangaku*, vvol. LIX, March 1965.

<sup>16</sup> Tomoya Iozawa. "A trial of a new design with the map of Himalchuli." *Journal of the Keio University Alpine Club*, Vol. III, no. 2, 1965.

<sup>17</sup> 'Topographic sketch map of Langtang.' Scale: 1/253 440. By Peter Aufschnaiter. In Toni Hagen, *Report of the Geological Survey of Nepal*. Vol I, Zurich, 1969, p. 119. (Reproduced from *Die Alpen*).

<sup>18</sup> 'Khumbu Himal (Nepal), 'Scale: 1/50,000. By Erwin Schneider and others. Wien, Research Scheme Nepal Himalaya, 1965. See Carl Troll and Ulrich Schweinfurth. "Die Karte des Khumbu-Himalaya (Ostnepal) 1:50 000. *Erdkunde*. Band XXII, LFG. 1, 1968, S. 29-33.



is corrected to 4,730 meters instead of the earlier 4873 meters, the highest summer fields now appear at Dzonglha (4843 m).

The second map in the series was the map of Khimti Khola, Likhu Khola, Shorong Drangka on the basis of surveys by Erwin Schneider during 1959-65.<sup>19</sup> The map scale is 1:50,000 and contour interval is of 40 meters with stressed ones at 200 meters. Steep rock faces are in black drawing and contours in brown. Settlement clusters and tracks also appear in light brown. Area under vegetation cover are coloured lemon green while cultivated areas near villages as well as pastures and high ground are left white. Place-names and drainage are in black. Lakes however appear in light blue. Colour has been used very sparingly in this map compared to others in the series produced by the Research Scheme Nepal Himalaya.

The third map in the series was that of the Tamba Kosi-Likhu Khola<sup>20</sup> and was the result of field work done during 1960-66. Photogrammetric work was done by Erwin Schneider and drafting of rocks by Fritz Ebster. Map scale and countour intervals are the same as in the Khumbu Himal map (40 meters interval and 200 meters stressed) but the rock drawings are in black as in the 1957 Mahalangur Himal map. Hill-shading in faint colours is maintained as in the previous

maps of the area while forest areas are shown in green. Cultural features such as sites of weekly market, religious monuments and administrative boundaries are shown in red. Libreria Alpina lists four other maps that probably belong to this series.<sup>21</sup> Drawn at a scale of 1:50,000 and published in 1974 from Wien, the maps are titled Shorong/Hinku; Dudh Koshi/Nepal; Lapchi Kang/Nepal and Rolwaling Himal, Gaurishankar (Nepal).

A map of Thak Khola drawn by Toni Hagen covers large areas of upper Kali Gandaki, eastern section of Dhaulagiri, entire Annapurna range and Manang valley.<sup>22</sup> The map based on the quarter inch sheets of Survey of India is supplemented by the author's ground surveys. The contour interval is at 250 meters with stressed contours at 1,000 meters. Basically a contour map, it also shows important tracks, settlements and peaks. Although the high ridge connecting Annapurna I (8,078 m) and Annapurna South (7,805 m) has been correctly shown which the Quarter Inch map wrongly depicted as a ridge extending further east to Hiunchuli (6700 m), there is no indication of the Tili-cho lake.

The latest series of regional maps has been produced by Arbetgemeinschaft fur Vergleichende Hochgebirgsforschung, (Association of Comparative Alpine Research), Munich. They have produced detailed maps of Kathmandu Valley in two scales, based on aerial photographs taken in December

<sup>19</sup> 'Khimti Khola, Likhu Khola, Shorong Drangka,' Scale: 1/50,000. Edited by Research Scheme Nepal Himalaya and sponsored by Fritz Thyssen Stiftung. Wien, Kartographische Anstalt Freytag U. Artaria, 1968. In *Khumbu Himal*, Band 2, 1968.

<sup>20</sup> 'Tamba Kosi-Likhu Khola (Nepal). 'Scale: 1/50 000. By Erwin Schneider and others. Wien, Research Scheme Nepal Himalaya, 1969, See *Khumbu Himal*, Band 7, Lfg. 1, Juillet 1969.

<sup>21</sup> Libreria Alpina. *Catalogo Generale 1981*, Bologna 1981, p.154.

<sup>22</sup> 'Topographical map of Thakkhola'. Scale: 1/253 440. By Toni Hagen. In *Geology of Thakkhola*, Zurich 1968.

1971 by Erwin Schneider. The map of Kathmandu Valley at a scale of 1:50,000 is printed in eight colours.<sup>23</sup> Contour interval is of 40 meters with stressed contours at 200 meters. Auxilliary contour lines of 20 meters in broken line have been used to represent the topography on the comparatively level valley floor. Hill shading is in grey and water bodies are shown in blue. Scarp faces are in brown hachures and woodland in green. Metalled roads are indicated in red while unmetalled roads and other tracks are in black. Selected monuments also have been shown in red.

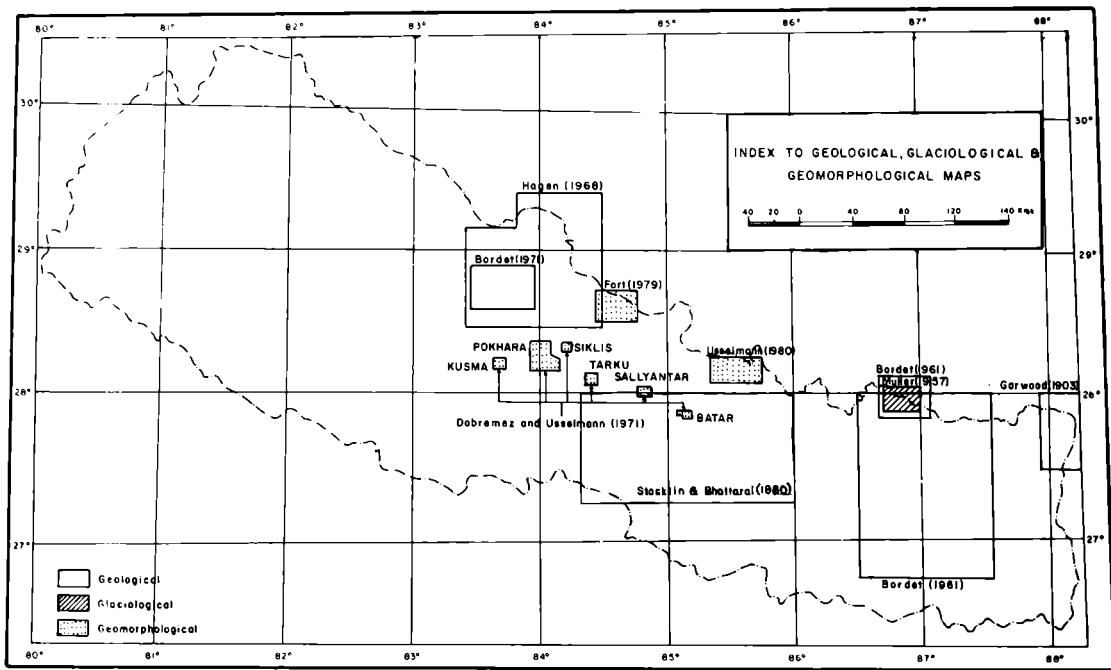
The above map was based on terrestrial photogrammetric material of Kathmandu Valley at a much larger scale. These have been represented in a series of 16 maps at a scale of 1:10,000.<sup>24</sup> The series represents one of the most detailed maps of the Valley. The contour intervals are at 10 meters with stressed contours at 50 meters. Scarp face and cuttings are shown in black hachures and water bodies are in blue. Woodland and field fences are in green while built-up area is in black. Among the cultural features are also included sites of brick kilns. Bench marks with spot-heights are liberally provided. The use of minimal colours in light tone makes the map useful for variety of planning and research purposes.

<sup>23</sup> 'Kathmandu Valley.' Scale: 1/50 000. Munich, Arbeitsgemeinschaft für vergleichende Hochgebirgsforschung, 1977. See Rudiger Finsterwalder. "The 1:50 000 Edition." In *Kathmandu Valley Maps, 1:10 000 and 1:50 000*. Munich, 1977, p. 15-18.

<sup>24</sup> Arbeitsgemeinschaft für vergleichende Hochgebirgsforschung, 1977. See Erwin Schneider, "The 1:10 000 Edition: Geodetic and Photogrammetric Work." In *Kathmandu Valley*, op. cit., p. 9-13.

# CHAPTER V

## GEOLOGICAL, GLACIOLOGICAL AND GEOMORPHOLOGICAL MAPS



19. Index to geological, glaciological and geomorphological maps

The immense relief contrast and variety of land form in Nepal are the result of diverse geomorphological processes acting over the geological foundation. The geology of the country is much evidenced by thrusts and upthrusts and contortions of reverse folds and nappes.<sup>1</sup> And, of all the thematic maps, geological maps of Nepal are most conspicuous for their variegated colour.

The earliest description on the geology and glaciology of a remote part of Nepal is to be found in Hooker's *Himalayan Journals* dealing with the upper Tamur valley. However, the first published map pertaining to geology of extreme north-east Nepal was prepared by E.J. Garwood who accompanied Douglas Freshfield on a reconnaissance and scientific expedition round Kanchenjunga in 1899. The map of Sikkim including parts of upper Tamur at a scale of one inch to 5 miles has geological details superimposed in red as to the rock type, direction and angle of dip.<sup>2</sup>

In the course of prospecting for economic minerals, the Bureau of Mines and Geology Department of Nepal have covered much of the country but the maps are only in blue print. Similarly, although Toni Hagen began his extensive geological exploration work in 1950, his scientific findings were published only a decade later. The first detailed regional geological map of Nepal was published in 1955. This was the regional map of Everest area by Pierre Bordet and M. Latreille who accompanied the French climbing expeditions to Makalu (8470 m) in 1954 and 1955. Their

comprehensive report includes two geological maps. The geological sketch of Everest and Makalu region at a scale of 1:50,000 makes liberal use of primary and secondary colours.<sup>3</sup> Thus 'young Everest' series is in yellow, Everest-Lhotse band in green, Makalu granite in red and Barun gneiss in pink. Glacier fields and lakes appear in blue, moraines in ochre and old fluvio-glacial terraces in light green. The contour interval is at 500 meters and spot-heights are given in meters. The altitude of Chukhung is given as 4450 m, much lower than in the Schneider maps. The area covered in the map extends between Lingtren (6702 m), Changtse (7547 m) and Chomo Lonzo (7796 m) in the north to Ama Dablam (6800 m), Hongu South Peak (6100 m), Chamlang (7319 m) and Peak VI (6840 m) in the south.

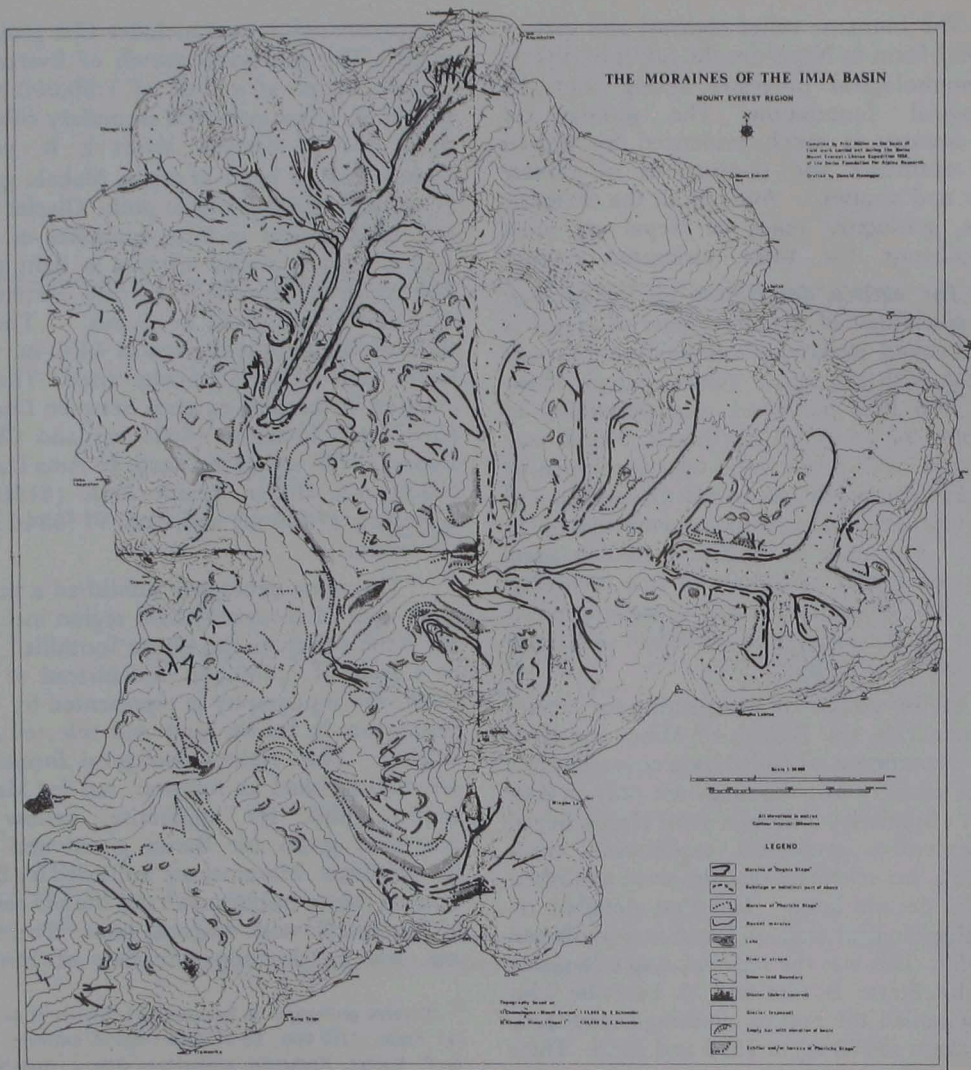
The same geologists published a smaller scale map of Everest-Makalu region including the Arun valley to the Chure foothills.<sup>4</sup> It is at a scale of 1:250,000 and instead of contours, the topography is represented by ridge alignments in brown lines and selected spot-heights. The various geological formations are distinguished as follows: red for Makalu granite, pink for migmatite, yellow for quartzite, green for Barun gneiss and blue for phyllites. Moraines are indicated by black dots on white background and the old terrace of Tumlingtar with diagonal lines. There is a gap left in the upper reaches of Inukhu,

<sup>1</sup> Harka Gurung. "Geological researches in Nepal." *Tribhuvan University Journal*, vol. IV, 1968, p. 6-12.

<sup>2</sup> 'Material for a geological map of Sikkim.' Scale: 1/251 454. By E.J. Garwood. In Douglas Freshfield, *op. cit.*

<sup>3</sup> 'Esquisse geologique de la region de l'Everest et du Makalu.' Scale: 1/50 000. By P. Bordet and M. Latreille. 1958. In P. Bordet, *Recherche geologiques dans l'Himalaya du Nepal, region du Makalu* (1954-55). Paris, Centre National de la Recherche Scientifique, 1961.

<sup>4</sup> 'Esquisse geologique de l'Himalaya de l'Arun et de la Region de l'Everest'. Scale: 1/250 000. By P. Bordet and M. Latreille. 1958. In Bordet and M. Latreille, *op. cit.*



20. *Moraines of Imja Basin (Muller, 1956)*

Hongu, Sankhuwa and Chhoyang rivers while the coverage to the south is more in the nature of a traverse.

The geological findings of Toni Hagen were first reported in 1959 in a long paper entitled "Ueber den Geologischen bau des Nepal-Himalaya"<sup>5</sup> including six maps in the text and 10 other figures. The figures represent three sheets of numerous profiles through the Nepal Himalaya, four geological maps of the Nepal Tarai and three sheets of geological profiles through the Siwaliks. All the maps and profiles are in black and white. They evidence the author's preoccupation in cartographic representation of Himalayan geology although over-burdened with Alpine tectonic theories.

In 1964, August Gansser published a geological map of the entire Himalayas extending from Nanga Parbat (8125 m) to Namcha Barwa (7755 m).<sup>6</sup> The base of the map is the World Aeronautical Chart which has been reduced to a scale of 1:2,000,000. The North-Eastern Frontier Agency area appears as a large blank while the Nepal section is well-covered. Physiographic control is provided by the drainage system in blue. Quarternary deposits of Srinagar and Kathmandu appear as white islands amidst a wide range of rock types represented in variegated colours. Colour scheme varies from ochre of the Pre-Cambrian to blue of the Mesozoic

and yellow of the Tertiary period. Colour representation is supplemented by numerals corresponding to each geologic type. Anticlines are indicated by red line and synclines by black line. Thrusts are shown in black line with directional indications. The inset map covering a much larger area shows rocks by major geological period in colour and superimposed with strike lines in black, and faults and thrusts in red line.<sup>7</sup>

Parts of Dolpo and the area north of Dhaulagiri was geologically mapped by Fuchs in 1964 at a scale of 1:100,000.<sup>8</sup> However, the most interesting area in west Nepal where geologists gravitated was Thak Khola, an impressive trench aligned transverse to the main Himalayan axis. In 1962, a Dutch expedition including some geologists visited Nilgiri but they seemed to have prepared no detailed maps. Pierre Bordet visited Thak Khola with a team of geologists in 1963 and 1966-67 and mapped the area from Dhampu to Chhuk. The map is at a scale of 1:75,000 and physiography is indicated by 250 meter contours in brown as well as drainage system.<sup>9</sup> Glaciated areas are in the form of blue line drawings and the use of strong colours for different rock types present an area of intense geological complexity with rock types varying within a short distance. Bold black lines for faults clearly emphasise

<sup>5</sup> Toni Hagen. "Ueber den Geologischen bau des Nepal-Himalaya mit besonderer Beruecksichtigung der Siwalik-Zone and der Talbildung" in *Bericht ueber die Taetigkeit (Jahrbuch) der St. Gallischen Naturwissenschaftlichen Gesellschaft*, Band 76, St. Gallen, 1959, p. 1-48.

<sup>6</sup> 'Geological map of the Himalayas.' Scale: 1/2,000,000. By August Gansser. In Gansser, *Geology of the Himalayas*, Zurich, Interscience Publishers, 1964.

<sup>7</sup> Tectonic map of the Himalayas and surrounding areas. Scale: 1/100 000. By August Gansser. In Gansser, *op. cit.*

<sup>8</sup> 'Geologische Karte von Dolpo und Dhaul Himal.' Scale: 1/100 000. By Gerhard Fuchs. In Fuchs, *Zum Bau des Himalaya*. Wien, Springer-Verlag, 1967.

<sup>9</sup> 'Esquisse geologique de la Thakkhola (Nepal Central). Scale: 1/75 000. By P. Bordet and others. In Bordet, *Recherches geologiques dans l'Himalaya du Nepal, region de la Thakkhola*, Paris, C.N.R.S. 1971.

the major strike being south-west/north-east. Apart from geological details, the map also has much cultural information such as cultivated area, hamlets, forts, monasteries and stupas.

Toni Hagen first visited Thak Khola in 1952 and published the geological map of the area in 1968. Hagen's map covers a much wider area than that of Bordet and includes the south slopes of Dhaulagiri and Annapurna Himal and extends to the Mustang frontier.<sup>10</sup> The map is drawn at a scale of 1:200,000 and ground control is provided by drainage system, selected spot-heights and place-names. Rock types are grouped into six categories. There is no gradation in colour scheme for rocks within a particular group except for the Tertiary-Cretaceous group in varying shades of green and yellow. However, one can recognise a general pattern of a large expanse of Quarternary-Tertiary series in the upper Kali Gandaki flanked by Mesozoic formations at higher elevations as well as the contact of Tertiary-Cretaceous series and Himalayan Schuppen zone (Hagen's 'Kathmandu nappe') along the main crest-line of Annapurna and Dhaulagiri. The map also provides a complete coverage of Manang valley as it extends east as far as Manaslu II (7835 m).

The results of Hagen's extensive geological researches in Nepal is presented in a geological map of Nepal at a scale of

1:1,000,000.<sup>11</sup> No colour has been used in this map and rock types are differentiated by choropleth shading. Rock types have been grouped into six broad categories. The four groups sandwiched between the Tibetan sediment zone and Tertiary Siwaliks that bear regional names have been subdivided according to geologic period. There are no internal grid and drainage lines and the sole ground reference is provided by initials of selected place-names. The above map is accompanied by two inset maps, one dealing with tectonics and the other showing the root zones and autochthonous zones. Hagen has identified Dadeldhura, Galpha, Pokhara, Tumlingtar and Angbung as para-autochthonous and autochthonous zones south of the Great Himalaya.

Manang area was mapped during 1969-70 by a French team led by P. Bordet. The map scale is 1:75,000 and this geological map represents the eastern extension of the earlier map of Thak Khola by Bordet.<sup>12</sup>

Hagen's solo work on the geology of Nepal during 1950-58 was soon followed up by a team of 15 geologists from Japan. Initiated by the Himalayan Committee of Hokkaido University, the sponsors sent 10 scientific expeditions to Nepal between 1955 and 1970. Their comprehensive report on the geology of the Nepal Himalaya includes a geologic map of Nepal in two sheets.<sup>13</sup> The

<sup>10</sup> 'Geological map of the Thakkhola (Nepal-Himalaya).' Scale: 1/200 000 By Toni Hagen. In Hagen, *Geology of the Thakkhola including adjacent areas* (Report on the geological survey of Nepal, vol II). Zurich, 1968.

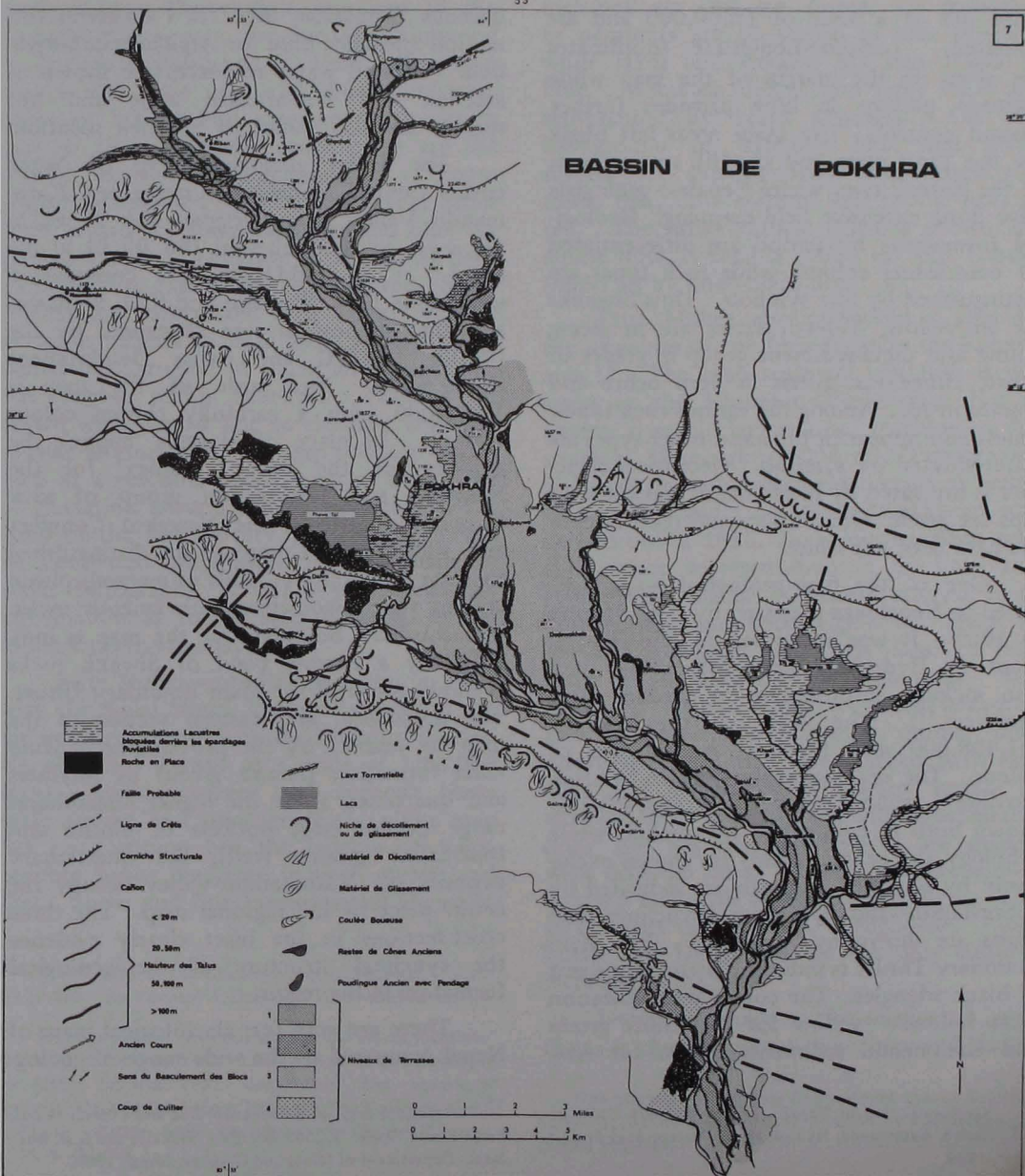
<sup>11</sup> 'Geological map of Nepal.' Scale: 1/100 000. By Toni Hagen. In Hagen. *Report of the Geological Survey of Nepal*, Vol. 1, Zurich, 1969. Hagen's field methods in geological survey and mapping are described in "Route-Mapping and Topographical Surveys with the Aid of Photographs." in

*Route-Mapping and Position locating in Unexplored regions* by Wilhem Filchner, Erich Przybyllok and Toni Hagen. Basel, 1957, p. 249-76.

<sup>12</sup> 'Esquisse geologique, Nyi-shang (Nepal central)'. 'Scale: 1/75 000. By P. Bordet and others. Paris, C.N.R.S., 1971.

<sup>13</sup> 'Geologic map of the Nepal Himalayas.' Two sheets. Scale: 1/500 00. In Yoshihide Ohta and Chikara Akiba (editors). *Geology of the Nepal Himalayas*, Sapporo, 1973.





21. Pokhara Valley (Dolfuss, 1971)

maps are at a scale of 1:500,000 and are coloured. Latitude-Longitude coordinates are given on the margin of the map while drainage pattern in blue provides further ground control. The main areas left blank are the Tarai plain and the Hill section west of the Karnali river where Nepalese geologists have done extensive field mapping. Geological formations by period are differentiated by contrasting colours while rock types are distinguished by line symbols. Thus Siwaliks are in yellow, Tibetan series are in green, young and meta-sediment group in grades of ochre, Himalayan gneiss in deep ochre and granite in red. Among the various rock types, limestones appear in blue and other types are differentiated by symbols. Geological structure is indicated by fault lines in black but no dips are given. Quarternary and recent deposits have been left white.

One of the first geological maps published in Nepal was prepared by C.K. Sharma in 1969. It was sponsored by the Department of Hydrology and Meteorology and also includes information on ground water resources.<sup>14</sup> The scale of the map is 1:1,408,000 and there is modest use of colour. The drainage system drawn in black provides ground control. Stratigraphy is shown both in colour and by symbols while lithology and general fossils are shown exclusively by symbols. Minerals are indicated by abbreviation and anticlines, synclines and faults are shown by black line. The Main Boundary Thrust is indicated by an alignment of black triangles. The colour representation is as follows: yellow for the Chure group and Kathmandu sediments, ochre for Are-

naceous formation, blue for Calcareous formation and light blue for Argillaceous formation. Ground water resources are shown as artesian and non-artesian zone and hot springs are also indicated by their location.

The latest geological map of Nepal covers Central Mahabharat range and Kathmandu Valley from Devghat (84 25 E) in the west to Sindhuligarhi (86 00 E) in the east.<sup>15</sup> The field-work and compilation were done by J. Stocklin and K.D. Bhattarai and the publication was sponsored by the UNDP, UNOTC and Swiss Development Cooperation. The scale of the map is 1:250,000 with a carefully chosen colour scheme. In place of Hagen's 'nappe', the authors use the term 'complex' for the Nawakot and Kathmandu group of rock formations. Thus, the Nawakot Complex and Kathmandu Complex are distinguished by their stratigraphy, grade of metamorphism and in their association with igneous rocks. The southern boundary of the map is indicated by a narrow band of Siwalik rocks (yellow) south of the Main Boundary Thrust. The north-west and eastern section of the map are marked by the provenance of Kunchha formation (lemon green) of phyllites and quartzites, while the higher Mahabharat range exhibit large pockets of biotite and tourmaline granite (red), the quarternary deposits of Kathmandu Valley occupy the centre-piece of the regional map. The three cross-sections in the inset clearly evidence the synclinal structure of the geological formation in the region.

There are very few glaciological maps of Nepal compared to the wide range of geolog-

<sup>14</sup> 'Geological map of Nepal'. Scale: 1/1 408 000. By C.K. Shama. Kathmandu, Hydrology and Meteorology Department, 1969.

<sup>15</sup> Geological map of Kathmandu area and Central Mahabharat Range' Scale: 1/250,000. By J. Stocklin and K.D. Bhattarai. Department of Mines and Geology, Nepal, 1980.

gical maps. The earliest one was of the Kangchenjunga area surveyed by Garwood in 1899 and published in 1903. The map drawn at a scale of 1:125,000 covers large tracts of Sikkim and extreme north-eastern part of Nepal and the centre-piece are the glaciers around Kangchenjunga.<sup>16</sup> Topography is indicated by hill-shading that varies from brown for lower sections and blue for glaciated areas. Drainage is shown in deep blue and the expedition route in red. Spot-heights are categorized into three: Survey of India heights in bold face, heights ascertained by Garwood in italics and miscellaneous heights within brackets. Glaciers are drawn with curved line to simulate contours as well as moraines. The map possibly can be used as a reliable bench-mark of the extent of glaciation around a high mountain at the close of the last century. If the map could be compared with more modern maps or aerial photographs, it could yield scientific information as to the rate of glacial retreat in the Eastern Himalaya.

Fritz Muller visited Everest area in 1956 with the Swiss Mount Everest Expedition and did intensive research on the Khumbu Glacier. He compiled a map at a scale of 1:50,000 from previous sources and author's plane table survey and photographs.<sup>17</sup> The map has no contours but the heights of neighbouring peaks are given in both meters and feet. Snow and firm, crevasses and ice walls,

melt-hollows and ice slopes, ice pinnacles or penitents are all shown in blue symbols while lakes and streams are also drawn in blue. Moraines, debris, and scree slides are represented by black symbols. On this background of basically blue and black surface are superimposed observation stations, theodolite stations and profile lines in red. The only cultural features shown are alpine huts at Dughla (4620 m) and Lobuje (4936 m) by small black box.

Fritz Muller also published a map of the moraines of the Imja Basin in the Everest area.<sup>18</sup> The map scale of 1:50,000 is the same as the Khumbu Glacier map but it covers a much larger area, reaching as far south as Thamserku (6608 m). Topography is based on earlier Schneider maps at scales of 1:25,000 and 1:50,000 and field-work was carried out in 1956. No colour has been used and object representation is by lines and symbols in black. Contour interval is at 200 meters and spot-heights are given in meters. Moraines have been classified into three groups according to their stage. Moraines of "Dughla Stage" are drawn in dotted line and recent moraines in thinner line. Exposed glacier areas are marked with fine dots and debris-covered glaciers appear as dark patches. Lakes appear with hypsometric lines and old moraine terraces are shaded with diagonal lines. Empty 'Kar' are shown as scarp face with elevation of the basin. The settlements of Phortse, Tengboche, Pangboche and Dingboche are the only cultural elements in the map.

Geomorphology or the science of land-forms is closely related to geology and glacio-

<sup>16</sup> 'Sketch map of the Glaciers of Kangchenjunga.' Scale: 1/125 000. By Edmund J. Garwood. In Freshfield, *op. cit.*

<sup>17</sup> 'Khumbu Glacier with side glaciers and recent moraines.' Scale: 1/50 000. By Fritz Muller, Zurich, Swiss Foundation for Alpine Research, 1957. See Muller, "Eight months of glacier research in the Everest Region." *The Mountain World*, 1958/59. Zurich, Swiss Foundation for Alpine Research, 1958, p. 191-208.

<sup>18</sup> 'The moraines of the Imja Basin, Mount Everest Region.' Scale: 1/50,000. Compiled by Fritz Muller and drafted by Donald Honnegar.

logy but very little research has been done in this field in Nepal. One of the first geomorphological survey work in Nepal was made by Olivier Dollfus and Pierre Usselmann in West-Central Nepal.<sup>19</sup> Their report includes geomorphological maps of Trisuli, Arughat, Tarkughat, Pokhara Valley and Kusma, all samples of river terraces. They however include one map of Siklis representing an area of rugged topography south of the main Himalayan massif. The map of the largest of these intermont basins, Pokhara, is shown with four different terrace levels. Another geomorphological work, also initiated by Centre National de la Recherche Scientifique, was done by Monique Fort in upper Burhi Gandaki.<sup>20</sup> In contrast to the tropical valleys studied by Dollfus and Usselmann, this later work deals with high altitude area and particularly with reference to quaternary formations and periglacial forms. The profusely illustrated report includes geomorphological maps of Sama basin, Samdo confluence and high valleys of Gya and Larkya. A recent geomorphological map of Langtang valley prepared by P. Usselmann also deals with a high Himalayan valley.<sup>21</sup> Drawn at a scale of 6 cm to 4 km, the map covers the area between Syabrubensi and about seven kilometers north-east of Langshisa. A combination of 38 symbols

and shades depict topographic, hydrographic, structural, glacial and proglacial forms along with indications of some processes on slopes. Successive front stages of the Langtang glacier are identified at six places: the lowest at about three kilometers east of Syarpagaon and highest at about four kilometers west of Langshisa. Legends are given in both French and English.

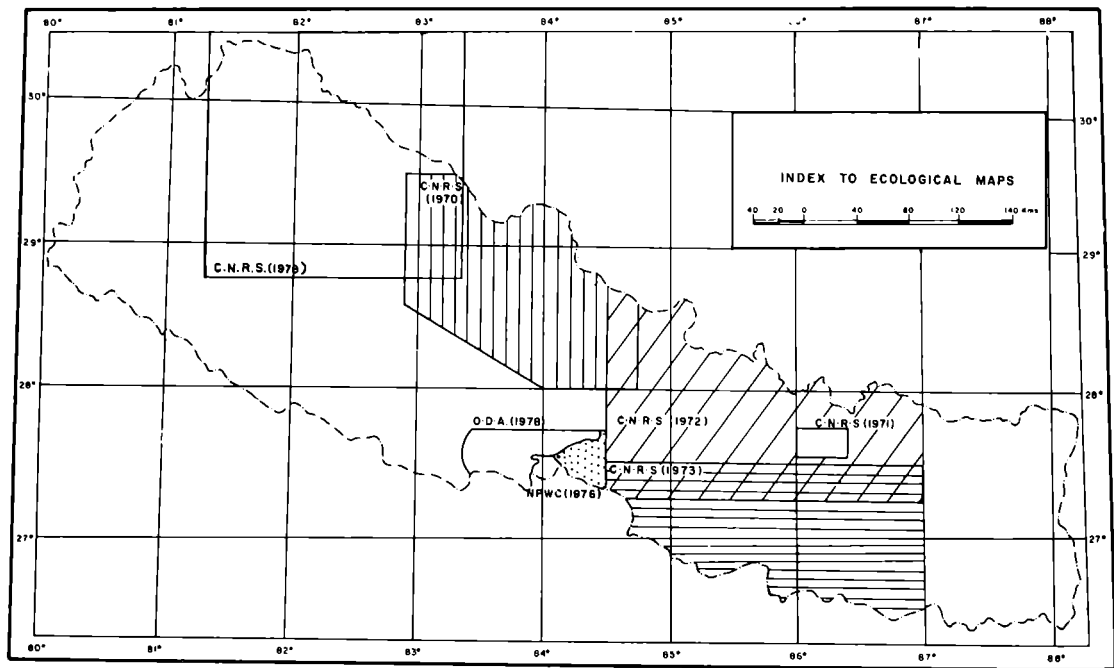
<sup>19</sup> Olivier Dollfus & Pierre Usselmann. *Recherche Geomorphologique dans le Centre-Ouest du Nepal*, C.N.R.S., Paris, 1971.

<sup>20</sup> Monique Fort. *Etudes sur le Quaternaire de l'Himalaya la haute vallee de la Buri Gandaki, Nepal*, C.N.R.S., Paris, 1979.

<sup>21</sup> P. Usselmann, "Cartographie geomorphologique et evolution Quaternaire d'une haute vallee Himalayenne: le Langtang." *Revue de Geomorphologie Dynamique* (Paris), Tome XXIX, no. 1, 1980, p. 1-7.

# CHAPTER VI

## ECOLOGICAL MAPS



22. *Index to ecological maps*

The term ecology has outgrown its early exclusive connotation with plant association and adaptation and now pertains to a much wider dimension. Therefore this section deals both with vegetation maps as well as population maps that represent an aspect of human ecology.

The first comprehensive vegetation map of the entire Himalayan range was compiled by U. Schweinfurth.<sup>1</sup> The map was originally prepared at a scale of 1:1,000,000 and published at a reduced scale of 1:2,000,000. Although the compilation was mainly from secondary sources, Nepal section is well covered except in parts of Western Nepal. The vegetation types with special reference to physiognomic appearance are indicated in different colours. There is obvious contrast in the 'colourful' aspect on the southern slopes of the main range and dull uniformity to the north of it.

Another map of the Himalayas with biogeographical emphasis was compiled by Carl Troll<sup>2</sup>. The map at a scale of 1:6,700,000 covers the entire Himalayan range and Tibet Plateau and drainage system is well represented. Areas of permanent snow cover on high ranges are shown in bold black lines. The Himalayas have been subdivided into regional sections each bounded with a red line and differently shaded in red. Nepal east of Dhaulagiri is included in the

Sikkim Himalaya (East Himalayan-type) and the western half of the country in Garhwal Himalaya (Western Himalayan-type). Dry inner valleys in Nepal is shown only in the middle section of the Karnali river. Of the six areas indicated for detailed regional mapping covered with terrestrial photography, Khumbu Himal is referred in the Nepal section.

The best ecological maps of Nepal have been prepared by Centre National de la Recherche Scientifique, Paris. The method of vegetation mapping is that of the Grenoble phytogeographical school and with liberal use of colour and symbols for each isopotential area. The approach is holistic and thus some maps also include cultural features in the landscape. The maps in the series except that of Jiri-Thodung area are at a scale of 1:250,000 and topography is based on the U.S. Army map series. Each map draws on materials from earlier sources in the area and is the joint product of an interdisciplinary team. Five of these maps are described below.

The first in the series is that of the Annapurna-Dhaulagiri area compiled by J.P. Dobremez and C. Jest.<sup>3</sup> The map has a contour base at an interval of 2,500 feet and heights are given in feet. Although Tilicho lake has been inserted, the ridge connecting Annapurna I and Annapurna South remains uncorrected and is represented wrongly as in the older survey maps. The same applies to the head of Ngadi Khola (Musi Khola) which is wrongly shown as emanating from Manalsu instead of Peak 29. Rock drawings for free-facing slopes are also according to the older

<sup>1</sup> 'Die horizontale und vertikale Verbreitung der Vegetation im Himalaya.' Scale: 1/2 000 000. By Ulrich Schweinfurth. In Schweinfurth, *die horizontale und vertikale Verbreitung der Vegetation im Himalaya*. Bonner geographische Abhandlungen, Heft 20, Bonn, 1957.

<sup>2</sup> 'Die Klimaökologische Gliederung des Himalaya.' Scale: 1/6 700 000. In Carl Troll, "Die Klimatische und vegetation geographische gliederung des Himalay system." *Khumbu Himal*, Band 1, Lfg. 5, 1967, S. 353-388.

<sup>3</sup> 'Carte écologique de la région Annapurna-Dhaulagiri (Nepal).' Scale: 1/250 000. J.P. Dobremez & C. Jest, C.N.R.S., Paris & Grenoble, 1970.



Quarter Inch maps. Vegetation types shown in 29 different colours and symbols have been placed under five broad groups. Each colour is given ecological meaning such as blue for moist, red for heath, green for temperate, yellow for aridity and brown for rich organic soil. The basic pattern of this particular map is that of a compact belt of barren high ground sandwiched between the xerophytic zone in the north-west and moist tropical zone in the south-east. Conspicuous areas in the map are the open Cedar-Cypress in Dunaihi valley, Pine-Cypress of Panchgaon and Pine-Juniper of Dhorpatan and Manang. The map is super-imposed with cultural features such as tracks, place-names and culture areas indicated by language, ethnic groups and caste. However, there is no distinction in the style of lettering for area names and ethnic groups. Two interesting elements of material culture are also shown by the southern limit of flat roof and northern limit of paddy cultivation.

The second in the series is the map of Jiri-Thodung region but it differs greatly from the other four both in methodology and presentation.<sup>4</sup> It is at a scale of 1:50,000 and deals with land use in greater detail. The map is based on topographic as well as aerial photographic sources, has contour intervals of 200 meters and all heights are in meters. There are 33 colour and symbol combinations ranged into six ecological levels. Of these 21 refer to vegetation types. Sub-Himalayan forests are shown in green and Sub-Tropical forest in yellow. Also shown are agricultural and pastoral zones, their shades varying according to elevation. Im-

portant places, hamlets and tracks are shown but there are no indications on ethnic and cultural areas in this map as in the Annapurna-Dhaulagiri one. The deep trench of Tamba Kosi is well-expressed by the extreme intrusion of the tropical *Shorea robusta* forest even north of Dolakha.

The Kathmandu-Everest map, the third in the series, in fact covers a much wider area including large tracts in west Nepal as far as Manaslu and parts of Chitawan.<sup>5</sup> The scale is 1:250,000 and contour interval is of 2,500 feet as in the Annapurna-Dhaulagiri map. Nine ecological levels are distinguished and these have been further classified into 48 sub-zones and vegetation types, each with a different colour and symbol. The higher levels are related to brown colour, the temperate level in green and deeper colours for sub-tropical and tropical levels. No cultivated areas have been shown as in the Jiri-Thodung map and neither are shown ethnic distribution as in the Annapurna-Dhaulagiri map. Apart from tracks in brown, motorable roads in black, other cultural features shown are the northern limit of buffalo and respective southern limits of yak and hybrid *dzo*.

The fourth ecological map in the C.N.R.S. series is the map of Central Tarai.<sup>6</sup> The scale is 1:250,000 and the contour interval is at 500 feet in the plain and 2500 feet in the hills. Although the altitudinal range represented in the map does not exceed 10,000 feet, the map has a wider range of

<sup>5</sup> 'Carte econogique du Nepal. Region Kathmandu-Everest.' Scale: 1/250,000. Compiled by J.F. Dobremez and others. Cartographic design by J.P. Guichard. C.N.R.S., Paris and Grenoble, 1972.

<sup>6</sup> 'Carte Ecologique du Nepal. 'Region Tarai Central' Scale: 1/250 000. Compiled by J.F. Dobremez and J.P. Guichard, C.N. R.S., Paris and Grenoble, 1973.

<sup>4</sup> 'Carte ecologique de Nepal. Region Jiri-Thodung.' Scale: 1/50 000. By J.P. Dobremez and others. C.N.R.S., Paris and Grenoble, 1971.

colour symbols. There are 75 different colour symbols to represent various phenomena in the landscape and of these 58 pertain to vegetation type. Other symbols represent cultivated area at different ecological levels. Temperate forests appear only in the north-east corner of the map, the Inner Tarai is a gray tropical zone and the Tarai plain is shown as a continuous belt of cultivation. Tracks are shown but not the Mahendra Highway while cultural information as to ethnic and caste groups are given only in the legend.

*Libreria Alpina*<sup>7</sup> lists two other maps in the series: that of Biratnagar-Kangchenjunga at a scale of 1:250,000 and Ankhul Khola-Trisuli at 1:50,000. The latest in the French ecological series is 'Carte Ecologique du Nepal, Jumla-Saipal' published in 1978. The map covers an area of 23,000 square kilometres from Talkot in the west to Kagkot in the east, north of Dhaulagiri.<sup>8</sup> Since the ecological details have been plotted on the U.S. Army Map Service series, the topographic errors of the older maps have been carried over. Thus the altitude of the region around Phoksumdo Tso exceeds by 500 meters from those of later, more realistic, surveys and the south-easterly bend of the Humla-Karnali near Simikot (81° 45' and 30° 00' N) actually occurs seven kilometres east of the point than that shown on the map.<sup>9</sup> Vegetation types on the basis of species dominance

have been classified into 36 types each with a distinct colour symbol. These then have been grouped into Upper Tropical, Sub-tropical, Collinean, Montane, Subalpine, Alpine and Nival levels. The south-western quarter of the map is dominated by laurel-oak (green) and oak (lemon green) forests while Dolpo appears as a yellow expanse of Caragana-Lonicera steppe. The tropical riverain forest makes a deep intrusion up the Karnali valley as far north as the confluence of the Humla-Karnali and Mugu-Karnali rivers. Cedar forests are prominent in three pockets: north slope of Malika Lekh near Sinja, along the south side of Tila valley from Chilkha to Giri Khola and Bheri valley around Dunaihi.

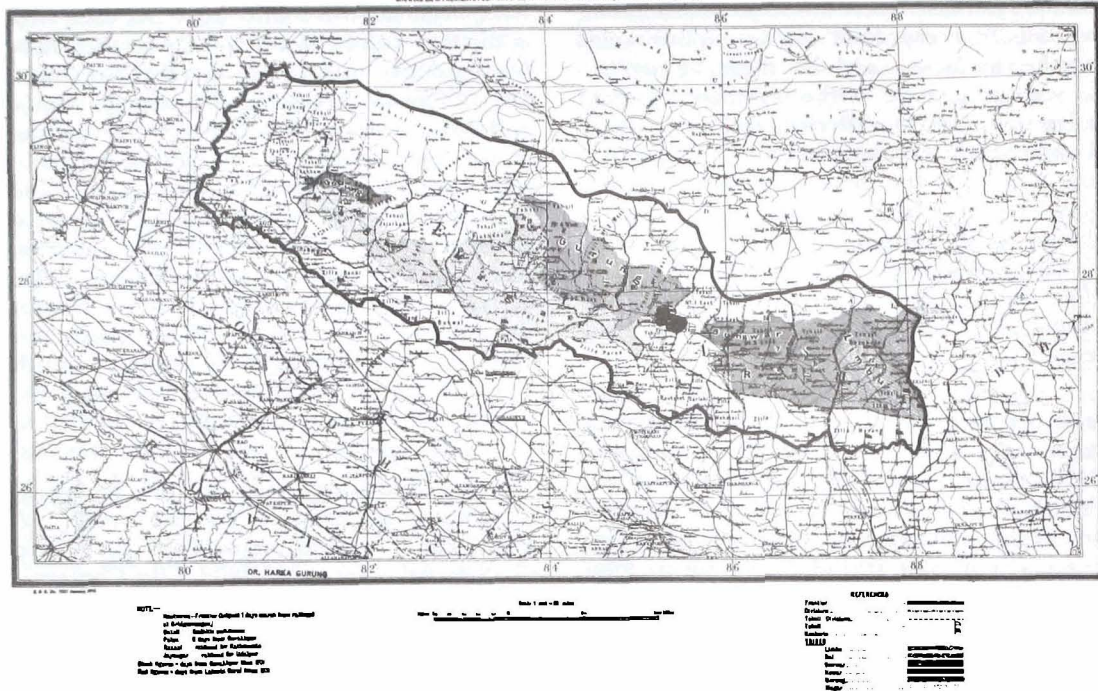
An interesting map in the ecological category is the map of Royal Chitwan National Park. It was prepared by the Office of National Parks and Wild Life Conservation and published by Tiger Tops in 1975.<sup>10</sup> The map is at a scale of 1:100,000 and has no grid reference. The contours are at intervals of 500 feet and the nature of the topography is further indicated by the drainage system which is fairly detailed. Important rivers are shown in blue and the small tributaries in black. Forest areas outside the Park are shaded with green diagonal lines while cultivated areas and settlements are in yellow diagonal lines. The Park area has been delimited by a bold black line. The area within the Park has been further classified into sal forest (green), sal forest with chir pine (blue), savannah grassland (yellow), riverain forest (brown) and Khair-Sissoo forest (grey). Varieties of wild life are pictorially shown on the map according to their natural habitat.

<sup>7</sup> *Libreria Alpina, op. cit.*, p. 154.

<sup>8</sup> 'Carte Ecologie Du Nepal: Region Jumla-Saipal'. Scale: 1:250,000. Compiled by J.F. Dobremez and T.B. Shrestha, Grenoble, 1978. The explanatory text to the map was published by C.N.R.S., Paris in 1980.

<sup>9</sup> Harka Gurung. *Vignettes of Nepal*, Kathmandu, 1980, p. 96.

<sup>10</sup> 'Royal Chitwan National Park. Information map.' Scale: 1:100,000. Kathmandu, Tiger Tops Pvt. Ltd. 1976.



### 23. Ethnographic map of Nepal (1915)

The cultural features shown are main roads and tracks in brown, airfields, Park office and entrance-points and the site of Tiger Tops Jungle Lodge and its extension Tented Camp in black. On the reverse side of the map is a useful introduction to the Park.

In contrast to the wide range of geological and vegetation maps, there are only few maps in the area of ethnogeography. The first attempt to define the extent and distribution of various ethnic groups of Nepal was published in 1915. The handbook on *Gurkhas* revised by B.U. Nicolay includes a map of Nepal showing the distribution of some

tribes.<sup>11</sup> The map has choropleth shading in red indicating areas of Limbu, Rai, Sunuwar, Gurung and Magar tribes. Based as it was on the information of the Gurkhas in service and their recruiting officers, the map is fairly reliable in the eastern and western hills from where most men were drawn. In the far west, on the other hand, the extent of Magar and Gurung areas are somewhat exaggerated.

The revised edition of the handbook *Gurkhas* by C.J. Morris published in 1933 and reprinted in 1936 included a map showing

<sup>11</sup> Vansittart and Nicolay, *op. cit.*

the distribution of tribes superimposed on the 'Skeleton map of Nepal.'<sup>12</sup> Although the base map is more reliable and the various tribal areas are distinctly coloured, the information is the virtual reproduction of the 1915 map referred in the foregoing paragraph. The colour scheme is constrasting and clear: pink for Limbu, green for Rai, violet for Sunuwar, yellow for Newar, red for Gurung, and blue for Magar. The Gurung area is overextended to the east as far as Nawakot while in fact Ankhu Khola is their eastern boundary. The map also shows a large chunk of Gurung territory north of Dailekh although they are found in only a few villages near Dailekh Bazar. Similarly, if the Magar extension west of Sallyan is doubtful, their extension east of Dev Ghat is a wrong intrusion into the Chepang and Tamang area.

The earlier series of army handbooks on Gurkhas was renovated in the form of *Nepal and the Gurkhas* in 1965. The revised book also includes a small-scale map of Nepal showing tribal areas in colour.<sup>13</sup> The basic design is according to the 1915 map but the Newar group has been excluded from the tribal list and Dailekh is shown as a non-tribal area. The colour scheme is different from the 1933 map. Although Limbu area remains pink, Rai area is lemon, Sunuwar area orange, Gurung area blue and Magar area yellow. The main changes from the 1933 map are the shrinking of Sunuwar area, retreat of the Gurung area from the east to Trisuli River and south of Annapurna in the north, and retreat of Magar area from Chisapani and Mustang but with new extension into Gorkha.

<sup>12</sup> Morris, *op. cit.*

<sup>13</sup> 'Sketch map of Nepal'. Scale: 1 inch to 40 miles. In Ministry of Defence (U.K.), *Nepal and the Gurkhas*, H.M.S.O., London, 1965.

A useful map related to the field of human ecology was prepared by the Geography Instruction Committee which dealt with distribution of population.<sup>14</sup> It was sponsored and published by the National Planning Commission in 1974 to mark the World Population Year. The scale of the map is about 1 inch to 18 miles and there is sparing use of colour. The administrative boundaries and main information are in black, district names in blue and urban areas in red circles. The population distribution based on the Census of Population of 1971 is shown by dot method for rural areas. The dots are of three scales corresponding to 100 persons, 500 persons and 1000 persons while urban population is shown by proportional circles ranging from 6,500 persons to 150,000 persons. An small inset of topography and drainage is given to explain the pattern of population distribution.

An interesting map relating both to ecology and specific area planning was prepared by the Overseas Development Administration (U.K.) in 1974.<sup>15</sup> The physical land suitability map of Nawal-Parasi district is drawn at a scale of 1:63,360 and incorporates much local detail on land use, soil groups and geomorphology on the basis of large-scale maps, aerial photographs and field surveys.

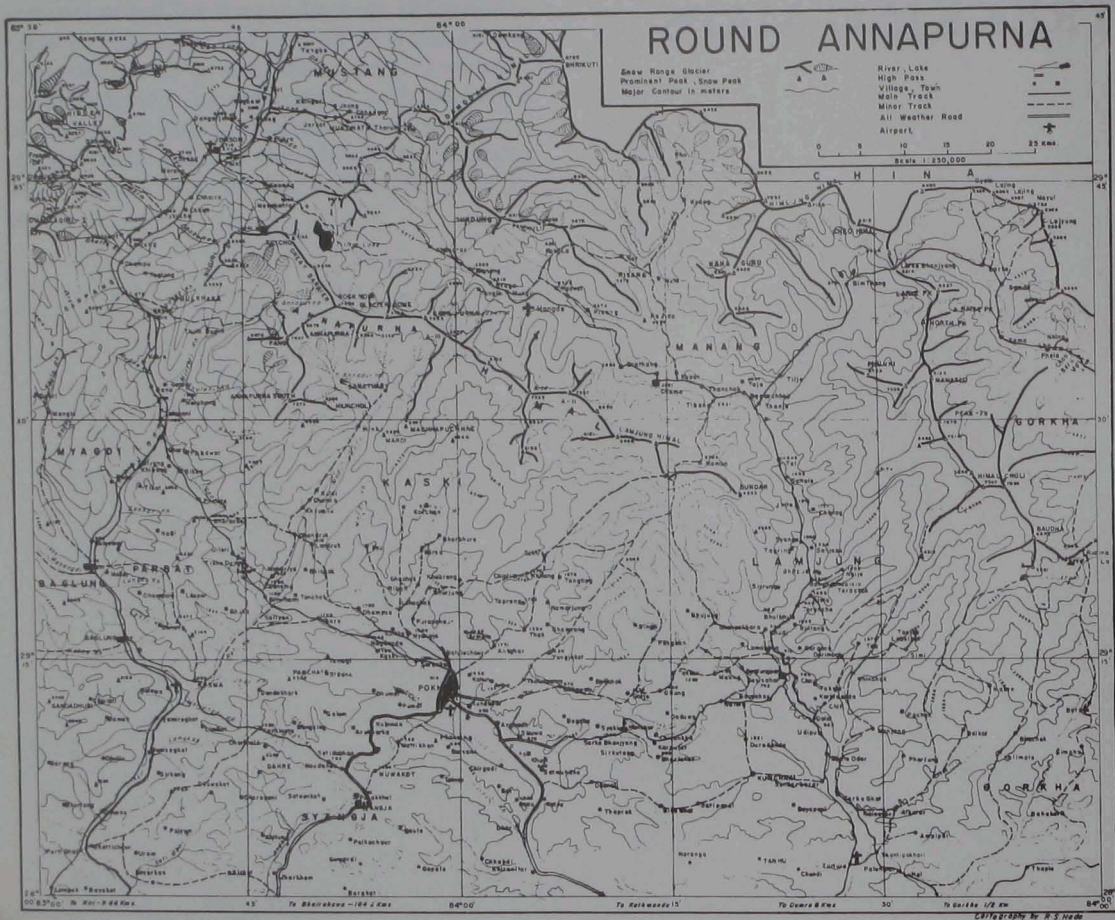
<sup>14</sup> 'Nepal, Distribution of Population (1971).' Scale: 1 inch to 18 miles. By Geography Instruction Committee, Tribhuvan University. Kathmandu, Central Bureau of Statistics, 1974. Subsequently, the Geography Instruction Committee also prepared a 'Land use map of Nepal' (One Inch to 8 miles) for the National Planning Commission but this map was not published.

<sup>15</sup> 'Physical land suitability. Nawal - Parasi Project Area, Nepal.' Scale: 1/63,360 (approx.) In Land Resources Division/Overseas Development Administration (U.K.), *Development Potential of the Nawalparasi Area of Nepal*. Surbiton, 1974.

Contours are given in light colour at intervals of 500 feet. Soils have been grouped into 10 classes according to their location. Their characteristics are indicated by numerals while land suitability of categories have been given in different symbols. The only colour used is green, in four categories, to delineate areas of (i) wooded alluvium suitable for intensive irrigated settlement, (ii) wooded terraces suited for tea production, (iii) wooded terraces suited for tea as well as settlement if domestic water is provided, and (iv) wooded terraces suited for settlement with provision of domestic water. Cultural features shown on the map include the Mahendra Rajmarg, minor roads and tracks, and existing settlements.

# CHAPTER VII

## TREKKING MAPS



24. Round Annapurna map (Gurung, 1980)



Since topographical maps at large and medium scale were not easily available, early climbing expeditions and later trekkers had to rely on copies and adaptations from older maps. The first trekking map published in Nepal for commercial purpose was that of Annapurna-Dhaulagiri area.<sup>1</sup> It was compiled by the present author on the basis of existing topographical maps and his travels in the area. The map scale is 1:250,000 and general topography is derived from the U.S. Army map series. Where available, particularly on the high ranges of Annapurna and Dhaulagiri, topographic details and new heights were derived from the new One Inch (1:63,360) maps. For example, the western section of Annapurna Himal and Tilicho lake were corrected on the basis of these maps. Topography is shown with bold black lines for snow ranges and punctuated with numerous high-points in black triangle and heights in feet. Other spot-heights are also supplemented in lower regions, including the 10,000 feet contour in black dotted line. Selected place-names with their altitude in feet are also shown in black. Glaciers, lakes and rivers are represented in blue colour. All cultural features such as motorable road, major and minor tracks and village sites are shown in red. The map was reprinted in 1970 and revised in 1972.

The second trekking map was published in 1970 and covers the area north of Kathmandu.<sup>2</sup> This was also compiled by the present author following the pattern of the

Annapurna-Dhaulagiri map using three colours. Snow ranges are indicated by black bold lines, selected peaks in open triangles and spot-heights in feet. The topographic sketch in upper Langtang Valley has been left incomplete and only the 10,000 feet contour is shown. Glaciers, lakes and rivers are indicated in blue and settlement sites, communication system including airstrips are in red. In comparison to the Annapurna-Dhaulagiri map, this map has a higher density of village names.

A trekking map for Everest area was published by Rene de Melleville in 1974.<sup>3</sup> It covers virtually the same area as that of the Khumbu Himal map by E. Schneider (1968) but the scale is reduced to 1:100,000. High ridges are indicated in bold black line, peaks in black triangle and heights in meters. Contour lines of 3,000, 4,000, 5,000 meters are shown in red broken lines. Settlements have been categorised into black box for permanent ones and white box for summer ones. Apart from bridge-points, other features of cultural interest such as *gompa* or *chorten* are indicated with abbreviated letters. A small inset of Pharak region shows the track between Lukla and Namche. There is much improvement in the second edition of the above map.<sup>4</sup> Though the scale and legend are based on the earlier map, there is more clarity. The boundary of the Sagarmatha National Park has been shown by an alignment of red stars while the previous inset of the Pharak region has been replaced by one

<sup>1</sup> 'Annapurna and Dhaulagiri Himal.' Scale: 1/250 000. Compiled by Harka Gurung and drawn by International Graphic Art. Kathmandu, 1968.

<sup>2</sup> 'North of Kathmandu, Langtang, Gosainkund & Helmu.' Scale: 1/250,000 Compiled by Harka Gurung and drawn by International Graphic Art, Kathmandu, 1970.

<sup>3</sup> 'Khumbu. Mount Everest.' Scale 1/100 000. By Rene de Milleville. In "The Khumbu Map", *Kailash*, vol I, no. 4, 1973, P. 245-46.

<sup>4</sup> 'Khumbu: Mount Everest (Sagarmatha National Park). Trekking Map.' Scale: 1/100,000. By Rene de Milleville. Published by Sherpa Trekking Service, Kathmandu, 1981.



of Namche-Khumjung area with the Shyangboche airstrip in the centre. On the reverse side of the map are given information on the Sagarmatha National Park, local flora and fauna and hints to trekkers both in English and French.

A series of trekking maps by Christian Kleinert was published in Germany in a handy volume.<sup>5</sup> The scale of maps vary from 1 cm to 5 kilometers and 1 cm to 2½ kilometers and one of the Chukhung-Island Peak trek is at 1 cm to 1 kilometer. The maps are drawn in outline form with main ridges in black and rivers in blue. The routes are shown in broken red lines with stages in red dot and stops indicated by red numerals. Important peaks and passes are shown with heights in meters. Apart from the map, each trek includes a route description supplemented with photographs including some good panoramic views.

Of the numerous trekking maps published recently one series has been issued by Himalayan Trekking Map. The series covers all the three important trekking areas: Everest, Langtang and Annapurna. The map of the Everest trek is at a scale of 1 inch to 2½ miles and covers most of Rolwaling and Khumba Himal.<sup>6</sup> The map background is in

ochre colour with black line drawings. Contour interval is 1,000 feet and spot-heights are given in feet. Rivers and place-names are also in black. Roads, tracks, air strips and important places along the route are in red. Location of guest houses, shops, check-posts and other features of interest to the tourists are indicated by abbreviated letters. In the inset also appear a useful table of places on the route with their heights and travelling time in-between the points.

The second map concerning Gosainkunda-Helambu-Langtang area covers virtually the same area as the 'North of Kathmandu' map of 1970 by Gurung. The scale is similar to the Lamosangu-Everest map (1 inch to 2½ miles) but the map background is yellow.<sup>7</sup> Contour interval is 1,000 feet and spot heights are given both in feet and meters. Lakes and rivers are shown in black while roads, tracks and important staging-points are shown in red. There is a small inset showing the trekking route between Sundarjal and Helmu area.

The third map in the series covers Pokhara, Jomosom, Muktinath and Manang area.<sup>8</sup> The map background is white and the scale is about 1 inch to ¾ miles. Contour interval is 1,000 feet and spot-heights are both in feet and meters. The ridge joining Annapurna I and Annapurna South is correctly shown and so is the location of Tilicho lake. Glaciers are prominently shown in blue. Highways are in double black lines and tracks and passes in red. All place-names except Pokhara, Jomosom and Manang (in

<sup>5</sup> Christian Kleinert, *Nepal Trekking, BV Tourenblatter*, Munchen, Bergverlag Rudolf Rother, 1975. The areas mapped are:

(1) Helambu-Gosainkund, (2) Langtang-Ganja La, (3) Kathmandu-Solu-Lukla, (4) Mount Everest Region - I, (5) Mount Everest Region - II, (6) Rolwaling-Trashi Lapcha, (7) Arun Valley, (8) Pokhara-Kathmandu, (9) Round Manslu, (10) Ghanpokhara-Namun Pass, (11) Annapurna Base Camp-Tent Peak, (12) Kali Gandaki Valley, (13) Round Dhaulagiri, (14) Rara Lake-Sisne Himal-Chaubise and (15) Dolpo.

<sup>6</sup> 'Lamosangu to Everest. Khumbu & Rolwaling Himal.' Scale: 1/158, 4000. Kathmandu, Himalayan Trekking Map, 1979.

<sup>7</sup> 'Gosainkund-Helambu-Langtang. Scale: 1/158 400, Kathmandu, Himalayan Trekking Map, No date.

<sup>8</sup> 'Pokhara-Jomosom-Muktinath-Manang.' Scale: 1/158 4000. Kathmandu, Himalayan Trekking Map, no date.

red) are given in black. The map also includes two insets; one is a small scale map of Dhaulagiri Himal and the other of Pokhara town.

A recent travel book on Nepal includes many maps at small scale showing trekking routes in remote areas of the country.<sup>9</sup> The route maps are drawn on the basis of various map sources and supplemented by the author's travels. The areas covered include seven from the far west, four from the western region, three from the central region and four from the eastern region. The scale of the maps range from 1 cm to 2 kilometers and 1 cm to 4 kilometers.

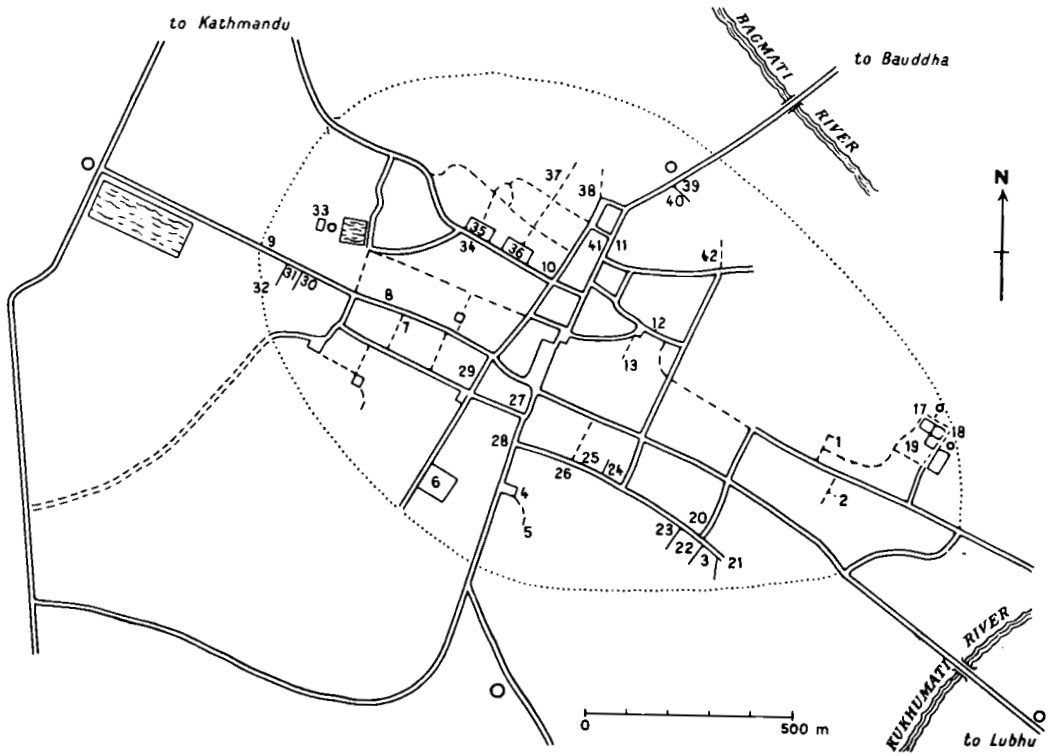
A recent trekking map, covers the area between Dhaulagiri main peak to Rupina La and deals with the entire Annapurna range, Manaslu-Himalchuli group and sections of Kali-Gandaki and Marsyangdi valleys.<sup>10</sup> The map scale is 1:250,000 and four colours have been used. Mountain ridges, place-names and heights in meters are in black. Glaciers, lakes and rivers are in light blue while settlement sites, roads, and tracks are in red. Contours at an interval 2500 feet are shown in light brown. Topography of high mountains and their heights are based on the latest One Inch maps.

<sup>9</sup> Harka Gurung. *Vignettes of Nepal*. Kathmandu, Sajha Prakashan, 1980. The areas represented are: (1) Baitadi, (2) Dang to Jumla, (3) Mugu, (4) Chaudbise and Kagmara, (5) Phoksumdo and Dhorpatan, (6) Northern Humla, (7) Bheri and Karnali, (8) Pokhara, (9) Lamjung, (10) Mustang, (11) Marsyangdi, (12) Chitwan, (13) Langtang and Gosainkund, (14) Kodari to Janakpur, (15) Everest environ, (16) Hongu and Inukhu, (17) Arun, (18) Ilam and Jhapa and (19) Map of Nepal.

<sup>10</sup> 'Round Annapurna'. Scale: 1/250,000. Edited by Harka Gurung and published by Vista Maps, Kathmandu, 1980.

# CHAPTER VIII

## TOWN MAPS



25. Patan map (Snellgrove, 1961)

Town maps are mostly on a large scale and show street plan, large building structures and other details of a particular town or city. Most of them have no topographical details and are in horizontal plan. In Nepal, most of these maps deal with cities and towns of Kathmandu Valley.<sup>1</sup> The first maps of Kathmandu towns were published in the 1950's by the Tourist Department and these were in simple black and white print. However, one of the earliest plans of the three towns of the Valley with particular emphasis on the location of Buddhist viharas was prepared by D.L. Snellgrove.<sup>2</sup>

Although a comprehensive volume of the Kathmandu town was published in 1969,<sup>3</sup> the first large-scale town map of Kathmandu and Patan city was prepared by P. Karan.<sup>4</sup> Field work was done in 1970 and the main emphasis on this Kathmandu-Patan map is on land use distinction in different categories. Land use has been categorised into residential (yellow and ochre,) commercial (linear black boxes), industrial (pink and blue), public and institutional (red) and open space (green). Some of these have been further distinguished

by variation in colour shade. Residential use has three colours according to population density, ranging from low density palace estates to medium density (under 300 persons per gross residential acre) and high density (300 to 700 persons per gross acre). Within each residential area large buildings are depicted in black according to their floor plan. Among public and institutional uses, temples and shrine areas have been shown in dark red. Similarly, open space has been distinguished into parks and farm land. Names of locality and important institutions are in black. Roads and lanes are in double line but no distinction has been made between paved and unpaved ones. Among the natural features appear, streams in blue and an arbitrarily chosen contour of 4,300 feet in hachures to mark the level of the upper terrace.

The most detailed plans of the three Kathmandu towns was published in 1973.<sup>5</sup> The ground plan drawing at a scale of 3 cm to 100 meter is by Wolfgang Korn and locational names by Heinrich Seemann. The lay-out of the built-up area is depicted clearly by line-drawing showing streets and lanes. Important roads and streets are in ochre colour and ponds and streams in bright blue. The most useful part of the map is the location of shrines by numbers on the map. Although the shrines so identified are listed on the side of the map and there is also grid on the map, no grid reference has been provided. The number of shrines so identified are 132 in the Kathmandu map, 177 in Patan map and 63 in Bhaktapur map. The maps are most

<sup>1</sup> An interesting exception is the series of sketch plans of Bhairawa, Biratnagar, Butwal, Dharan, Dhankuta, Ghandruk, Namche Bazar and Tansen by T. Iozawa in *Trekking in the Himalayas*. Tokyo, Yama-kei Publishers, 1976.

<sup>2</sup> D.L. Snellgrove. "Shrines and temples of Nepal" *Arts Asiatique*, Tome VIII, fascicule 1 & 2, 1961, p.2-10 & 93-119. The three plans of Kathmandu, Patan and Bhatgaon are at a scale of 3 cm to 500 meters.

<sup>3</sup> Housing & Physical Planning Department (Nepal). *The Physical Development Plan for the Kathmandu Valley*. Kathmandu, His Majesty's Government of Nepal, 1969.

<sup>4</sup> 'Kathmandu-Patan. The Twin Cities Urban System' Scale 0.9 inch to 1000 ft. Compiled by Pradyumna P. Karan and cartography by James E. Queen. In *The Himalayan Review*; vol VI., 1973.

<sup>5</sup> 'Kathmandu.' (Scale: 3 cm to 100m), 'Patan' (2.8 cm to 100 m), and 'Bhaktapur' (3.4 cm to 100 cm). Drawn by Wolfgang Korn. In H. Seemann, *Nepal 2031*. Stuttgart, Emil Bandell, 1973.

useful to those interested in cultural aspect of the Kathmandu towns.

Nepal Geographical Society produced a city map of Kathmandu in 1975 and this was revised in 1977 for the Tourist Department.<sup>6</sup> The map is at a scale of about 2 cm to 100 meters and has dull green background. Roads and streets are in white while street and locality names are printed in black. Durbar Square and Ranipokhari are depicted in ground plan but other buildings of prominence are pictorially shown in profile. Streets, place-names, places of interest and offices are provided with number and can be located with the help of grid reference provided. On the reverse side is the map of Kathmandu valley at a scale of 1.4 cm to 1 kilometer. The map has a blue background and shows streams, roads and places of interest in black.

About the same time appeared another city map of Kathmandu-Patan that was printed in Hong Kong.<sup>7</sup> Although no scale has been given, it comes to about 1 cm to 200 meters. The map background is green and roads and streets are in white. Streams are in deep green and all place-names are in black. Selected monuments and buildings are pictorially represented in plan. Enlarged details of the Kathmandu Durbar Square and Durbar Marg appear in small insets and on one margin is a list of places with grid reference.

Another city map of Kathmandu-Patan published by the Hotel Association of Nepal was printed in Bangkok.<sup>8</sup> The scale is about 3 cm to 1 kilometer showing location of the various hotels. Streams are in blue and hotels are shown with red star. Roads are in double black line and some selected cultural monuments are depicted pictorially. In the inset is an administrative map of Nepal indicating STOL fields and places with hotels. In 1979 appeared yet another Kathmandu-Patan map published in Delhi<sup>9</sup> very similar in design to the Continental Resorts map of Hong Kong edition. Except for the change in symbol for prominent places, the two maps are identical in scale, format, colouring, lettering of place-names and even the insets. The list of places with grid references on the margin is a virtual reproduction of the former map.

The best city map of Kathmandu was published in Munich in 1979.<sup>10</sup> The map is at a scale of 1:10,000 and is based on the Kathmandu valley map 1:10,000 series surveyed in 1971 and Kathmandu Metropolitan Area Map (1:2,000) surveyed by AERMAP Company (Florence) in 1975. Representation is in 8 colours but there is an effective use of soft tones. It is a comprehensive map expressing both essential natural and cultural elements in the landscape. Woodland appears in light grey and tarmac roads in yellow. Roads, footpaths, foot-bridges and other

<sup>6</sup> 'Kathmandu City.' Scale: 1.40cm to 1km. Prepared by M.S. Manandhar and drawn by Indra N. Manandhar. Kathmandu, Nepal Geographical Society, 1977.

<sup>7</sup> 'Kathmandu-Patan.' No Scale. Designed & produced by Continental Design & Art Studio. Hong Kong, Continental Resorts Ltd., 1977. Included in *Nepal This Month*, 1977-78.

<sup>8</sup> No Title. (Kathmandu & Patan). Scale: 3 cm to 1 km. Drawn by Graphics Rachna. Kathmandu, Hotel Association of Nepal, 1977.

<sup>9</sup> 'Kathmandu & Patan.' Not to scale. Included in *Holiday and Trekking in Nepal* by Nest & Wings, New Delhi, 1979.

<sup>10</sup> 'Kathmandu City.' Scale: 1/10 000. Sponsored by Fritz Thyssen Foundation. Munich, Arbeitsgemeinschaft für vergleichende Hochgebirgsforschung, 1979.

linear cultural features are also in grey. Contours of 10 meters and stressed contours of 50 meters in orange are supplemented by grey hachure on slopes. Of the numerous items located by numbers with grid reference, the colour range of numerals are as follows: red for monuments, blue for hotels, green for airlines and travel agencies and black for others. In addition there are indications to locations of taxi rank and trolley bus stop. A recent city map of Patan published by Arbeitsgemeinschaft für vergleichende Hochgebirgsforschung (Munich) is patterned after the above-mentioned map of Kathmandu city.<sup>11</sup> The map is at a scale of 1:7,500 and makes use of six colours. Rivers, ponds and wells are in light blue, metalled road in yellow, built-up area, and other roads and footpaths are shown in light brown. The contour interval is of 20 meters with supplementary contours of 5 metres in grey. Locality names and spot-heights are given in black. Place-names have been provided with diacritical marks to aid correct pronunciation. In addition to location of taxi-rank and bus stops, monuments are indicated by red legend numbers and hotels by blue legend numbers.

A recent addition to the large-scale maps of Kathmandu cities are those of Patan and Bhaktapur published by Vista Maps.<sup>12</sup> The maps are drawn from existing sources with

emphasis on places of touristic interest. The maps have yellow colour base with streets and lanes left white. Important monuments are pictorially shown and temples, shrines and other places are numbered according to a grid reference. Names of streets, and other places-names are all in black print. Both maps have an inset of their respective Durbar Squares.

Very few large-scale maps of towns outside Kathmandu valley have been published so far. An early sketch map of Pokhara Bazar was prepared by Ferdinard E. Okada in 1959, but was never published. The map is in blue-print at a scale of 4 inch to one mile and shows general alignment of streets with some locality names. Two maps of Pokhara town area were published by the Town and Country Planning Organisation of India in 1968.<sup>13</sup> The one including the immediate environs of Pokhara is at a scale of 1:15,840 and has closely-spaced contours on the hill slopes. As it was basically a proposal for physical development plan, the emphasis was on proposed land use categories shown by different shades and symbols without use of colour. The other map, of the main town area, at a scale of 1:4,800 shows land use projected for 1986. Both fall in the category of physical planning maps. Incidentally, this plan was never launched and instead an entirely new one prepared by the Department of Housing and Physical Planning was implemented in 1973. Similar planning maps exist for Pokhara, Surkhet and Dhankuta towns but these have not yet been published. A

<sup>11</sup> 'Patan City Map.' Scale: 1/7,500. Sponsored by Fritz Thyssen Foundation. Published by Arbeitsgemeinschaft für vergleichende Hochgebirgsforschung, Munich, 1980. See also Niels Gutschow, "Patan - Historical development, spatial structure and ritual topography." in *Khumbu Himal*, Band 13, Lfg 4, 1981, Seite 262-272.

<sup>12</sup> 'Patan City', Scale: 1 cm to 40 meters and 'Bhaktapur'. Scale: 1 cm to 40 meters. Edited by Harka Gurung. Kathmandu, Vista Maps, 1980.

<sup>13</sup> 'Development of Pokhara in relation to its environs' (1/15 840) and 'Development plan for Pokhara' (1/4 800). In *Development Plan for Pokhara Nepal* by Town & Country Planning Organisation, Ministry of Works, Housing & Supply. (India), no date.

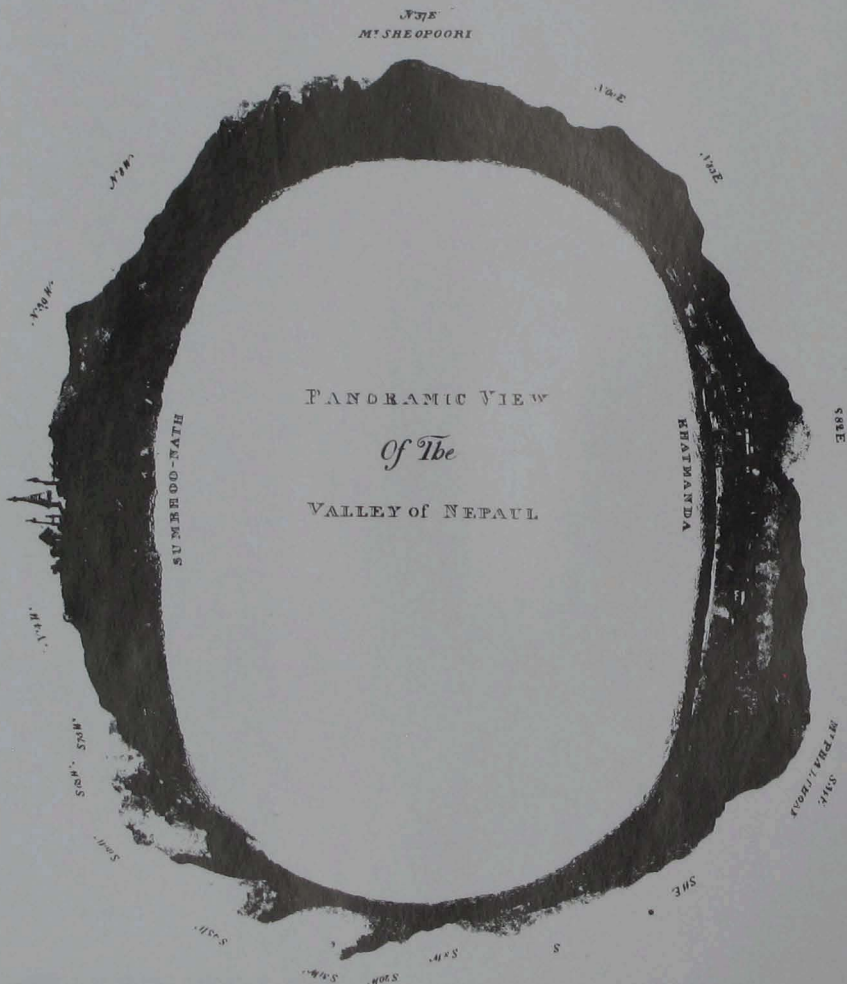
recent map of Pokhara town at a scale of 1:20,000 is in three colours.<sup>14</sup> Places of touristic interest, hotels, restaurants and government offices are shown by different symbols with a grid reference.

<sup>14</sup> 'Pokhara Town.' Scale: 1/20 000. Edited by Harka Gurung. Kathmandu, Vista Maps, 1980.



# CHAPTER IX

PANORAMA AND PHOTO MAPS



26. Panoramic view of Nepal Valley (Kirkpatrick, 1811)

Maps whether general or thematic that are drawn to scale are more scientific representation of the ground. On the other hand, panoramic sketches and photographs that relate to man's terrestrial view are more effective as a means of landscape appreciation. Another modern perspective being increasingly used for various purposes is the vertical aerial photograph. Since there are many examples of good panoramic photographs and also photogrammetry is a technical field, this section deals only on some panoramic sketches and three samples of satellite photographs.

The earliest panoramic view of a part of Nepal was that of Kathmandu valley published in Kirkpatrick's book in 1811.<sup>1</sup> In this old etching, the viewer is placed at the center of the picture encircled by the surrounding view. The most prominent features are the three spires of Swayambhunath in the westerly direction overlooking a clump of trees. To the north rise Sheopuri Lekh and on the eastern quarter are the crowded buildings of Kathmandu city beyond the Vishumati river. The south view is made up of low hills.

Hamilton's book on Nepal includes four plates in the series of 'A View of the Himalaya Mountains' as seen from a point (Oba Mohisyu) in the south-east section of Kathmandu valley.<sup>2</sup> The five panoramas were drawn by Charles Crawford and the etching was done by W. & D. Lizars. The snow-peaks in the distant horizon are shown in white silhouette and prominent peaks are indicated

with capital letters along with their bearing from the point of observation. Objects and features in the middle distance are indicated by small letters and named in the key. These include Changu Narayan temple, Thimi, Buda Nilkantha, Devapatan, Pashupatinath, Pulchowk, Raniban, Patan and Swayambhunath.

A more realistic panorama drawn from nature was by August Gansser from Jandi (7870 ft) above Binsar that includes Central Himalayan peaks from Kedarnath (23,000 ft) to Nampa (23,288 ft).<sup>3</sup> In 1959, Toni Hagen drew a series of tectonic stereograms of Nepal in seven sections to illustrate his geological findings.<sup>4</sup> In a few bold strokes, he effectively brings out the structural make-up of the concerned areas.

The two better known valleys of Nepal, Kathmandu and Pokhara, have been done in block diagrams by the present author. They were both drawn in perspective on the basis of the detailed contours of the One Inch maps with a vertical exaggeration of 12.67. The Pokhara diagram was prepared in 1964 and was included in his doctoral dissertation. The Kathmandu perspective diagram was done in 1968 and was published in the Kathmandu valley report of Housing and Physical Planning Department in 1969. Both were later printed in three colours.<sup>5</sup> The physical background is in grey, lakes and streams in

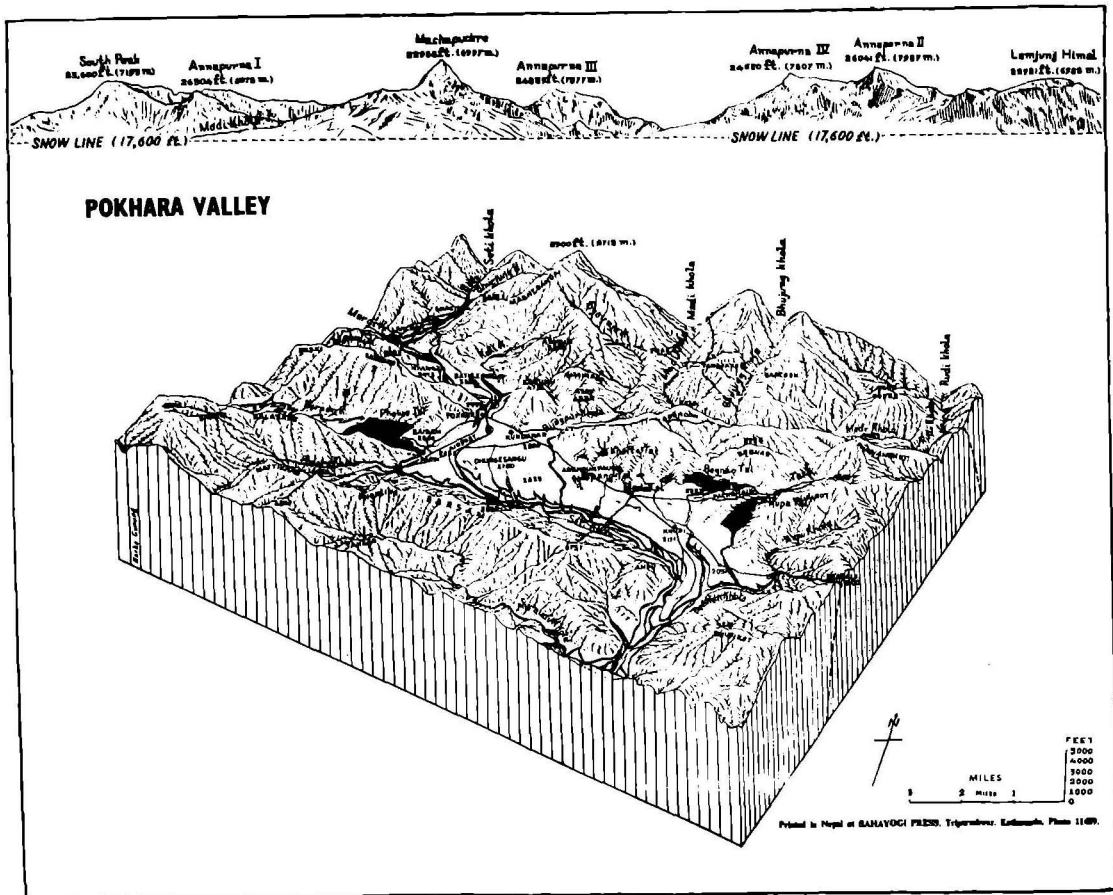
<sup>1</sup> 'Panoramic View of the Valley of Nepal'. In Kirkpatrick, *op. cit.*

<sup>2</sup> 'Himalaya Mountains,' Plate I to V. By Charles Crawford. In Buchanan-Hamilton, *op. cit.*

<sup>3</sup> 'Panorama.' By August Gansser. In Heim & Gansser, *op. cit.*

<sup>4</sup> Hagen (1969), *op. cit.* includes Kanchendzonga-Mount Everest, Mount Everest-Shisha Pangma, Shisha Pangma-Manaslu, Manaslu-Dhaulagiri, Dhaulagiri-Hiunchuli Patan, Hiunchuli Patan-Saipal and Saipal-Nampa.

<sup>5</sup> 'Pokhara Valley' and 'Kathmandu Valley'. By Harka Gurung. Kathmandu, Sahayogi Press, 1970.



## 27. Pokhara Valley (Gurung, 1970)

blue and roads, tracks and place-names in red. Each is provided with sketch profile of snow range to the north.

In November 1969, this writer and Barry Bishop made a cross-country flight over Nepal at about an altitude of 14,000 ft. Bishop took a complete set of photographs of the Nepal Himalayan range as a base material for a panoromic profile which the

National Geographic Society was then planning to publish. However, the panorama of Nepal published in the *National Geographic* in 1971 was not exclusively of the mountain range but of the whole country including parts of the adjacent countries.<sup>6</sup> The south-eastern perspective of this colourful panorama

<sup>6</sup> *National Geographic*, Nov. 1971, fold-out (p. 664-66).

drawn by Heinrich C. Berann, was determined by the angle of Apollo 7 photographs taken in 1968 from 125 miles in space on which it was based. The white of the snow peaks, green of the higher ridges and yellow of the valleys, all provide a composite picture of a rugged terrain. Roads appear as white ribbons and selected places are marked by red dots. Another example of perspective picture based on satellite photographs was the Nepal-Tibet Panorama by Serbjeet Singh.<sup>7</sup> The Nepal section in the panorama is a maze of peaks and pinnacles with accentuated slopes while the depressed Tarai merges imperceptibly into the Gangetic plain. Many peak names and place-names printed on the panorama are helpful in identifying the various places.

A fine series of mountain panoramas of Nepal was drawn by T. Iozawa who made two photographic flights over Nepal.<sup>8</sup> The first flight was done on 21st November 1970 during which he covered Khumbu to Dhaulagiri in an anti-clockwise flight and getting very close to the mountains. The second flight was made on 1st January 1972 and extended as far as Talplejung in the east and beyond Chankheli in the north-west. On the basis of close-up photographs taken during these flights, Iozawa has compiled a whole series of panoramas of Nepalese mountains along with regional locational maps.

Completely different from the raw nature of high mountains is the perspective view of a cityscape drawn and published by Tomoya Iozawa.<sup>9</sup> The perspective is foc-

cussed on the center of the Kathmandu city with an aerial view from the south-east. The picture base is grey and the lighting from the south brings into sharp relief the white facade of some large buildings including the Grecian columns of the Gaddi Baithak at Durbar Square. The contrast between the placidity of spacious Tundikhel and maze of buildings in the old quarter of the city is visibly apparent. Locality and street names are printed in black capital letters. Insertion of some vehicles near Bhugol Park and an incipient crowd in the Basantpur vegetable market simulate life into this fine picture map.

Three samples of colour photographs taken from satellites exemplify the present high level of technology in space representation. One of the imageries was taken by LANDSAT-I-MSS on 14th March 1973 from about a height of 910 kilometers in space.<sup>10</sup> The photograph covers Central Nepal from Langtang to parts of Terai. Snowfields are in white, streams appear as pink ribbons while forest and cultivated areas have variegated tones of yellow and green. The gorges of Bhote Kosi (Trisuli), Bhoti Kosi (Sun Kosi) and Tamba Kosi make deep intrusions to the north and in the south, the Bagmati-Marini and Kamala-Katari confluences are clearly visible north of the prominent Chure range. Indrawati-Sunkosi Valley traverses the eastern half of the image and Kathmandu city appears as a brown dot across the south-turning angle of the Bagmati river.

Another imagery is that taken by SKYLAB on 9th December 1973 from about a height of 435 kilometers.<sup>11</sup> Although the

<sup>7</sup> 'Nepal-Tibet Panorama.' By Serbjeet Singh. Munchen, Geo-Buch Verlag, 1977.

<sup>8</sup> T. Iozawa. *Panoramic View of the Nepal Himalayas* (in preparation).

<sup>9</sup> 'Kathmandu.' By Tomoya Iozawa. Chiba, 1972.

<sup>10</sup> 'Kathmandu. Zentraler Nepal-Himalaya.' LANDSAT-I-MSS Aufnahme, Farbbild, Kanale 5.7. Aufnahmedatum: 14. März 1973, Flughöhe: ca. 910 km.

images are very clear, we are on less surer ground in this mountainous region for which area no detailed topographic maps exist for comparison. It shows some sections of high mountains north of Manang and a large area in Tibet. The dark deep gorges on the right hand bottom of the image are probably Nar and Phu valleys. North of the snow ranges, a series of streams debouch north across wide moraine fields to a barren brown landscape. The most conspicuous feature is the south-west/north-east geological strike in the snow-covered area including a series of paralld snow-free south scarps in the centre of the image. On the left-hand south corner is an emphatic valley, possibly the Thak Khola fault, that lies transverse to the general strike.

The World Bank has compiled a photo-map of Nepal based on Landsat imageries taken between 10th February and 23rd March 1977.<sup>12</sup> The map is at a scale of 1:500,000 and is issued in two sheets. The Eastern Sheet extends up to Pokhara (84° E) and includes an inset and stereoscopic pair of Kathmandu Valley. The Western Sheet has an inset showing the index of Landsat coverage by their dates. The sheets have been overlaid with Universal Transverse Mercator grid network based on the Everest Geodetic System. On the photo-imagery are indicated the approximate international boundary, selected place-names and river names, railways, ropeways,

roads, tracks and airports – all in black. Towns have been further categorised as regional development centres, zonal headquarters and district headquarters. Also indicated are peaks above 8,000 metres and major mountain passes. There is a very effective rendering of colour tones.

The first edition issued in 1980 had some mistakes in location of places, place-name spelling and administrative designation including some error in road alignment. Much of these have been corrected in the revised version of 1981. However, some errors remain. The district headquarters of Achham is shown as Ridikot instead of Mangalsen and that of Dhading district as the old Dhading Bazar instead of the relocated Dhading Bensi. Malemchi is shown too south in place of Helmubensi and Kusma on the wrong side of Modi river. Although, there is a good network of all weather and seasonal roads, places of major road intersection such as Kohalpur, Lamahi, Pathalaiya and Dhalkebar have not been shown. The Mahendra Highway west of the Kosi barrage swings too far north while a non-existent road is shown linking Simra and Gaur. The alignment of road between Kakani and Bidur as well as that between Malekhu (on the Prithvi Rajmarg) and Dhading Bensi are also wrongly placed. The alignment between Majhuwa Khaireni and Damauli is shown along the Bandipur ridge instead of through Dumre and Chhirkane saddle. Furthermore, bBalewa airport is on the wrong side of the Kali-Gandaki, Juphal airport in Dolpo and Patan airport in Baitadi have not been indicated. Foot trails are too indistinct on most map area. Despite these minor shortcomings, the above photo-map provides a realistic picture of the landform and land use in Nepal.

<sup>11</sup> 'Him-daya. Grenz/kama Tibet/Nepal zwischen Mustang und dem Manaslu, 8133m.' SKYAB - Farbfotografie. Aufnahme datum: 9. December 1973. Fluehche: ca. 435. Km.

<sup>12</sup> 'Nepal (Eastern Sheet-Western Sheet). Scale: 1/500,000. Compilation, design and supervision by W. Drewes and K. Willett. Published by Resource Planning Unit, Agricultural and Rural Development Department, World Bank, Washington D.C., 1980

# CHAPTER X

## RELEVANT PUBLICATIONS

The main objective of this survey is to enumerate and evaluate existing published maps including those in books and journals that contribute to the better understanding of maps regarding Nepal. It seems relevant here to make brief mention of some publications that refer specifically to Nepalese maps and those that include more maps of Nepal.

The most authoritative source on maps of Nepal is obviously *Carte du Nepal* by L. Boulnois published under the Nepal Bibliography series by Centre National de la Recherche Scientifique.<sup>1</sup> The volume lists 373 maps in chronological order and gives comprehensive details regarding each map. Furthermore, information is provided as to where the maps can be located in Paris and London libraries. Among them are also listed 26 maps in manuscript form preserved in the libraries of the India Office and the Royal Geographical Society in London. As mentioned in the chapter on historical perspective, the volume includes a historical sketch dealing with early appearance of Nepal on maps of Asia as drawn by westerners from the 16th century onwards with some reproductions. In the end are given indexes of maps by title, author, subject classification and the sources quoted.

Two earlier publications can be singled out as official cartographic products of Nepal. The first was *Maps in Nepal*, a Nepali edition, published by the Statistics Department as an aid to the national census<sup>2</sup> of 1952/54. The series of maps with administrative sub-divisions and census divisions and supplemented by three appendices of area list are most useful in understanding the then administrative set-up of the country.

The second publication, *Nepal in Maps*, produced by the Department of Publicity in 1966 may be described as an embryonic attempt at producing a national atlas for Nepal.<sup>3</sup> It includes 25 maps at a scale of 1 inch to 40 miles that show physical, social and development aspects of the country. There is liberal use of bright colours and most symbols showing the distribution of elements are plotted according to administrative division rather than specific locations. In the appendices are given various statistics on economic aspects.

There are three books that include many good maps. *Nepal: a cultural and physical geography* by P.P. Karan in an atlas format has 33 maps on Nepal including a fold-out on administrative division.<sup>4</sup> The maps are generally at scale of 1:2,534,400 and represent various aspect of Nepal. For example, six maps deal with population and five maps concern with social and religious aspects. An interesting map is that of 'land use' in three colours: cultivated land in yellow, forest and pasture in green and waste land in white. The map was probably constructed on the basis of the Survey of India quarter inch maps although the author mentions elsewhere the use of oblique photographs.<sup>5</sup> The earlier basis of the land use map is supported by the fact that the vast extension of forest area is

<sup>3</sup> Publicity Department (Nepal), *Nepal in Maps*. Kathmandu, 1966. Review by Harka Gurung in *The Rising Nepal*, 24th June 1966.

<sup>4</sup> P.P. Karan. *Nepal: a cultural and physical geography*. University of Kentucky, Lexington, 1960. Review by Harka Gurung in *Himalayan Review*, vol. 1, 1968, p. 78-80.

<sup>5</sup> P.P. Karan. "A land use reconnaissance in Nepal by aereofield techniques and photography." *Proceedings of the American Philosophical Society*, vol. 104, no. 2, April 1960, p. 172-87.

<sup>1</sup> Boulnois, *op. cit.*

<sup>2</sup> Statistics Department, *op. cit.*



more representative of the distant past when the quarter inch maps were made (1924-27) rather than the picture of the 1950's. However, it would be a useful cartographic exercise if this map is compared with more recent land use maps in order to measure the extent of land use change through time.

At about the same time (1961) was published Toni Hagen's book on Nepal,<sup>6</sup> In addition to the numerous high-quality photographs in colour and black-and-white, this book includes a useful text and many maps. The third edition of the book has 24 maps and diagrams dealing with natural features and development aspects. The small map on the distribution of ethnic groups is a fairly reliable representation while the two maps of transport network provide a comparative picture of change during the decade 1960-1970. The third book, in German, by Wolf Donner is a comprehensive geography of Nepal.<sup>7</sup> The volume has 122 maps and diagrams drawn by the author himself. It deals with land, people and economy of Nepal and the economic chapter is well represented by numerous maps of crop distribution, industrial location and trade flow. The regional chapters have been further enriched by the author's field observations who worked in Nepal as a F.A.O. advisor.

A volume produced in Nepal with a high standard of cartographic presentation was the Kathmandur Valley Plan by the Housing and Physical Planning Department.<sup>8</sup> The publica-

tion has 50 maps and diagrams with a wide range of colour, shade and symbol. These include 9 maps of Nepal in general, 15 maps of Kathmandu valley and numerous site plans and profiles of individual towns and settlements.

Another interesting volume is the illustrated book *Trekking in the Himalayas* by Tomoya Iozawa.<sup>9</sup> First published in Japanese in 1976, it now has a English translation edition. It includes many colour photographs and maps and a large section is devoted to Nepal. The text is interspersed with a rich variety of sketches of individual mountains and site plans of towns and villages. Also included are 20 regional maps of Nepal and a two-page general map of Nepal in bold colours.

The best regional maps of Nepal Himalaya is to be found in a large volume published in Japan. *The Himalayas*, being the first volume in the series of Mountaineering Maps of the World deals with the entire Himalayan range and includes numerous maps and photographs.<sup>10</sup> A finely-shaded map at the scale of one to three million provides a comprehensive view of the Himalayas. At the beginning of the volume also appears a clear photo-map of Nepal from Landsat Imagery of which photo mosaic is by Kashiro Nishimura and interpretation by Tomoya Iozawa. Nepal is further represented by a general map (1:2.5 scale) and then regional maps. These detailed regional maps by four cartographers

<sup>6</sup> Toni Hagen. *Nepal: The Kingdom in the Himalayas*. Berne, Kummerly & Frey, 1961 and 1971 (Third edition). Review by Harka Gurung in *Geographical Journal*, vol. cxxiii, 1962, pp. 86-87.

<sup>7</sup> Wolf Donner. *Nepal: Raum, Mensch und Wirtschaft*. Wiesbaden, Otto Harrassowitz, 1972.

<sup>8</sup> Housing and Physical Planning Department (Nepal), 1969, op. cit.

<sup>9</sup> Iozawa, 1976, op. cit.

<sup>10</sup> Ichiro, Yoshizawa (Ed.). *Mountaineering Maps of the World. Vol. I: The Himalayas*. Tokyo, Gakushu-Kenkyu-Sha, 1977.

are generally at a scale of 1 cm to 2 kilometers. The regional maps included are that of Kangchenjunga, Annapurna and Dhaulagiri by Yoshimi Yakushi; Mount Everest, Khumbu Himal and Rolwaling by Eizo Suwata; Langtang-Ganesh and Api-Nampa-Saipal by Kazuyuki Suwata and Manaslu and Kanjiroba by Sado Yoshinaga. The maps are finely drawn with ridges in bold brown lines and streams in blue. Line drawing of rock faces, simulated contours in blue for glaciated area and subtle hill-shading provide a clear impression of the relief.

Finally, reference must be made to the two recent Nepalese efforts in cartographic field. Both works were initiated by the Mapping Sub-Committee of the National Council for Science and Technology and evidence increasing awareness regarding maps in the country. The first work, *Map Inventory of Nepal*, was published in 1980.<sup>11</sup> The inventory includes a list of both published and unpublished maps and aerial photographs along with the information on where they can be located. The materials have been grouped into (1) topographical sheets, (2) thematic maps, (3) cadastral sheets, (4) miscellaneous maps and (5) aerial photographs sheets. The work however needs much improvement both in terms of coverage and editing.

The second publication, *Nepal: Atlas of Economic Development*, is a much more ambitious venture.<sup>12</sup> It is the work of a large team of geographers with information

gathered from various government agencies. It includes 71 maps of Nepal at a scale of one inch to about 70 kilometers. The northern boundary of the maps follow the alignment of post-1960 maps and only the last map is according to the Nepal-China Boundary Protocol of November 1979. No colour has been used and representation is by choropleth shading, proportional circles, bar diagrams and dot method. The maps have been grouped into ten categories. The categories are General with 10 maps, Population with 5 maps, Agriculture with 9 maps, Industry with 4 maps, Transportation with 4 maps, Communication with 6 maps, Banking with 6 maps, Education with 9 maps, Health with 7 maps and Regional Development with 10 maps. Most of the information are plotted on the basis of administrative districts and ranking by districts is provided in the inset. In the last section on Regional Development is given rank order of districts using nine separate indices and a map on 'Levels of Regional Development based on 40 variables. Each map is accompanied by a text on the nature of data, pattern of distribution, conclusion and a table. The Atlas will remain for sometime to come a valuable source on spatial pattern of development in Nepal and a useful base for comparative purposes later.

<sup>11</sup> National Council of Science and Technology (Nepal). *Map Inventory of Nepal, 1980*. Kathmandu, National Council of Science and Technology, 1980.

<sup>12</sup> Ram Krishna Shrestha and Pitambar Sharma (Editors). *Nepal: Atlas of Economic Development*. Kathmandu, National Council of Science and Technology, 1981.

# APPENDIX

## HEIGHT OF PEAKS ALONG NEPAL'S NORTHERN FRONTIER

There were no detailed maps available for the northern borderlands of Nepal until the publications of the results of the joint survey of the Nepal-China boundary in 1979 in atlas form.\* The maps derived from vertical aerial photographs are at a scale of 1:50,000 and is based on gross tranverse rhombic projection. The area covered includes four to five kilometres on either side of the Nepal-China boundary. Each map sheet is provided with grid co-ordinates in minutes.

The height of peaks and summits listed are based on the above maps. Only peaks along the boundary alignment and those within the Nepalese territory are included. All peaks above 6,500 metres and those with specific names above 6,000 metres have been listed.

Peak names are according to the atlas except those within brackets, inserted by the author from other sources. Peaks without names have been indicated with a dash (—). The name of mountain range (Himal) is based on the atlas except for the substitution of Mahalangur Himal for Chamlang Himal and addition of Rolwaling and Jugal Himal that do not appear in the atlas.

\*Ministry of Foreign Affairs, Nepal. *Nepal-Chin Simanke Pratham Sangyukta Nrikchhanma Adharita Mul Lipsita Sanglagna Naksaharu* (Maps included in the Main Text and based on the First Joint Survey of the Sino-Nepal Boundary), Kathmandu and Peking, 1979.

Order of Magnitude	Name of the Peak	Himal or Range	Height in Metres	Longitude o ' "	Latitude o ' "
1.	Mount Everest (Sagarmatha)	Mahalangur	8848	86 55 32	27 59 17
2.	Lho Tse	"	8516	86 56 05	27 57 42
3.	Makalu (I)	"	8463	87 05 21	27 53 23
4.	(Lhotse Shar)	"	8400	86 56 34	27 57 30
5.	—	"	8492	86 55 30	27 58 53
6.	Cho Oyu	"	8201	86 39 42	28 05 37
7.	(Cho Oyu, North)	"	8106	86 39 58	28 05 56
8.	(Cho Oyu, South)	"	8046	86 39 38	28 05 46
9.	—	"	7982	86 39 38	28 05 18
10.	Gyachung Kang	"	7952	86 44 34	28 05 52
11.	(Lhotse, West)	"	7947	86 55 18	27 57 28
12.	—	"	7916	86 41 08	28 06 03
13.	—	"	7900	86 40 32	28 06 07
14.	(Gyachung Kang II)	"	7882	86 44 56	28 05 39
15.	(Ngangpai Gosum)	"	7874	86 41 20	28 06 28
16.	(Makalu II)	"	7865	87 04 56	27 53 56
17.	Nup Tse (I)	"	7855	86 53 14	27 58 12
18.	(Nup Tse II)	"	7815	86 53 20	27 57 58
19.	—	"	7803	87 05 42	27 52 45
20.	(Nup Tse III)	"	7800	86 53 40	27 57 43
21.	—	"	7789	86 39 38	28 05 17
22.	—	"	7743	86 42 21	28 06 21
23.	(Nup Tse IV)	"	7732	86 52 46	27 58 16
24.	—	"	7697	86 54 37	27 57 30
25.	—	"	7686	87 05 26	27 52 54
26.	—	"	7681	86 42 49	28 06 25
27.	(Kangshung Tse)	"	7678	87 04 42	27 54 58
28.	—	"	7658	86 44 15	28 06 12
29.	—	"	7620	86 54 30	27 59 34
30.	—	"	7594	86 41 50	28 06 30
31.	—	"	7591	86 57 54	27 57 20
32.	—	"	7504	86 39 30	28 04 51
33.	(Jongsang)	Janak	7483	88 08 11	27 52 51
34.	—	"	7470	88 08 25	27 52 38
35.	(Shar Tse)	Mahalangur	7459	86 59 00	27 56 57
36.	—	Janak	7451	88 08 20	27 52 44



Order of Magnitude	Names of the Peak	Himal or Range	Height in Metres	Longitude o ' "	Latitude o ' "
37.	(Kangshung Tse, South)	Mahalangur	7450	87 04 39	27 54 31
38.	—	"	7437	86 43 32	28 06 14
39.	(Ganesh I) Yangra	Ganesh	7429	85 07 38	28 23 30
40.	—	Mahalangur	7417	86 44 53	28 05 08
41.	—	Janak	7370	88 07 40	27 52 52
42.	—	"	7353	88 08 09	27 52 03
43.	—	Mahalangur	7351	86 36 54	28 04 24
44.	—	"	7350	86 38 10	28 04 14
45.	—	"	7315	86 58 24	27 57 17
46.	—	"	7307	86 39 00	28 04 30
47.	—	Janak	7304	88 08 13	27 51 55
48.	—	Mahalangur	7285	86 53 29	27 59 45
49.	—	Janak	7285	88 08 54	27 52 34
59.	—	"	7274	88 08 28	27 52 17
51.	—	Mahalangur	7245	86 52 29	27 58 37
52.	—	Janak	7233	88 08 22	27 51 56
53.	—	Mahalangur	7210	86 39 15	28 04 40
54.	(Langtang Ri)	Langtang	7205	85 41 02	28 22 55
55.	—	Mahalangur	7199	86 59 30	27 57 13
56.	—	"	7186	86 38 30	28 04 26
57.	(Chamar, North)	Sherang	7187	84 56 42	28 33 20
58.	(Chamar, South)	"	7183	84 56 54	28 32 49
59.	Pumo Ri	Mahalangur	7161	86 49 43	28 00 54
60.	Gauri Shankar	(Rolwaling)	7134	86 20 08	27 57 55
61.	—	Nemjung	7128	84 25 04	28 44 10
62.	—	Mahalangur	7127	86 41 28	28 05 37
63.	Himlung	Peri	7126	84 25 20	28 46 18
64.	Pabil (Ganesh II)	Ganesh	7110	85 04 51	28 20 44
65.	—	Peri	7098	84 24 58	28 45 25
66.	—	Janak	7081	88 09 11	27 52 24
67.	—	Mahalangur	7075	86 41 49	28 05 23
68.	(Ganesh III) Salasumdo	Ganesh	7052	85 07 20	28 20 05
69.	—	Langtang	7050	85 51 22	28 23 00
70.	(Outlier)	Janak	7044	88 05 30	27 52 16
71.	Hungchhi	Mahalangur	7036	86 45 32	28 02 05
72.	Ratna Chuli	Peri	7035	84 22 30	28 51 55

Order of Magnitude	Name of the Peak	Himal or Range	Height in Metres	Longitude o ' "	Latitude o ' "
73.	—	Mahalangur	7024	86 39 05	28 03 56
74.	—	Janak	7023	88 07 54	27 52 11
75.	—	Langtang	7013	85 42 42	28 23 10
76.	—	Mahalangur	7009	86 37 37	28 04 27
77.	—	Janak	6988	88 05 48	27 52 00
78.	—	(Rolwaling)	6983	86 20 16	27 57 24
79.	(Loenpo Gang) Dorle Pahar	(Jugal)	6979	84 48 00	28 11 45
80.	Dorje Lakpa	"	6966	85 46 50	28 10 25
81.	—	Mahalangur	6950	86 45 01	28 04 50
82.	—	"	6945	86 46 19	28 02 14
83.	(Ganesh IV)	Ganesh	6945	85 03 44	28 22 16
84.	—	Peri	6932	84 26 13	28 46 08
85.	—	Langtang	6931	85 42 51	28 22 52
86.	—	Mahalangur	6925	86 41 49	28 05 26
87.	—	"	6913	86 40 33	28 05 34
88.	—	"	6900	86 32 57	28 03 03
89.	—	Jugal	6899	85 46 32	28 17 30
90.	—	Lugula	6899	84 15 35	28 53 45
91.	(Chago)	Mahalangur	6893	87 03 15	27 55 35
92.	—	Panbari	6892	84 28 56	28 43 10
93.	—	Janak	6884	88 06 18	27 49 17
94.	—	"	6881	88 06 09	27 49 26
95.	—	Mahalangur	6875	86 45 54	28 04 29
96.	(Ganesh V)	Ganesh	6875	85 06 30	28 20 53
97.	—	Peri	6874	84 24 59	28 45 52
98.	(Chumbu)	Mahalangur	6870	86 47 18	28 00 47
99.	—	Langtang	6865	85 44 54	28 14 56
100.	—	Mahalangur	6861	86 39 26	28 03 42
101.	—	Janak	6854	88 06 58	27 52 04
102.	(Lashar I)	Janak	6847	88 03 17	27 53 17
103.	—	Peri	6840	84 23 10	28 51 40
104.	—	Langtang	6838	85 41 40	28 23 05
105.	—	Mahalangur	6835	86 47 24	28 01 07
106.	(Omi Kangri)	Janak	6829	87 57 51	27 53 51
107.	—	Mahalangur	6821	86 33 30	28 03 24
108.	Cheo	Peri	6820	84 27 04	28 45 55

Order of Magnitude	Name of the Peak	Himal or Range	Height in Metres	Longitude o ' "	Latitude o ' "
109.	—	Mahalangur	6816	86 33 08	28 02 46
110.	—	Janak	6814	88 06 54	27 51 44
111.	(Lashar II)	"	6806	88 03 55	27 53 13
112.	—	Mahalangur	6801	86 48 47	28 01 06
113.	—	(Jugal)	6799	85 48 27	28 11 50
114.	—	Langtang	6798	85 42 59	28 22 34
115.	—	Mahalangur	6793	86 84 35	28 04 03
116.	—	"	6791	86 43 51	28 05 29
117.	—	"	6790	86 33 48	28 03 58
118.	—	"	6781	86 34 00	28 02 33
119.	—	(Rolwaling)	6771	86 20 10	27 57 00
120.	—	Mahalangur	6770	86 40 23	28 05 08
121.	—	Peri	6767	84 29 30	28 44 04
122.	—	Langtang	6758	85 44 13	28 17 57
123.	Chabuk	Janak	6754	87 59 07	27 53 12
124.	—	(Rolwaling)	6753	86 31 26	27 56 24
125.	—	Panbari	6752	84 28 30	28 43 02
126.	—	Janak	6749	88 04 48	27 53 49
127.	—	Gurans	6744	81 06 26	30 02 31
128.	—	Mahalangur	6743	86 42 16	28 05 36
129.	(Pethang Tse)	"	6739	87 00 57	27 57 30
130.	—	"	6734	86 36 11	28 05 14
131.	—	(Rolwaling)	6734	86 26 34	27 54 24
132.	—	(Jugal)	6733	85 48 59	28 12 09
133.	—	Mahalangur	6729	86 33 30	28 03 09
134.	—	"	6726	86 44 00	28 02 38
135.	—	Changla	6721	82 11 58	30 06 07
136.	—	Janak	6718	87 58 10	27 53 34
137.	—	Langtang	6715	85 37 52	28 16 15
138.	(Lingtren)	Mahalangur	6714	86 51 18	28 01 40
139.	—	(Jugal)	6713	85 47 43	28 11 59
140.	Cho Pulu	Mahalangur	6711	86 58 55	27 55 10
141.	—	"	6707	87 06 32	27 51 35
142.	—	Janak	6706	88 04 12	27 53 29
143.	—	Mahalangur	6702	86 54 02	27 59 10
144.	—	Peri	6694	84 26 45	28 47 35

Order of Magnitude	Name of the Peak	Himal or Range	Height in Metres	Longitude			Latitude		
				o	'	"	o	'	"
145.	—	"	6687	84	20	43	28	52	20
146.	—	Mahalangur	6682	87	06	30	27	51	17
147.	—	Nemjung	6677	84	25	45	28	44	59
148.	—	Mahalangur	6676	86	06	30	27	51	52
149.	(Juneaux)	"	6675	87	04	20	27	52	52
150.	—	"	6674	88	08	26	27	51	36
151.	—	Janak	6668	88	06	17	27	52	01
152.	Langpo	Kipu	6668	85	09	29	28	29	50
153.	—	Mahalangur	6667	86	48	04	28	01	20
154.	—	Peri	6662	84	21	05	28	51	57
155.	—	"	6654	84	26	39	28	46	02
156.	—	Langtang	6653	85	42	05	28	23	01
157.	—	Peri	6648	84	23	52	28	51	32
158.	—	(Rolwaling)	6646	86	30	59	27	57	24
159.	—	Yokapahar	6644	81	05	30	30	03	05
160.	—	Langtang	6641	85	44	53	28	14	34
161.	Phurbo Chyachu	(Jugal)	6637	85	52	12	28	07	49
162.	(Khumbu Tse)	Mahalangur	6636	86	52	21	29	01	14
163.	Pangbuk	"	6631	86	31	11	28	00	15
164.	—	"	6630	86	33	30	28	03	40
165.	Chandi	Kanti	6623	82	47	50	29	43	10
166.	—	Peri	6622	84	26	46	28	47	03
167.	—	Mahalangur	6615	86	31	16	28	00	46
168.	—	"	6614	86	36	30	28	05	26
169.	—	"	6608	84	40	55	28	37	44
170.	—	Janak	6606	88	05	10	27	53	36
171.	—	Mahalangur	6606	86	53	26	27	57	10
172.	—	Peri	6604	84	21	26	28	51	34
173.	—	"	6602	84	27	30	28	45	27
174.	—	"	6594	84	24	13	28	45	29
175.	—	Mahalangur	6592	86	36	12	28	06	06
176.	—	Janak	6588	87	58	46	27	53	22
177.	—	(Jugal)	6586	85	45	23	28	10	31
178.	—	Langtang	6586	85	38	14	28	16	23
179.	—	Mahalangur	6586	87	03	55	27	55	27
180.	(Dzanye)	Janak	6584	88	01	44	27	54	22

Order of Magnitude	Name of the Peak	Himal or Range	Height in Metres	Longitude o ' "	Latitude o ' "
181.	—	"	6582	87 58 25	27 53 28
182.	—	Mahalangur	6581	86 52 00	27 58 15
183.	—	Janak	6576	88 04 28	27 53 37
184.	—	"	6574	87 57 26	27 54 28
185.	—	Langtang	6575	85 37 25	28 15 23
186.	—	Mahalangur	6575	86 42 26	28 04 40
187.	—	Janak	6571	88 05 19	27 53 27
188.	—	Mahalangur	6570	87 02 02	27 57 00
189.	—	Yokapahar	6570	81 05 15	30 03 20
190.	—	Peri	6566	84 25 52	28 48 55
191.	—	Samdo	6565	84 41 10	28 38 05
192.	—	Mahalangur	6564	86 43 14	28 05 46
193.	Changla	Changla	6563	82 07 45	30 18 10
194.	—	Peri	6556	84 24 35	28 51 13
195.	—	Mahalangur	6543	86 43 50	29 05 14
196.	—	"	6543	86 47 38	28 00 05
197.	—	Janak	6537	87 51 59	27 54 40
198.	—	"	6535	86 09 40	27 52 08
199.	—	Mahalangur	6528	86 39 30	28 03 10
200.	—	Palchung Hamga	6528	82 53 13	29 41 35
201.	—	Peri	6524	84 24 04	28 49 48
202.	—	Mahalangur	6523	86 31 17	28 01 05
203.	(Ganesh VI)	Ganesh	6521	85 03 00	28 21 45
204.	—	Peri	6518	84 26 30	28 47 44
205.	—	Langtang	6506	85 39 46	28 18 14
206.	—	Mahalangur	6506	86 50 19	28 01 01
207.	—	"	6506	86 40 56	28 05 17
208.	—	"	6502	86 32 10	28 03 03
209.	(Peak 3)	"	6433	87 07 36	27 50 02
210.	Nalakankar	Nalakankar	6422	81 23 30	30 15 01
211.	Jyachhung	Gurans	6388	81 05 03	30 06 24
212.	Bhrikuti Shail	Lugula	6384	84 13 35	28 53 38
213.	(Peak 5)	Mahalangur	6381	87 10 17	27 49 19
214.	Samdo	Samdo	6335	84 41 40	28 38 13
215.	Asajya Tuppa	Gorakh	6265	82 16 40	30 03 46
216.	Senup	Lumbasumba	6257	87 46 44	27 51 56

Order of Magnitude	Name of the Peak	Himal or Range	Height in Metres	Longitude o ' "	Latitude o ' "
217.	Kangla	Janak	6242	87 50 29	27 56 59
218.	Man Shail	Mustang	6235	83 48 48	29 18 05
219.	Saula	Kutang	6235	84 45 16	28 36 47
220.	Kantupang Kandumbu	Nalakankar	6219	81 23 30	30 14 07
221.	Lasa	Gurans	6189	81 05 00	30 08 10
222.	Khayang	Samdo	6186	84 42 51	28 37 59
223.	Swelo Khang	Nyashing	6180	84 38 39	28 43 30
224.	Pashubo	Taya	6177	85 09 59	28 31 51
225.	Dankuru	(Rolwaling)	6129	86 32 00	27 56 34
226.	Gaugiri	Damodar	6110	84 11 20	29 02 44
227.	Chomo Pamari	Pamari	6109	86 05 24	28 03 27
228.	Danphe Shail	Palchung Hamga	6103	83 00 30	29 40 22
229.	Arniko Chuli	Mustang	6034	83 09 25	29 10 35
230.	Chandi	Chandi	6024	81 52 99	30 21 40
231.	Ghodachadi	(Rolwaling)	6009	86 19 10	27 56 52



# AUTHOR INDEX

- Akiba, Chikara 52n  
 d'Anville, Jean-Baptiste Bourguignon 7  
 Arbeitsgemeinschaft für vergleichende Hoch- -  
 gebirgsforschung 46, 75n  
 Aufsnaiter, Peter 42, 44  
 Aziz, Barbara 2n  
 Berran, Heinrich C. 81  
 Bhattarai, K.D. 54  
 Bibliotheca Himalayica 9  
 Bishop, Barry C 81  
 Bordet, Pierre 49, 51, 52, 3, 7n, 9, 18n, 84  
 Boulnois, L. 2, 4n, 5, 7n, 8n, 67  
 Buchanan-Hamilton, Francis 7, 18, 20-21, 79-  
 Centrale Nationale de la Recherches Scienti-  
 fique 3, 49n, 51, 55n 56, 59, 60n, 61n, 84  
 Crawford, Charles 7, 9, 18, 41, 79  
 Das, Sarat Chandra 22  
 Debresson, Lucien, 43  
 Defence Ministry (U.K.) 63n  
 Dobremez, J.F. 59, 60n, 61n  
 Dollfus, Oliver 53, 56  
 Donner, Wolf 85  
 Drewes, W. 82n  
 Dyhrenfurth, G.O., 43n  
 Ebster, Fritz 43n, 44  
 Filchener, Wilhem 52n  
 Finsterwalder, Rudiger 46n  
 Foreign Ministry (Nepal) 29n, 30n  
 Fort, Monique 56  
 Freshfield, D. W., 22, 32, 39n  
 Fuchs, Gerhard 34  
 Furer-Haimendorf, C. Von 43n  
 Gansser, August 41n, 51, 79  
 Garwood, E.J., 22n, 49, 55, 32, 38, 39n  
 Geo-Buch, Verlag, 81n  
 Geography Instruction Committee, 63  
 Grueber, Johann 7, 9  
 Guichard, J.P. 60n  
 Gurung, Harka 28n, 38n, 49n, 61n, 66, 67n,  
 68, 69n, 75n, 76n, 79n 80 84n, 85n  
 Gurung Kesav 9  
 Gutschov, Niels, 75n  
 Hagen, Toni, 42n, 43n, 45, 49, 52, 79, 85  
 Heim, Arnold 41n, 79n  
 Herzog, Maurice 42n  
 Himalayan Trekking Map 68  
 Holland, G.S. 43n  
 Honnegar, Donald, 55n  
 Hooker, J.D. 41, 49  
 Hotel Association of Nepal 74  
 Housing & Physical Planning Department  
 73n, 79  
 Hydrology and Meteorology Department 54  
 Ichac, Marcel 43  
 India, Government of 26,  
 Iozawa, Tomoya 44, 73n, 81, 85  
 Jest, Corneille 59n  
 Karan, Pradyumna P, 27, 73, 85  
 Kircher, Athanasius 9  
 Kirpatrick, William 7, 8, 18, 19, 78, 79  
 Kleinert, Christian 68  
 Korn, Wolfgang 73  
 Kummerly and Frey 26n, 41n, 43n  
 Kurz, Marcel 41  
 de l'Isle, Guillaume 7  
 Land Resources Division, O.D.A. (U.K.) 63n  
 Landon, Perceval 25, 41, 42  
 Latreille, M. 49  
 Libreria Alpina 45, 61  
 Lindesay, G. 7  
 Manandhar, I.N. 75n  
 Manandhar, M.S. 75n  
 Markham, Clements R. 7  
 Milleville, Rene de 67  
 Mines and Geology Department 49, 54n  
 Morris, C.J. 33, 63  
 Muller, Fritz 50, 55  
 Namgyai, Rinzin 22  
 Narahari Nath, Yogi 9  
 National Council of Science & Technology 86  
 National Geographic Society 80  
 Nepal Geographical Society 74  
 National Planning Commission 63

- Nest & Wings 75n  
 Nicolay, B.U. 62  
 Nishimura, Kashiro 85  
 Okada, Ferdinand E. 75  
 Ohta, Yoshihide 52n  
 Petech, Luciano 7  
 Przyłlok, Erich 52n  
 Publicity Department 85  
 Queen, James E. 73n  
 Ram, Hari 22  
 Research Scheme Nepal Himalaya 44n, 45  
 Roe, Thomas 7  
 Royal Geographical Society 43  
 Schneider, Erwin 29, 30, 31n, 51 43, 44n,  
 45n, 46, 67  
 Schweinfurth, Ulrich 44n, 59  
 Seemann, Heinrich 73  
 Sharma, C.K. 54  
 Sharma, Pitambar 86  
 Sherpa Trekking Service 67  
 Sherestha, Ram Krishna 86  
 Shrestha, T.B. 61n  
 Singh, Mani, 22  
 Singh, Nain, 22  
 Singh, Serbjecet, 81  
 Snellgrove, David 72, 73  
 Statistics Department (Nepal) 27, 84  
 Stocklin, J. 54  
 Survey Department,, 3, 24, 28  
 Survey of India 3, 25, 27, 32, 33, 34, 36n,  
 41, 45  
 Suwata, Eizo, 86  
 Suwata, Kazuyuki, 86  
 Swiss Foundation for Alpine Research 43,  
 55n  
 Tiger Tops, Ltd. 61  
 Tilman, H.W. 42n  
 Town & Country Planning Organisation 75  
 Troll, Carl 43n, 44n, 59  
 Tyson, John 44n  
 U.S. Air Force 33  
 U.S. Army Map Service 3, 35n, 67  
 Usselmann, Pierre 56  
 Vansittart, Eden 25n, 62n  
 Vista Maps 54n, 69n, 75n, 76n  
 Waddell, L.A. 23  
 War Office (U.K.) 3, 34  
 Waugh, Andrew 25  
 Webb, William, 22  
 Wignall, Sidney 43n  
 Willet, K. 82n  
 World Bank 82  
 Yakushi, Yoshimi, 86  
 Yoshinaga, Sado 86  
 Yoshizawa, Ichiro 85n

## ABOUT THE AUTHOR

HARKA GURUNG was born in Lamjung, Central Nepal (1939) in a Gurkha soldier family. He went to a military school in India and subsequently topped in the Intermediate Arts at Tri-Chandra College, Kathmandu (1957). He graduated from Patna University, India (1959) with First Class Honours in Geography. He joined the University of Edinburgh under a Colombo Plan scholarship and did Diploma in Geography (1961) and Doctor of Philosophy (1965). He has held teaching assignments at the University of Edinburgh, School of Oriental & African Studies, London, and Tribhuvan University, Kathmandu.

London, and Tribhuvan University, Kathmandu.

He was Member, Tribhuvan University Senate (1967), National Education Committee (1971-77) and National Planning Commission (1968-1972). He was Vice-Chairman, National Planning Commission (1972-75) and initiated regional planning in Nepal. In December 1975, he was nominated to the Rastriya Panchayat and was appointed State Minister for both Education and Industry & Commerce (1975-1977), and Public Works & Transport and Tourism (1977-1978).

He has represented and led country delegations to the Colombo Plan (1974, 1975), UNCTAD (1976), UNESCO (1976), TCDC (1978), ESCAP (1977 as Chairman), Rehovot Conference (1969), and IGC (1964, 1968, 1980). He has done consultancy work for UNDP, UNICEF and other development agencies.

Publications include ANNAPURNA TO DHAULAGIRI (1968), REGIONAL DEVELOPMENT PLANNING FOR NEPAL (1969), GRADUATES IN NEPAL (1972), VIGNETTES OF NEPAL (1980) and numerous articles on geography, economic development, politics and tourism.

tourism. He is presently finalising books on dimensions of development in Nepal, mountaineering history of Nepal and perspective study of Pokhara Valley. He is presently member of the National Commission on Population (Nepal) and engaged in full-time research and consultancy.



