Tropical Geomorphology

Although similar geomorphic processes take place in other regions, in the tropics these processes operate at different rates and with varying intensities. Tropical geomorphology therefore provides many new insights regarding geomorphic processes. This textbook describes both the humid and the arid tropics. It provides thoroughly up-to-date concepts and relevant case studies, and emphasises the importance of geomorphology in the management and sustainable development of the tropical environment, including climate change scenarios. The text is supported by a large number of illustrations, including satellite images. Student exercises accompany each chapter.

The book highlights three areas:

- Geology, landforms and geomorphic processes in the humid and arid tropics
- Source-to-sink passage of water and sediment from the mountains to the sea
- Anthropogenic alteration of natural geomorphic rates and processes, including climate change.

Tropical Geomorphology is an ideal textbook for any course on tropical geomorphology or the tropical environment, and is also invaluable as a reference text for researchers and environmental managers in the tropics.

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In Memory of Reds

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Preface

This is an introduction to a very large part of the world's surface with rich and varied landforms. The tropics include high mountain ranges, major rivers, ancient surfaces, large alluvial plains and deltas, arid landscapes, and wonderful examples of volcanic landforms. The tropical oceanic coverage is huge and it influences the world's climate. It is surprising that, in spite of a recent spurt in case studies, our knowledge regarding the geomorphology of the tropics remains limited and that case studies from the tropics have hardly been used for generalisation and theory construction. This lacuna is fascinating, especially as all world maps on sedimentation rates indicate that huge amounts of sediment are pouring into the oceans from certain parts of the tropics, as a result of events happening inland.

No single template can exist for tropical geomorphology given the wide variations in regional geology, climate, and land cover. A major part of the tropics carries old subdued landscapes that have evolved since the Gondwana era, whereas other parts, including active plate boundaries and large alluvial plains, are much younger and may record a rapid rate of erosion and sedimentation. The original land cover is changing drastically and the current rates of geomorphic processes are no longer natural everywhere. The old images of a chemical-weathering driven, deep regolith-covered landscape of large plains and isolated hills are only partly correct.

This book is an attempt to present the tropics in their rich and varied reality. This objective has determined the selection and arrangement of topics included for discussion and the level at which they have been covered. The book updates the concept of tropical geomorphology in stressing the increasingly important anthropogenic alterations of the landscape. The book ends with an attempt to look into the future of the tropics, given current modifications such as climate change. The approach of the book also defines the expectations from its users. It is written primarily as an advanced undergraduate textbook and assumes that the readers already have a basic background in physical geography or geology. It makes no further demands apart from an interest in the tropics.

Two aspects of the book should be mentioned. It is well illustrated, as a book in geomorphology should be, and the illustrations are of equal importance to the text. The illustrations include several high-resolution satellite images from IKONOS. Given the 1 m resolution of these images, they are a wonderful tool for future geomorphological studies, a tool which is probably not as well used as it should be. We now even have commercial satellites capable of providing images at 50 cm resolution. The second aspect of the book is the set of questions at the end of the chapters. These are a mixed batch; some for problem solving, others encouraging the reader to think in more detail beyond the text. Like the illustrations, these questions complement the text.

The formulation of this book started decades ago, when I was a student in Presidency College, Kolkata and had trouble matching what I read in books with the landscape around me or even with the landscape displayed on the topographical sheets of India. I am immensely grateful to the late M. G. Wolman for allowing me to do my PhD fieldwork in Jamaica which was a liberating educational experience. A long stay in Singapore permitted field access to Southeast Asia. My various friends and colleagues completed my education by allowing me to work with them in the field in various parts of the tropics. I am indebted to all of them.

The introductory chapter has benefited tremendously from the comments of Professor Wolman. Parts of the book were also read and commented on by Liew Soo Chin, Jean-Claude Thouret, Richard Corlett, and Anthea Fraser Gupta.The Centre for Remote Imaging, Sensing and Processing (CRISP), National University of Singapore very kindly allowed me to use satellite images from their archives. I have also been permitted to use illustrations from a number of publications, which are acknowledged in specific places. I should acknowledge the kindness of Lee Li Kheng in drafting the figures and of David Appleyard in transforming my photographs into publishable material. I am grateful to Jean Rollinson for her careful copy-editing and to Laura Clark of Cambridge University Press for guiding me through the production stage.

Avijit Gupta