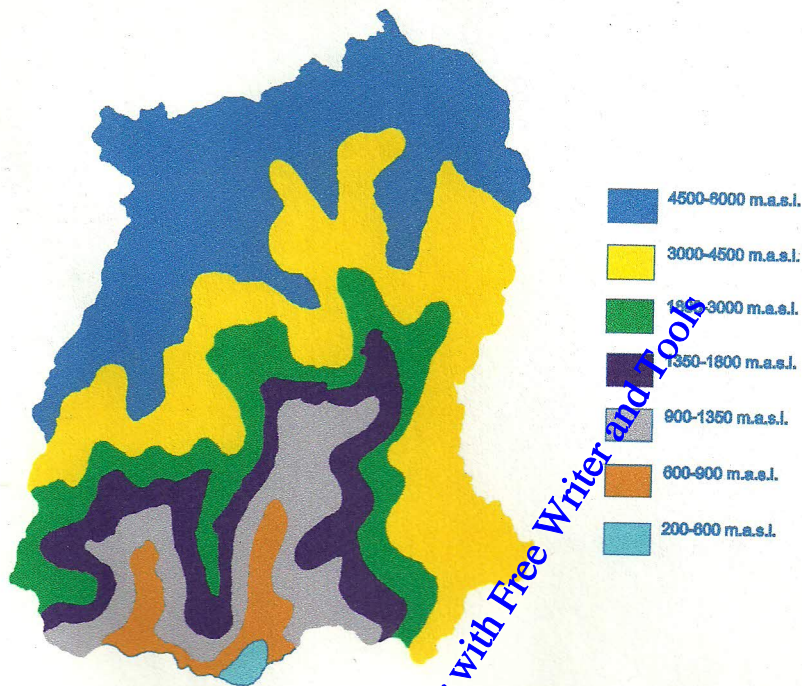


Status Report For Initiating Landslide Studies In Sikkim

DST Project No.ES/11/09



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On
Status Report for Initiating
Landslides Studies
In
Sikkim

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(Visiting Fellow Sept. 1999 to Sept. 2002)

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Introduction

Lofty Himalayas are the highest mountain chain in the world. They were formed by the collision of Indian plate with the Tibetan plate. The uplift of Himalaya changed the climate of the globe. One of the most spectacular and intriguing atmospheric phenomena is the monsoon. The rain provides life giving water to millions of people in the subcontinent on one hand, and cause accelerated erosion by various processes on the other hand, one of them being mass movements in Himalaya. North Eastern Himalaya experience very high incidence of landslides every year, destroying the road communication system, engineering structures, and causing loss of life and property. This retards the development activities of a region. Fig 1.1 depicts instability condition around the state capital. Sikkim in particular witnesses very high incidence of landslides.

Government of Sikkim approached Department of Science and Technology (DST) Government of India to help undertake systematic study of landslide problems in the state. Prior to undertaking such a systematic study DST felt the need of status report on landslides in Sikkim, which would form the basis for the preparation of an action plan for undertaking landslides studies in the state. Number of workers has published their results and observations of their work on landslides in Sikkim Himalayas in number of journals and symposia. Geological survey of India has carried out substantial amount of work which has been published in their records, memoirs and special publications, but many of their reports on landslides in the state are not published, and hence out of reach. Directorate of Geology and Mining, Government of Sikkim has quite a few unpublished reports on landslides in the state. The Department made these reports available for consultation to the authors. Central Building Research Institute, Roorkee and Central Road Research Institute New Delhi have also carried investigation of landslides in the state. Results of some of their reports are published but most of the reports are unpublished. Proceedings of seminar on landslides and erosion problems with special reference to Himalayan region (24 – 26 February 1975) is possibly the only publication where number of papers on the problems of landslides in the state of Sikkim are published in one place. In recent years, especially after the 09 June 1997 disastrous landslides in Gangtok. Recent significant work has been carried by Central Soil and

Material Research Station in collaboration with the Norwegian Geotechnical Institute, Norway. DST sponsored research project at Jadavpur University, Kolkatta has undertaken geotechnical investigations for Chandmari landslide in Gangtok.

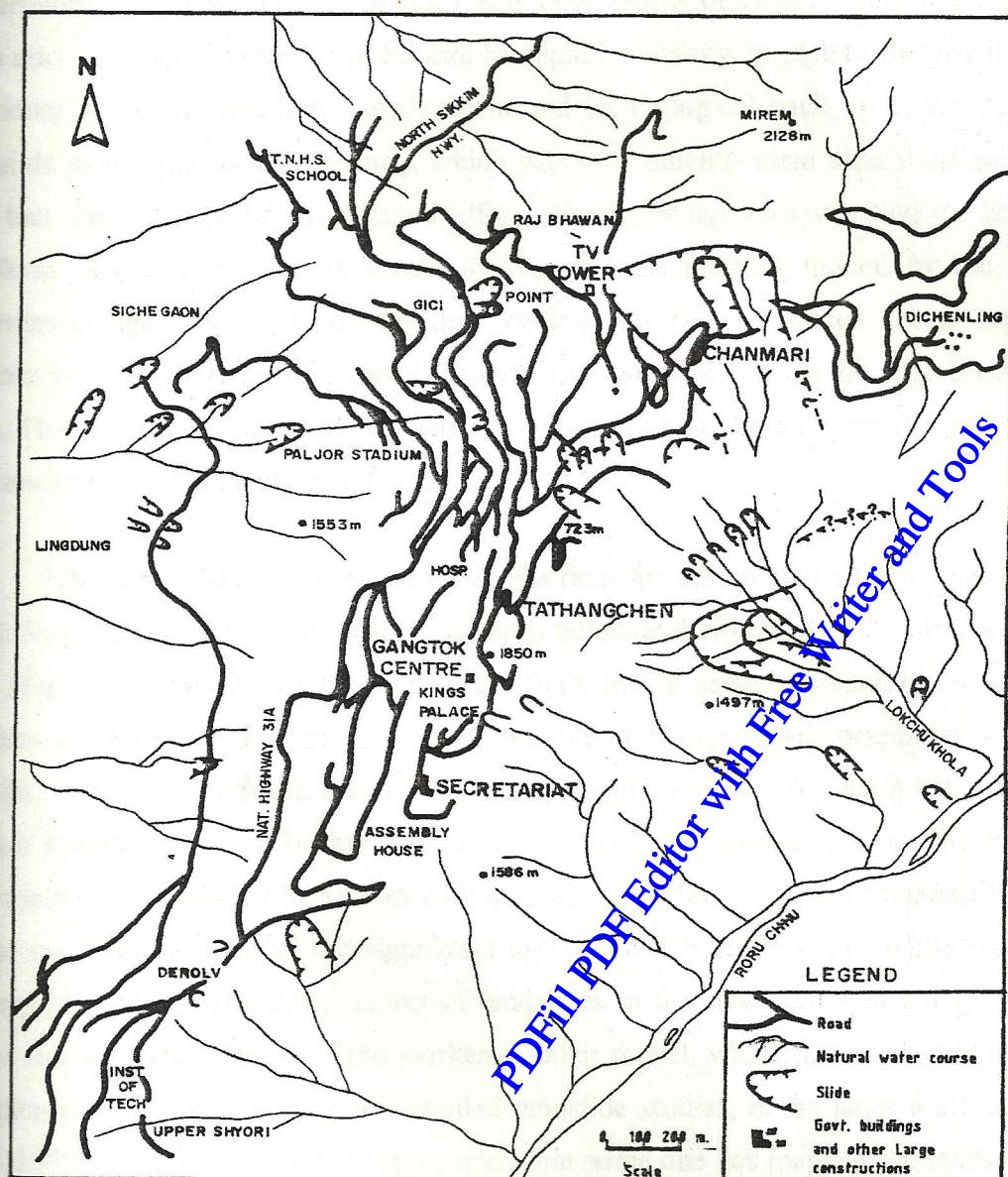


Fig. 1.1. Instability conditions around Gangtok state capital
(after Bhasin et al 2002)

DST considering the problem of frequent landslides in Sikkim considered the possibility of establishment of a multi disciplinary cell dedicated to landslide studies in the State. In April of 2002 authors visited the state along with the DST team to discuss the

issue of establishment of a multi disciplinary cell dedicated to landslide studies and to get the first hand knowledge of the problem of landslide in the state. During the visit, meetings were held with Chief Secretary and Secretaries to Department of Forest, Department of Science and Technology and Department of Geology and Mining. DST team also met Vice Chancellor of Sikkim Manipal University to explore the possibility of providing academic, research, development and technological back up to the proposed landslide unit in the state. One thing, which was very much evident after these meetings, was that there is lack of coordinated effort by various agencies working on landslide problems in the state. This is especially true for the projects funded by the central government agencies. Most of the time central government funded teams not even interact with the State Government Departments while working on the landslides in the state. This practice needs to be rectified in coming years to get better results and address the needs of the state Government.

Sikkim has been divided into four districts for administrative purposes – East, West South and North. South District is the smallest and North District is the largest in area (Fig 1.2). Majority of the population lives in the eastern, western and southern districts of the state. The main river of Sikkim is Teesta which originates in North Sikkim, runs North to South and has large number of tributaries of which the major one is river Rangit (Fig 1. 3). In this work an effort has been made to tabulate the available information on landslides in Sikkim with an aim to provide the reader an overall picture of the work carried. One of the significant aspects, which has emerged while compiling this report is that geotechnical aspect of landslides in the state has been not given been given due attention by most of the workers. Other aspect, which has not been given due weightage, which is necessary for detailed landslide studies, is the large scale mapping i.e. 1:1000, or 1:5000. Even if it is presumed that some one has mapped the landslides on large scale it is not reflected in the publications by and large, and this situation needs to be rectified in the future. It is commonly agreed that water is the prime cause of landslides, which is provided in large measures by prolonged monsoon rain in the state. Rain triggers landslides of various magnitude, type and size. In this work an effort has also been made to review the available rainfall records of Gangtok and Darjeeling in the adjoining state of West Bengal. After reviewing geomorphologic, climatic, geologic and tectonic settings, having bearing on landslide activities, a set of recommendations is made for preparing an appropriate plan of action for detailed landslide studies in the state.

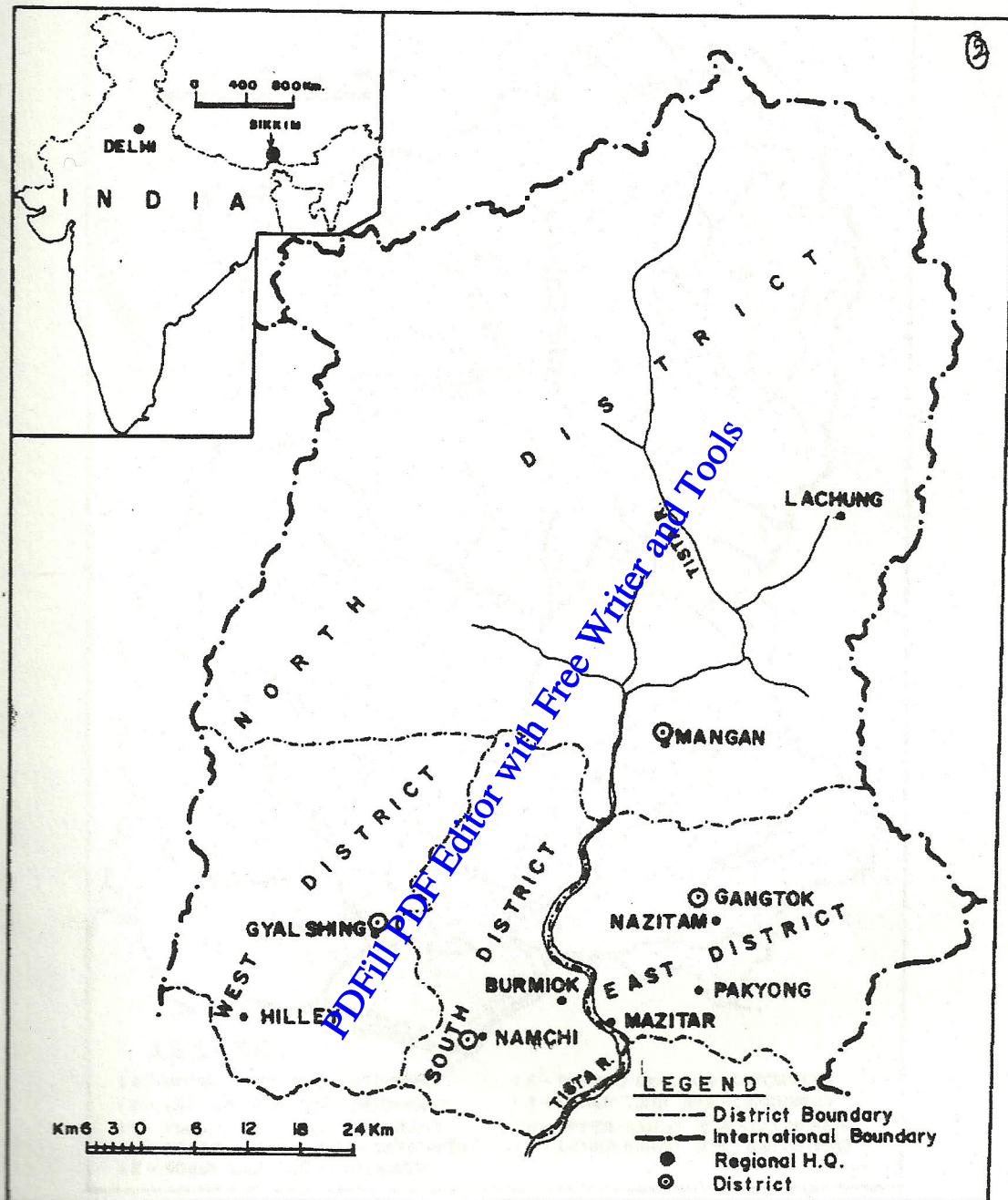


Fig. 1.2. District boundaries of Sikkim (after Tejwani 1981)

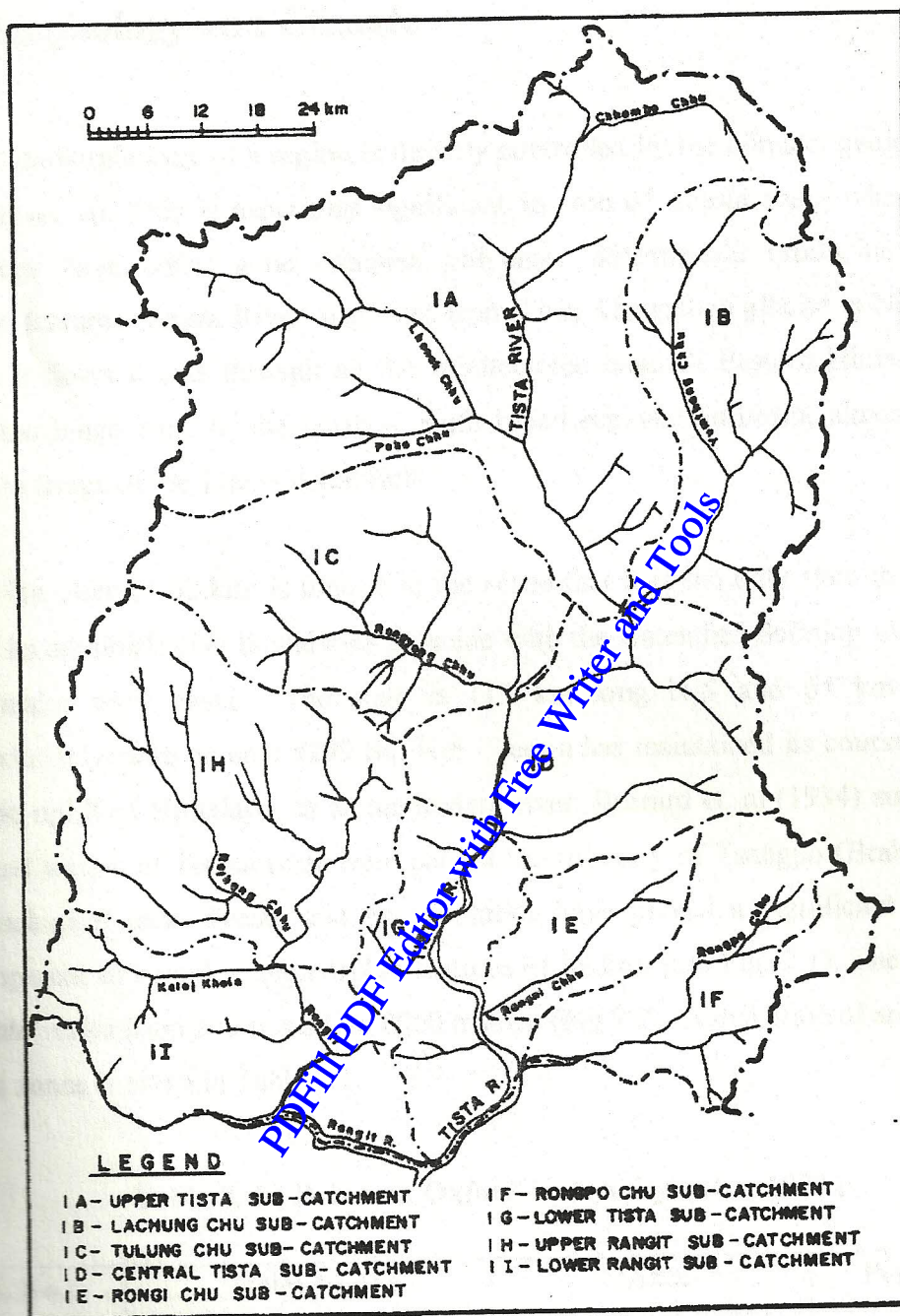


Fig. 1.3. Major drainage network in Sikkim (after Tejwani 1981)