PREFACE

Recurrent landslides leading to loss of human lives and properties have been causing severe erosion of revenue and slowing the pace of development in Gangtok town, the capital of the Himalayan state of Sikkim in north-eastern India.

The present researcher has as such conducted a thorough field investigation of the fragile tectono-morphic setup supported by various laboratories analysis and finally integrating all kinds of information to find out the hazard and high risk zones to be taken care of for reducing the potential hazard. Various aspects of land characteristics, human interaction and climatic impact have also been systematically studied using all modern techniques and instrumentation.

This research work had its initiation in the year 2000 when the present author took part in an excursion to Gangtok and was attracted by the overall geographical set up of the area. After post-graduation, the present researcher was encouraged by his teacher Prof. S. R. Basu who knew the terrain. As such the author took the opportunity to utilize the vast knowledge of Prof. Basu to continue his research work immediately after the completion of his P.G. degree. Since then, through his constant inspiration, help, guidance and encouragement the present research has been completed and to be presented for the Ph.D. degree of Calcutta University. The author would like to take the opportunity to extend his heartfelt thanks, gratefulness and gratitude to him. Moreover grateful acknowledgement is due to all the teachers of the Department of Geography, Calcutta University specially Professor S.C. Mukhopadhyay, Professor Pannalal Das, Professor Ranjan Basu, Professor K. Chatterjee, Sri S. Malakar and Dr. Sukla Bhaduri for their valuable suggestions and constant encouragement. Here, the name of Dr. Sunando Bandyopadhyay, Reader, Department of Geography, Calcutta University should be specially mentioned for his valuable guidance towards the preparation image processing and GIS map making.
Gratitude are also due to Dr. Arabinda Ghosh, Professor (Rettd.), Department of Geological Sciences, Jadavpur University, and Sri Animesh Bhattacharjee, Ex-Director, GSI (Eastern Region) for their constant help and guidance especially for geological aspects of this research. The name of Prof. Sukia Basu of the Department of English, Visva- Bharati University is to be gratefully remembered for her constant encouragement and mental support.

The researcher is also thankful to Dr. U. Bhattacharya, GSI, East Sikkim; Dr. P. Bhowmik, GSI, East Sikkim; Mr. S. Das and Mr. A. Kumar, Census of India, East Sikkim; Mrs. K. Lama, PHE, Gangtok, Govt. of Sikkim; Mr. P.D. Lepcha, UD & HD, Gangtok, East Sikkim; Mr. T.N. Tashi, Dept. of Geology and Mines, Govt. of Sikkim; Dr. D.R. Nandy, Ex-Director GSI, Kolkata for their constant help.

Special gratitude is also expressed to Dr. Ashis Paul and Dr. Debdas Roy (Geologist) who have implanted the seeds of research in author's mind since the college life at Asutosh College, Kolkata.

Grateful acknowledgement is due to Sri Arindam Gupta, Sri Koustab Chakraborty of Department of Statistics, Calcutta University for helping in the statistical calculations, Ms. Sampa Hazra for helping in petrological studies, (Department of Geology) Mr. Budhadeb Karmaker and Mr. Parimal Biswas for their help by providing relevant books and journals needed for this research work.

The author is also thankful to the Librarians of the Dept. of Geography, University of Calcutta; ISI, Kolkata; GSI, Kolkata and G.B. Panth Institute of Himalayan Studies, Tadong, East Sikkim for helping in supplying different books and journals as when required.

Special gratitude is due to Dr. S.P. Sinha Roy, Ex-director CGWB, Kolkata and Dr. P.K. Sikdar, Prof. Hydrogeology, IISWBM, for their encouragement during hydrology course in IISWBM.

The author expresses his sincere gratitude to Dr. Sunil Kumar De, Lecturer (Sr. Scale), Tripura University for his constant help and encouragement in all matters related to this research work.

Thanks are also due to Dr. Ramakrishna Maity, Dr. Paramita Majumdar, Dr. Sisir Chatterjee, Ms. Sutapa Saha, Mr. Jayanta Sen, Ms. Suman De (Sen), Ms. Mousumi
Basu, Raja Ghosh, Sumana Bhattacharjee, Chandan Golui, Abdul Halim Molla, Dilip Maity, Sudipto Tripathi, Somnath Bhattachaerjee, Kalyan Howlader, Tara Prasanna Mukherjee, Mithun Pramanik, Ananda Gopal Maiti, Atanu Mandal, Pranab Kumar Dash, Khurshida Khatun for rendering their sincere help. I would like to thank some of my students like Mithun Pramanik, Atanu Mandal, Ananda Gopal Maiti and Pranab Kumar Dash for their day and night attention in preparing of the manuscript and in drawing the maps and sketches.

Special thanks are due to Dr. Soumitra Gupta, Dr. T. Das and Mr. S. Tripathi for helping in analyzing the soil samples, Mr. Deepak Mathur for his untiring patience in drawing the maps, Ms. Ruby Das for helping in typing and preparing the layout of this thesis. Last but not the least the author gratefully acknowledges the help rendered by his family members by their moral support towards the completion of the present research.

Biswajit Bera
23.07.07