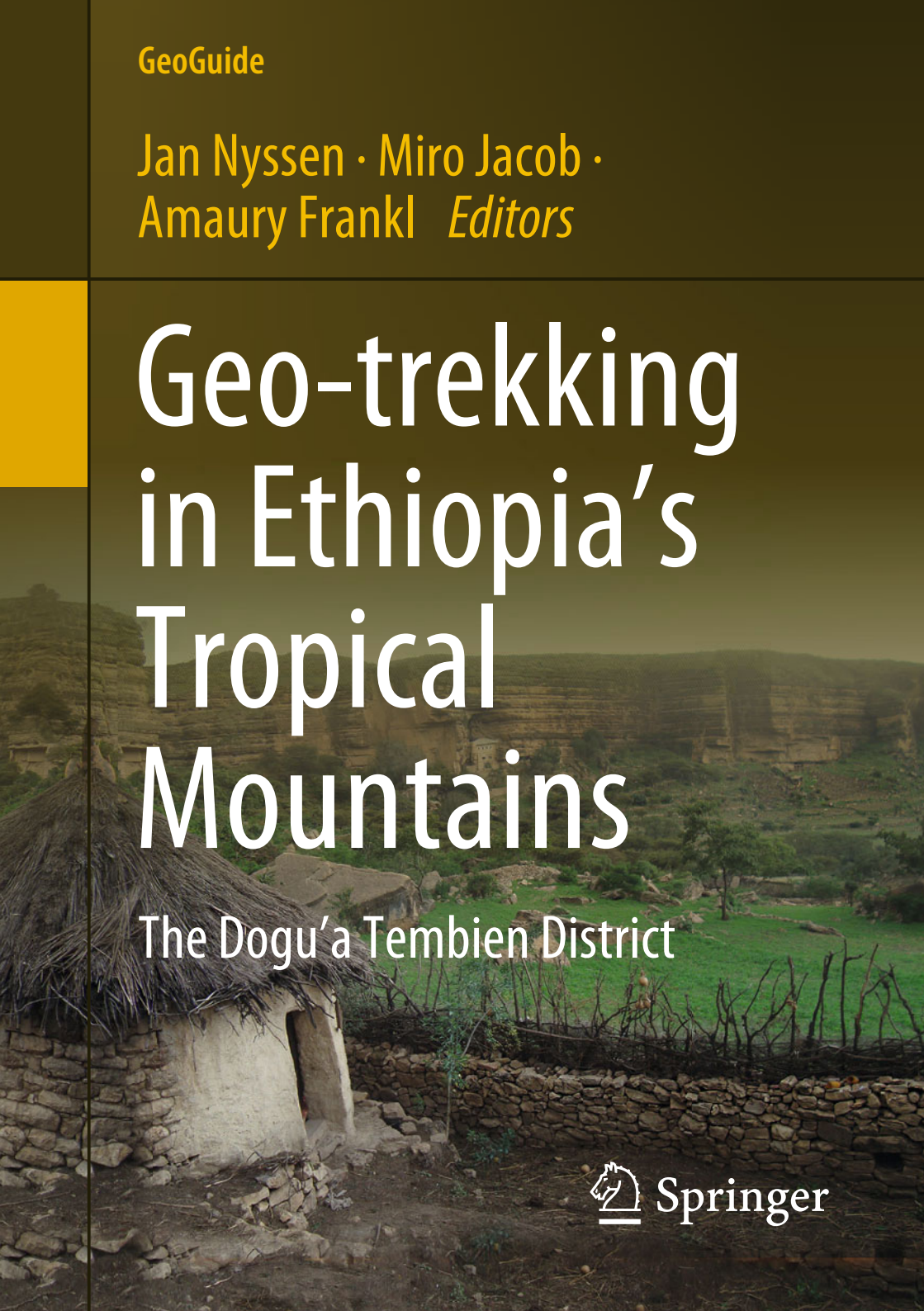
GeoGuide

Jan Nyssen · Miro Jacob · Amaury Frankl *Editors*

Geo-trekking in Ethiopia's Tropical Mountains

The Dogu'a Tembien District



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GeoGuide

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Foreword I

As the first of its kind, *Geo-trekking in Ethiopia's Tropical Mountains, the Dogu'a Tembien District* represents the state of the art of the scientific knowledge concerning a district in Ethiopia where the natural and social environment and the agricultural system have been intensively investigated. Several studies on a Ph.D. and M.Sc. level were conducted by Ethiopian and Belgian students. For their field studies, the students stayed with the community to understand, comprehend and internalise the manifested social and biophysical dynamics. Furthermore, the insights into the indigenous knowledge of the communities have been explored and incorporated in the knowledge systems used to close the gap between the farmers' knowledge, scientific interpretation and the perception of the policymakers. Several workshops, conferences and seminars were organised (involving the communities) so as to own and sustain the generated knowledge. In the villages, young students were engaged as data collectors, translators and guides. Their contributions made a substantial improvement in understanding the whole landscape, including the cultural and physiographic heritages.

The book aims to reach a broader public and includes a very accurate and self-explanatory map, I believe the first such detailed map in the region, as well as a description of the trekking routes. This makes it an interesting source of information and a guide for international as well as local visitors. As much as possible, the technical jargon was minimised to enable readers to immerse themselves in the scenic landscape with evidently revealing observation points. Previously unexplored cultural and heritage sites are described and incorporated into the chapters. It is appropriate to mention the tremendous trust and confidence we got from so many local people to reveal all the pertinent information to our researchers during visits to viewpoints, churches, caves, households and community engagements.

The Dogu'a Tembien GeoGuide builds upon the outcomes from the Mekelle University's cooperation with its Belgian partners. The editor, Prof. Jan Nyssen, has been instrumental in this endeavour as he partnered through smaller and larger projects. Together with the co-editors Dr. Amaury Frankl and Dr. Miro Jacob and many senior colleagues, they coached the M.Sc. and Ph.D. students from Mekelle University and from various Belgian universities for their fieldwork in Ethiopia. They also initiated different development projects, particularly in the Dogu'a Tembien District, such as May Zegzeg, EthioTrees, Ma'ar and School WatSani. The results from all these activities formed the basis for this book and allowed to attract other high-level scholars so that a large range of natural and social sciences could be addressed.

In September 1994, when Jan came for the first time to undertake his M.Sc. field study, I accompanied him to Dogu'a Tembien as his local promoter. That is when he fell in love with the people and the landscape of the area. He vowed to understand the socio-economics and biophysical attributes of the area and wanted to share it with researchers, academics and policymakers. In "sickness and health", he is still in solidarity with the society who openheartedly accepted him and several students to undertake their research. Since then, he has been coming regularly to Ethiopia for research linked with several universities. When in Ethiopia he mostly lives in Dogu'a Tembien—he knows the district like his hand palm, likewise the people also know him as their kin. "Mister Jon" is a household name in the area.

Jan and the other authors of this book have published many articles in peer-reviewed journals, as a first author and as a co-author together with Ph.D. students. All this accumulated scientific knowledge is now accessible to a broader public.

We hope that the publication of this book will contribute to tourism development in Tigray and to diversification in tourism branding. Ethiopia has a lot to offer to geo-tourists, in the concept of geo-parks, and Dogu'a Tembien could become a major geo-touristic destination, given its unique ABC combination: "A" for Abiotic, with the presence of numerous different geological formations, clearly visible as the landscape is deeply nicked, and a wide variety of soil types, each used for a specific purpose; "B" for Biotic with more than a hundred church forests and several remnant forests—the Chege forest measures almost one square kilometre; and "C" for Cultural with ten ancient rock churches, military headquarters in caves or birthplaces of historic persons: Ras Alula is from Mennawe, Emperor Yohannes from Melfa, and there are claims that the Queen of Sheba was born near Tselere. Special attention has been given to the traditional agricultural system and the recently improved

land management, which allow the *Tembienot* (inhabitants of Tembien) to live in an—sometimes challenging—environment but resilient enough to change it into opportunities.

Mekelle, Ethiopia
February 2019

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Foreword II

It is a great pleasure for me to introduce the present publication on geo-trekking in Tigray, for several reasons. The book, the online map and the trekking guide provide the first-time ever description of an area in Ethiopia that deserves to be better known for its invigorating landscape, inspiring people and rich heritage locations. The Dogu'a Tembien area is a fascinating example of a rural landscape with a history as old as the Aksumite kingdom. The area is a stronghold of Christianity, with numerous churches that can be visited along the geo-trekking routes described in the present publication.

The materials provide an excellent basis for fostering sustainable tourism in a local setting where tourism infrastructure has so far been largely absent. Here, visitors will trek along local trails and stay overnight in traditional housing, bringing with them most of the items they need for their well-being, such as sleeping bags, maybe tents and cooking materials, as well as water purification devices or tablets. They will be more than rewarded for their choice of modest conveniences by encountering traditional lifestyles and visiting beautiful sites.

Many of the geo-sites described along the trekking routes are of national and international significance. The authors have taken great care to describe these sites for visitors who want to improve their on-the-spot understanding of geomorphological, geological and hydrological features in a tropical mountain setting, and who wish to deepen their insights into the historical, sociological and cultural dimensions of the land and its agriculture.

Three distinguishing features characterise the authors' work. The first volume of *Geo-trekking in Ethiopia's Tropical Mountains*: *The Dogu'a Tembien District* provides an excellent example of science-based information on the Dogu'a Tembien environment. Although it can be used as a stand-alone scientific publication, it will be even more valuable when used in combination with a field tour along one or several of the many trekking routes provided.

Second, the geo-trekking map has been prepared as an online supplement to the book, originally prepared at a scale of 1:50,000 on which all locations and trails are found, and where some features for geo-trekking have been added. Besides topography, which is represented with contour lines at 25 metres' vertical interval, a hill shade and the river network, the map shows general land cover, location names, boundaries, trails and roads, Christian churches, and most importantly, names of locations with specific geo-features described in the book, such as caves, waterfalls, quarries, landslides, terraces, gullies and many more.

Third, the separate guide for trekkers starts with useful general information, followed by a detailed description and illustration of close to 40 trekking routes, each lasting from a few hours to several days. Most routes start in a given location at, or nearby, the town of Hagere Selam, the capital of Dogu'a Tembien District, and end in a location of particular interest, such as a rock-hewn church, a waterfall or a spectacular view of the landscape. Some routes follow, in part, motorable tracks that can be used for shortening the walk or making a quick motorised return to the centre possible, where more modern facilities for lodging and eating are available. In addition to the time calculated for the routes, travellers will have to add the time to the starting point as well as the time to return from the end point. For routes up to about 5 hours' walking, a good physical condition will suffice, whereas for routes from 5 to 15 h, prior training will definitely be needed. Finally, a few of the routes are long-distance treks; i.e., they last several days and end as far as the Simien Mountains situated in Gonder, way beyond Tekezze River. Distance, duration, difference in up-and-down elevation and degree of difficulty are given in a graphic format at the beginning of each description, while the text is supplemented with a detailed account of features along the trail, often illustrated by photographs, graphs, drawings and cross-sectional profiles. Finally, very useful in the trekking guide is a Tigrinya—English glossary, with nearly 200 most useful words for the non-Tigrinya speaker. It is, however, assumed that all groups travelling on foot in such an area will employ a local guide to accompany them. The English of these guides will usually be limited, so that knowledge of some words in Tigrinya will not only be useful, but will also guarantee immediate attention from local people who will always react positively to such efforts.

In sum, I wholeheartedly recommend this publication, particularly for its innovative combination of scientific material and an online overview map with a broad number of geo-trekking options. Let us hope that this will motivate many local to international visitors to travel to Hagere Selam Town and use the

geo-trekking material to visit the Dogu'a Tembien area and learn more about its rich geo-heritage, current landscape and hard-working people.

Erlenbach im Simmental, Switzerland
February 2019

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Preface for Volume I

In order to reach a broader public of people who are interested in geo-sites and human–environment interactions, we took the initiative to prepare a geo-guide concerning the District Dogu'a Tembien in Ethiopia. This mountainous area with a rich culture and a scenic landscape is probably the most studied in the country. We attempt to make our research findings accessible to a wider public, pointing at the observations on geomorphology, geology, hydrology, vegetation, human–environment interactions, rural sociology, land management and soil and water conservation and particularly the large effort that is done on environmental management. At the same time, Volume II provides concise and site-specific contents for scientific and student excursions, and it enhances and promotes geo-heritage and geo-tourism.

Since our large team has been carrying out research in that district for 25 years and has published in journals and organised conferences, the time has come to convey the wide array of new scientific knowledge to the broader public. This has already partly been done through field trips with farmer groups and excursions of conference participants (Dryland Forests 2004; High Land 2006; Water 2011; Livelihood 2013), stays and treks by three international scientific trips (two by the International Association of Geomorphologists and one by the Belgian Flemish Association of Geography Teachers), one excursion with our own master's students and the publication of a 100-page vulgarisation work in the Tigrinya language. Here, the scientific writings and the earlier partial field guides have been fully rewritten, edited, reviewed and published as a comprehensive geo-touristic work.

Many of the geo-sites in Dogu'a Tembien are only accessible on foot, and data collections for the different chapters were mostly done that way. As this involved many semi-permanent stays in Dogu'a Tembien, we could prepare Volume II as a trekking guide, which will enhance the sustainable trekking tourism at the same time. Volume II indicates the exact field locations of the

geo-sites: whoever is working, living in or visiting Ethiopia can observe our findings in the field.

Volume I reads as a regional geographical monograph, reporting dense research findings for one district of about 1000 km^2 in Ethiopia; it is also the first geo-trekking guide for the country. After a Part I (five chapters) that sets the natural and social scene (of the district), the seven chapters of the Part II cover the details of geology and geomorphology and include the best sites for geological observations, as well as the setting of Dogu'a Tembien's rock churches. Part III addresses the surface water, groundwater and rivers. In Part IV, the biodiversity, forests, flora and wildlife are handled, whereas Part V presents the different geomorphic processes that can be observed (and that have been studied in detail) in Dogu'a Tembien. Part VI discusses the interaction between humans and the environment, particularly the agricultural system, soils, land use, livestock and land management, while Part VII holds five chapters about the historical, sociological and cultural dimensions, all in relation to the land and environment. As stated, Volume II provides information so as to allow a geo-trekking visit to the district: detailed logistics, a description of more than 350 km of geo-trekking routes and a specially elaborated geo-trekking map on a scale of 1:50,000.

The authors of each chapter tried to avoid the most specific jargon of their research field or explained the terminology otherwise. Yet, when necessary, Andrew Goudie's glossary (http://www.geomorph.org/2014/07/iag-glossary-of-geomorphology-by-prof-andrew-goudie-2/) will set the reader back on track (jointly with Wikipedia).

The editors, after consulting Tigrinya linguists, have not applied a scientific transcription of the Ge'ez into the Latin script for location names and historical persons, which would require the use of diacritics. We tried to render the terms as close as possible to the Tigrinya originals, both in spelling and pronunciation. Stressed consonants are doubled in the transliteration: "Addi". We however allowed simplifications, for example if diphtongues would sound like one vowel. Single speech marks (') are used after letters that are pronounced with an ejective or guttural sound. Regarding place names, we have also adopted the form that was utilised in the local discourse, particularly the shorter colloquial form of longer place names; an example is "Dabba Selama", which is the short form of "Inda Abba Selama". In a few exceptional cases, we departed from this line of thought when names had become standardised in the international usage: Mekelle, Adigrat, Haile Selassie, Kolla. For location names within the designation of the geological formations, we continued to apply the terminology that had been transmitted since the early geological

works in the nineteenth century, though they sometimes depart strongly from the actual names of the place that was referred to: "Antalo Limestone" refers to the town of Hintalo (the formation does not even outcrop in that place!). Obviously, for the names of the Ethiopian authors of our chapters or of cited publications, we have accepted the transliteration used by the authors themselves. In the reference lists, Ethiopian authors are conventionally referred to by their name followed by their father's name.

Almost every chapter holds one or several maps that indicate the (relative) location of the geological or geographical features. For the exact positioning, we refer to the online supplementary map of Volume II (Chap. 36). Furthermore, Chap. 31 discusses all maps and aerial photographs available for Dogu'a Tembien in detail.

Finally, the two volumes of this book have been written for a broad audience inside and outside Ethiopia, including tourists interested in natural resources, occasional visitors, regional geographers, inhabitants of the surrounding cities (who look for a weekend activity), tourism professionals, government decision-makers, hikers who want to go "off the beaten track" and scholars from various disciplines looking for background information on Dogu'a Tembien and Tigray. We hope that it will please you…

Ghent, Belgium
February 2019

Jan Nyssen
Miro Jacob
Amaury Frankl

Preface for Volume II

In order to reach a broader public of people who are interested in geo-sites and human–environment interactions, we took the initiative to prepare a geo-guide concerning the District Dogu'a Tembien in Ethiopia. This mountainous area with a rich culture and a scenic landscape is probably the most studied in the country. In Volume I, we attempted to make our research findings accessible to a wider public, pointing at the observations on geomorphology, geology, hydrology, vegetation, human–environment interactions, rural sociology, land management and soil and water conservation and particularly the large effort that is done on environmental management. Volume II provides concise and site-specific contents for scientific and student excursions, and it enhances and promotes geo-heritage and geo-tourism.

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Volume II holds numerous cross references to themes developed in Volume I. Yet, when necessary, Andrew Goudie's glossary (http://www.geomorph.org/2014/07/iag-glossary-of-geomorphology-by-prof-andrew-goudie-2/) will set the reader back on track (jointly with Wikipedia).

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Ghent, Belgium
February 2019

Jan Nyssen
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Acknowledgements for Volume I

The editors wish to thank the large number of people who have contributed to this book, including the inhabitants of Dogu'a Tembien, the authors, the reviewers and publishing staff.

In Dogu'a Tembien, literally thousands of people (mostly farmers) have given information, granted access to their land, invited researchers to their home for coffee or *siwa*, provided accommodation and shown directions. Priests have opened their churches, and office-holders made data available. On the occasion of group excursions, the villagers from Hech'i, Harena and other settlements have organised welcome parties for the visitors. The society as a whole hosted researchers and students, who could also benefit from the skills of their housekeepers and cooks. We have learned to walk in these mountains from local people, who guided us through the tangle of paths and field accesses. Guides and translators were our direct link to the cultural environment. They taught us to see, hear and understand the landscape and told us if it was possible to walk across a farmers' field, where a dog could be expected, or when it was time to speed up (in order to reach home before sunset).

The authors are to be congratulated for their contributions and their numerous revisions and for moulding the text into the format of this book. The authors are from Ethiopia and many other countries and have strong expertise in their fields. Most of them are academics, but a few also come from governmental and non-governmental organisations. The authorship reflects likewise close international collaborations and friendships overseas.

We particularly wish to thank Johanna Schwarz and Claudia Mannsperger at Springer Nature in Heidelberg, Germany; through lots of correspondence on the manner in which the book should be conceived and complemented, they have always encouraged and assisted us in a very professional way. Frances Williams, author of "Understanding Ethiopia" in the same Springer GeoGuide series, gave useful conceptual advice regarding this book and reviewed several

chapters. A large group of scientists reviewed one or more chapters and followed up the rewriting: Alemayehu Wassie, Andrea Sembroni, Araya Alemie, Bart Muys, Bedru Babulo, Ben Derudder, Biadgilgn Demissie, Daan Dekeukeleire, Denyse Snelder, Derege Meshesha, Elise Monsieurs, Etefa Guyassa, Federico Sani, Francesco Dramis, Geert Baert, Geoffrey Houbrechts, Hanne Hendrickx, Hans Hurni, Harapriya Rangan, Jan Kropáček, Jan Moeyersons, Jan Vanderborg, Joost Dessein, Jozef Deckers, Jozef Naudts, Karen De Coene, Karen Vancampenhout, Katrien Descheemaeker, Kristien Ooms, Liesbet Nyssen, Lieve Dillen, Lorenzo Borselli, Luc Lens, Lukas Mauerhofer, Mark Breusers, Meheretu Yonas, Mekete Dessie, Nils Broothaerts, Paolo Billi, Pierre-Gil Salvador, Raf Aerts, Rossano Ciampalini, Seifu Admassu, Sofie Annys, Stéphane Follain, Tesfaalem Ghebreyohannes, Tesfay Araya, Tony Prave, Valery Terwilliger, Veronique Dermauw, Vincent Hallet, Willy Verheye and Zbelo Tesfamariam. Bart Dewit from the Geography Department of Ghent University customised an in-house editorial management Web interface. Sabine Cnudde and Karine Van Acker from the same department contributed to proofreading and technical support. Ronald Ykema assisted in mapping, and Mieke Nyssen has artistically drawn the 16 large mammals of Dogu'a Tembien.

Over the years, many institutions have funded the research that lies on the basis of the various chapters. All these financial contributions are recognised, but listing all would inevitably lead to embarrassing omissions. Yet, there should be a special mention for the core contribution by the Flemish University Cooperation VLIR-UOS from Belgium.

On a more personal note, Jan Nyssen, the lead editor of this book, wishes to acknowledge the support by his spouse Annemie Goossens, throughout 25 years of research undertakings in Ethiopia.

Acknowledgements for Volume II

The editors wish to thank the large number of people who have contributed to this book, including the inhabitants of Dogu'a Tembien, the authors, the reviewers and publishing staff.

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We acknowledge the assistance of Seifu Gebreslassie, Abraha Teklu and Romha Assefa in locating the geo-sites and establishing the trek routes. Raf Aerts contributed substantially to the section on mountain safety, and Wolbert Smidt coached the consistent transliteration of place names from Ge'ez to Latin alphabet. Sofie Annys, Miro Jacob, Hanne Hendrickx, Liesbet

Nyssen and Hailemariam Meaza read parts of the chapters of Volume II and contributed significantly to restructuring it. All co-authors of chapters (Volume I) are acknowledged for indicating potential geo-sites, as well as Frances Williams and Amaury Frankl for thoroughly reviewing Chaps. 37 and 38.

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