

云南植被生态景观

Vegetation Ecological Land-
scapes of Yunnan

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Vegetation Ecological Land- scapes of Yunnan

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Preface

Ecological environmental issues are attracting people's increasing attention today. Many problems pertinent to the existence and development of human beings, such as environmental protection and ecological equilibrium, are constantly being discussed in daily life and in the newspapers. At present, appreciation of natural resources and conservation of the environment have been enhanced as global strategies. A pressing matter is to give full attention to environmental deterioration, natural resource depletion and the scarcity of energy resources, which are matters of vital importance to human society.

Environmental degradation is usually linked to misuse of natural resources; it is reinforced by air and water pollution as a result of industrialization. However, at present, not everyone fully understands the formation and development of environmental factors and their interactions. Public education is urgently required. Vegetation is the main part of the immense and complicated eco-environmental system, which is of decisive significance to many other environmental factors, and forms various natural landscapes on the earth. After reading this book, readers are expected to be aware of the numerous plant communities in Yunnan and their ecological conditions, and to give full attention to the environment.

In the light of the unusual eco-envi-

ronmental conditions of the low-latitude Yunnan Plateau, this book, with color photographs as its main feature, is systematically arranged by chapter and section according to the characteristics of composition, structure and physiognomy of the different vegetation types. The book fully displays the rich and colourful cubic landscapes, especially those on the Yunnan Plateau. Gathering together many photographs taken by Yunnan scientific workers in botany, ecology and forestry for years, this basic reference book is of substantial content, and for popular consumption it is best to use visual images.

Yunnan has a strong appeal to scientific workers both at home and abroad because of its extremely diversified biological resources. It is a paradise indeed for scientists of geosciences, ecology, botany, zoology, forestry and agronomy. This elaborately prepared album vividly depicts this paradise; I believe it will meet the reader's expectation.

Wu Zhengyi

20 December 1993

序 言

生态环境问题在当今社会中越来越引起人们的重视,在日常生活中以及报章杂志上经常论及至此。爱惜资源,保护生态环境等生态学方面的问题,已提到有关全球战略的高度,诸如生态环境的恶化、自然资源枯竭、能源短缺等等,业已成为当前人类社会生死存亡的重要问题,必须引起注意。

生态环境的破坏是和滥用资源分不开的,而某些工业的发展又造成了空气和水体等污染,进而加剧了生态环境的恶化。然而,构成环境诸因素的形成发展,以及它们的相互影响和作用,至今公众并非尽然皆知,尚须大家去了解它,宣传它。植被正是组成这庞大而复杂生态环境系统中的主体,在环境的诸多因素中起着决定性的作用,并在地球表面形成各种自然景观。作者们推出这部《云南植被生态景观》图集,旨在使广大读者对云南

诸多植物群落和生态环境条件有所认识,从而引起对生态环境的关注。

本书运用彩色照片为主的形式,依据云南低纬高原特殊的生态环境条件,融集省内植物学、生态学、林学工作者多年的照片资料,按照各植被类型的组成、结构、外貌等特征,按系统分章分节,反映了以植被为主体的云南高原上丰富多彩的、立体的生态景观。内容丰富,是一份难得的基础资料。

作为生物资源极为丰富多样的云南,曾经吸引过国内外生物学工作者的极大兴趣,也是地学、生态学、植物学、动物学、林学、农学等工作者的向往的地方。作者精心编辑的这本图集,形象直观,通俗易懂,我想正是广大读者所希望的。

吴征镒

1993年12月20日

Foreword

Yunnan Province of China covers an area of 394000 km², approximately 4% of China's land area. It is well known worldwide for its diversified types of vegetation, including about half of the total higher plant species occurring in China. The vegetation there includes unique tropical forests, widespread evergreen subtropical forests, well-developed subalpine vegetation, and dry river-valley vegetation. The landscapes in Yunnan are in all their majest. Because of the strong impact of the tropical monsoon and the plateau landform with high elevation on the north side and low elevation on the south side, Yunnan is a place for mixing, adjoining and transition of the vegetations of East Asia, South Asia, the Qinghai-Xizang Plateau and the Indo-China Peninsula. In addition, owing to the rolling hills, deeply cut river-valleys and diversified topography, the crisscross phenomina of different vegetation types are very common. These are the major characteristics of the Yunnan Vegetation.

In order to truly and visually reflect the diversity and complexity of the Yunnan vegetation, according to the land division commonly accepted, the classification system employed for the book *Vegetation of Yunnan* is adopted for the preparation of this album. *Ecological landscapes of*

Yunnan Vegetation is elaborately compiled, containing over 450 color photographs that are arranged according to the characteristics of physiognomy and structure and the ecological features of the major vegetation types.

The compilation of this album is a basic research project of the Yunnan Commission for Science and Technology, undertaken by the Kunming Institute of Ecology, Chinese Academy of Sciences (CAS). Its editorial board consists of experts from the Kunming Institute of Ecology, CAS; Kunming Institute of Botany, CAS; the Institute of Ecology and Geobotany, Yunnan University; and the Office of the Yunnan Agriculture Regionalization Commission. The work was supported by the scientists and technicians concerned from Kunming Institute of Botany, CAS; Yunnan Institute for Forestry Survey and Planning; Southwestern College of Forestry; Yunnan Academy of Forestry; and Yunnan Forestry School. We express our profound thanks to all those who so generously contributed their expertise and valuable material in this effort.

Jiang Hanqiao
4 December 1993

前 言

云南省以占中国 4% 的土地面积(39.4 万 km^2),容纳了占中国半数的植物种类和丰富的植被类型而闻名于世。这里的热带森林独具特色;亚热带常绿林分布广泛;亚高山植被在滇西北地区十分发育;干旱河谷植被深嵌在高原内部;真可谓景象万千。分析其原因,这主要是深受热带季风的空问变化,和北高南低的高原地势影响,从而在云南这块土地上实现了东亚至南亚,青藏高原至中南半岛之间的交汇、连接与过渡,加之山地连绵,河谷深切,地形多变,各种植被类型的交叉、镶嵌现象相当普遍,从而构成云南植被的基本特点。

为了真实而直观地反映云南植被多样复杂的特点。我们采用了《云南植被》一书中植被分类的系统,结合常用的地域分区按主要植被类型的外貌、结构特征、生态特点和代表性植物,

精心编撰了这本拥有 450 多幅彩色图片的《云南植被生态景观》。

本图集系云南省科委应用基础研究项目,由中国科学院昆明生态研究所主持,并与云南大学生态学与地植物学研究所、云南省农业区划委员会办公室共同组成图集编辑委员会。在编辑过程中,得到了中科院昆明植物所、云南省林业调查规划院、西南林学院、云南省林业科学院、云南省林业学校等单位有关科技人员的积极配合与支持,提供了不少宝贵的素材,致使编汇工作顺利完成,谨此致谢。

姜汉侨

1993 年 12 月 4 日

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1 Ecological Environment

Yunnan is a low-latitude plateau Province of China, and an inland mountainous region. It is located in the southwest corner of China a latitude between 21°29'N and 29°15'N and a longitude between 97°39'E and 106°12'E, with the total area of 383 000 square kilometers. 91 percent of the area is mountainous region. There are 1 440 intermountain basins of over 1 square kilometers, and their total area amount to 240 000 square kilometers. The topography of the land declines from northwest to southeast. The highest point is the Kagerbo Peak of the Meili Mountain which is 6 740 meters above sealevel while the lowest point is the mouth of the Yuanjiang River on the China-Vietnam border, which is only 76.4 meters above sealevel. In the province, there are two types of landforms.

The Mid-yunnan plateau, which locates in the east of the Ailao Mountain, includes Kunming, the central part of Chuxiong, Yuxi, western and southern part of Qujing, has relatively intergrated broad-ling. Hills and low mountains of little undulation are main landforms. Relatively high mid-lying mountains exist near the fault basins. The east and the southeast of the plateau show considerable topographic diversity, including the stone-forests, the Karst depressions, peak forests, caverns and underground rivers. There are also plenty of tour resources, including the famous Lunan Stone Forests, with steep cliffs, jogged rocks of grotesque shapes and various postures. This is an wonderful scene.

To the west of the Ailao mountain is

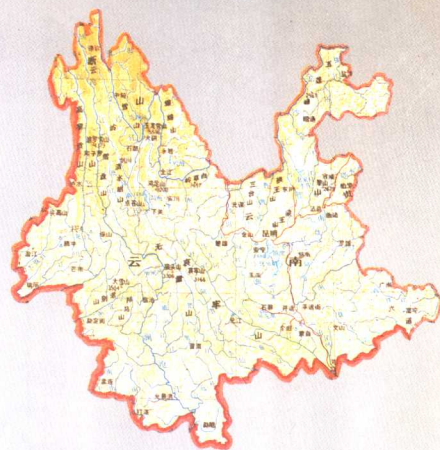
a large valleys extending south through of the Hengduan Mountain range. The north of this range is a famous valley consisting of three great rivers (the Nujiang River, the Lancang River and the Jinsha River). These three rivers are parallel flowing from north to south. To the south and the southwest of the range is an area of low lying mountains, hills and basins, where the topography is low and the wide valley basins well develop.

There are six river systems in the province which pour into the Pacific Ocean and the India Ocean respectively, they are the Jinsha River (the Yangtze River), the Nanpan River (the Pearl River), the Yuanjiang River (the Red River), the Lancang River (the Mekong River), the Nujiang (the Salween River) and Dulong River, and the Longchuan River. There are also over 40 plateau lakes in the region. The largest one is the Dianchi Lake with its area of 312 square kilometers. The second one is the Erhai Lake, about 250 square kilometers. The deepest one is the Fuxian Lake, 164 meters in depth. It is followed by the Lugu Lake, 73.2 meters deep.

Yunnan Province is located in the southwest of Eurasia with a distinctly monsoon climate. In the winter, a dry continental wind called "westly jet" prevails, but in the summer, the marine monsoon dominantes. The resultant weather is dry in the winter and moist in the summer.

The unique landforms and complicated physical condition made Yunnan a diverse ecological environment with various

ecosystems. These extend from northern tropical dry-hot and humid climate to subtropical temperate and highland climate. Accordingly, the types of the soil and the vegetation also change. The soil ranges from tropical laterite, subtropical red soil, temperate brown soil to frigid sub-alpine meadow soil. The vegetation includes rain forests and monsoon forests in the tropical areas, evergreen broad-leaved forests and evergreen coniferous forests in the subtropical areas, deciduous broad-leaved forests and coniferous forests in the temperate areas, also alpine brushes, alpine meadows and alpine desert. There are also various kinds of animals, such as the tropical Asia elephant, the green peacock, the frigid yak and so on. Such are the complicated biogeographic landscapes and diverse ecosystems as an epitome of the types of vegetation from the Hainan Island to the Changbai Mountain which across twenty five degrees latitudes in eastern China. This complicated and diverse ecological environment supports an abundance of species. Therefore, Yunnan is called "the plant kingdom" and "the animal kingdom". According to tentative statistics, there are about 14 000 kinds of seed plants in Yunnan Province which account for half of those in China, about 769 kinds of birds account for 66 percent of those in the country and about 248 kinds of mammals account for 56 percent. Yunnan is also home to 47 percent of all reptiles and 37 percent of all amphibious creatures in China. The rare animals in Yunnan account for half of those in China.



第一章 生态环境

云南简称滇，地处祖国的西南边陲，位于北纬 $21^{\circ}09'$ — $29^{\circ}15'$ ，东经 $97^{\circ}39'$ — $106^{\circ}12'$ ，是一个低纬高原和多山的内陆省份。全省面积 39.4 万 km^2 ，其中山地占 94% ，山间盆地（俗称“坝子”）面积在 1km^2 以上者有 1440 多个，总面积约 2.4 万 km^2 。全省地势呈西北高，东南低阶梯式倾斜，境内最高点为梅里雪山的卡格博峰，海拔 6740m ，最低为河口县元江出境处，海拔仅 76.4m 。省内地貌以哀牢山为界分为东西两大类型。

哀牢山以东高原面保持比较完整，称滇中高原，主要包括昆明地区、楚雄州中部、玉溪地区，以及曲靖地区的西部和南部，多属起伏不大的低山和残丘，仅在断陷盆地附近有相对高差较大的中山山地。高原的东部及东南部有大面积喀斯特地貌景观，石芽、石林、溶斗、溶蚀洼地、峰林、溶洞、地下河等形态多姿，孕育了无数的旅游胜地。如著名的路南石林，石峰壁陡，怪石嶙峋，姿态万千，为天下少见之自然奇观。

哀牢山以西为横断山系纵谷区，其北部由高黎贡山、怒山、云岭三大山脉和怒江、澜沧江、金沙江纵向相间排列，是世界著名的纵谷区；其南部及西南部则地势较低，宽谷盆地发育，为低

山丘陵盆地类型。

省内江河由东至西，计有金沙江（长江上游）、南盘江（珠江上游）、元江（红河上游）、澜沧江（湄公河上游）、怒江（萨尔温江上游）及独龙江、陇川江（伊洛瓦底江上游）六大水系，分别注入太平洋及印度洋。此外还有近 40 个高原型湖泊和众多的高山冰碛湖，其中以滇池为最大，水域面积达 312km^2 ；洱海次之，为 250km^2 。最深湖泊为抚仙湖，水深 164m ；泸沽湖水深 73.2m 。

云南位于欧亚大陆东南部，季风气候非常明显。冬季盛行干燥的大陆西风急流，夏季为湿润的海洋季风所控制，从而造成冬半年干旱，夏半年湿润，四季不分，干湿季分明的气候特点。

云南由于独特的地貌形态及复杂的自然条件，形成了极其多样的生境和各种复杂的生态系统类型。全省从南到北，由低到高，气候有北热带干热与湿热气候，亚热带、温带和高山冰漠带气候等。土壤有热带砖红壤性土，亚热带赤红壤、红壤，温带棕壤和寒带亚高山草甸土等多种土壤类型。植被有热带雨林、季雨林，亚热带常绿阔叶林、常绿针叶林，温带落叶阔叶林、针叶林，高山灌丛、草甸，高山苔原、荒漠

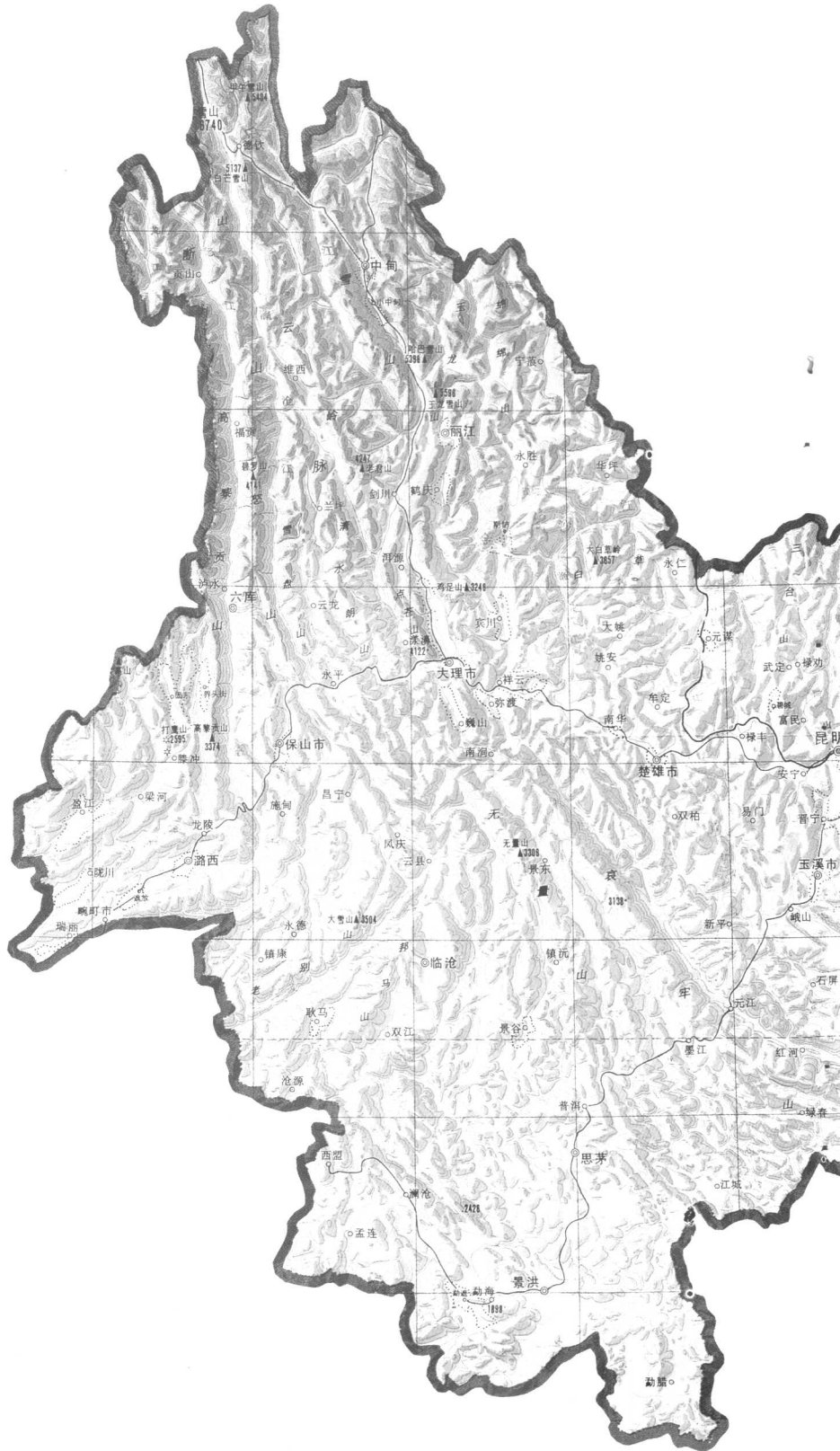
等生态系统类型。动物种类更是丰富多样。如此复杂多样的生物地理景观和众多的生态系统类型，犹如我国东部地区横跨 25 个纬距，从海南岛到长白山的各种植被类型的缩影。这种情况，在国内外均属罕见。在这种复杂而多样的生态环境中，孕育了极其丰富的物种资源，素有“植物王国”、“动物王国”之誉。据初步统计，全省种子植物有 14000 种，约占全国的一半。野生动物中鸟类有 760 种，占全国总数的 66% ；兽类有 248 种，占全国总数的 56% ；其中珍稀动物种类占全国之半。目前，为了自然资源的保护和利用，挽救濒于绝灭的生物资源，我省已建立 79 个不同类型的自然保护区，总面积达 176.4 万 ha ，约占全省总面积的 4% 。这对于改善环境，保护物种，充实人们的生产和生活，以及科研教学必将起到积极的作用。

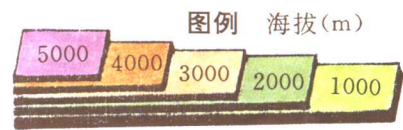
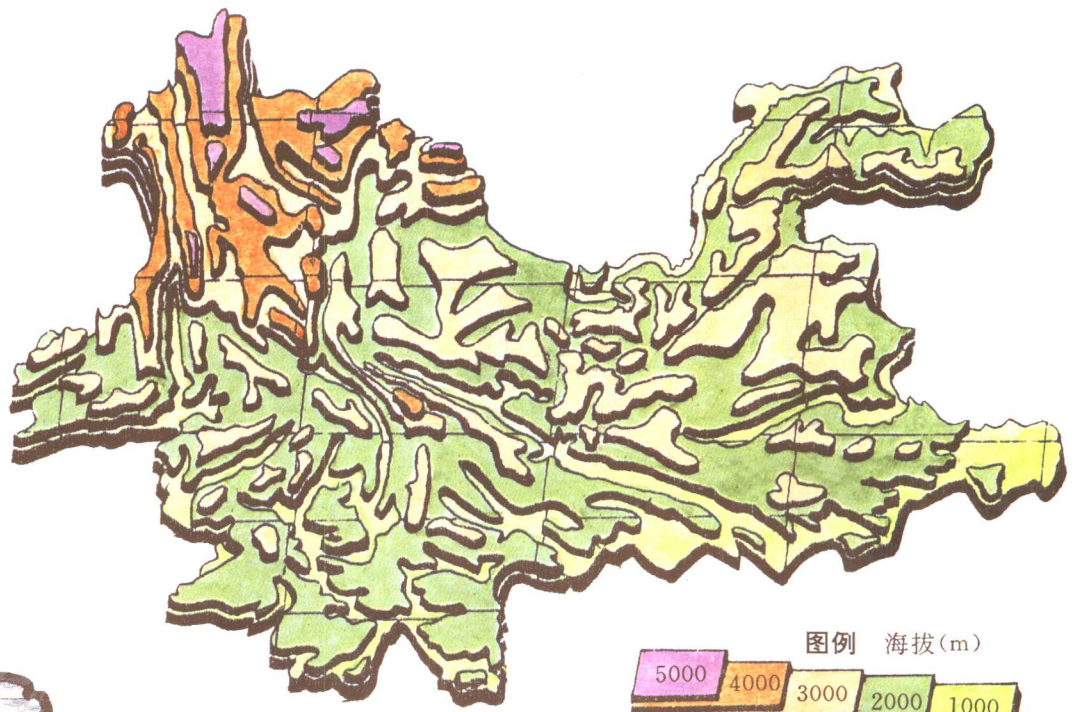
1.1 地形地貌

云南山原辽阔,全省地貌由滇东高原与滇西纵谷形成基本骨架 1.1a,地势由西北向东南倾斜,呈阶梯式递降 1.1.b。滇西北最高,海拔 3000—4000m;滇中高原为第二梯层,海拔 2000—2500m,山间盆地多在 2000m 以下;滇南各地为第三梯层,海拔在 1200—1500m,宽谷盆地在 600—1000m。各层次内均有不同的山地与河谷相切,纵横交错,地形十分复杂。滇西北多高山,从西至东有高黎贡山、怒山、云岭山三大山系呈南北走向,纵贯滇西,其间挟持有怒江、澜沧江、金沙江,形成著名的横断山纵谷地带;滇东高原除北部有金沙江深切外,多为起伏不大的山间盆地与断层湖泊,另有各种形态的石灰山岩溶地貌;滇南与滇西南则为中山、丘陵、盆地交错分布的山原地貌。

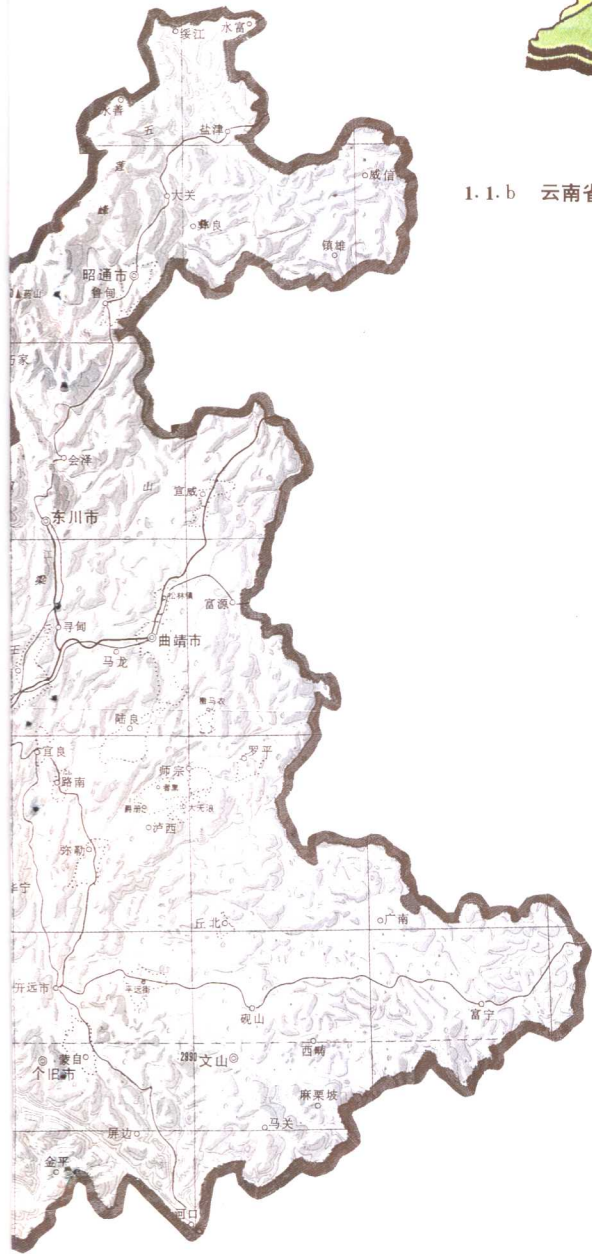
1.1 Landform and Topograph

Of the vast mountain plateau area in Yunnan, the topography mainly includes the east plateau and the west valleys as shown in figure 1.1a. The land of it declines from northwest to southeast, showing the stepped-structure as can be seen in figure 1.1b The first step, northwest Yunnan, is the highest and about 3000—4000m above the sealevel. The second step, the Mid-Yunnan plateau, is about 2000—2500m above sealevel with the intermountainous basins no more than 2000m. The third step, the South Yunnan, is about 1200—1500m above sealevel while the wide valley basins are 600—1500 m. In these three steps, the topography to some extent is complicated with the criss-cross mountains and river valleys. In the Northwest Yunnan, the Hengduan Mountain prolongs along from north to south. From west to east there stands the Gaoligong Mountain, the Nu Mountain and the Yun Mountains accompanied replateau spectively with the Nujiang River, the Lancang River and the Jinsha River. In the east plateau, except the deep valleys of the Jinsha River in the north, there has developped the diverse mountainous basins, the fault lakes of little undalation. The south and southwest Yunnan has developped a landform with the criss-cross mid-mountains, hills an basins.





1.1.b 云南省阶梯状地势示意图



1.1.a 云南省地貌

1.1.1a, b, c 云南属于多山的内陆省份,山体连绵高大,河谷深切,各河谷中镶嵌有诸多大大小小的盆地,是云南的稳产农作区。广大的山地仅有少量缓坡辟为农地,多数还是荒山秃岭(a. 东川小江),仅在滇西北个别山区有大片的天然林保存(b. 德钦甲午雪山),还有一些海拔 5000m 以上的孤峰,终年白雪茫茫(c. 德钦白茫雪山)。

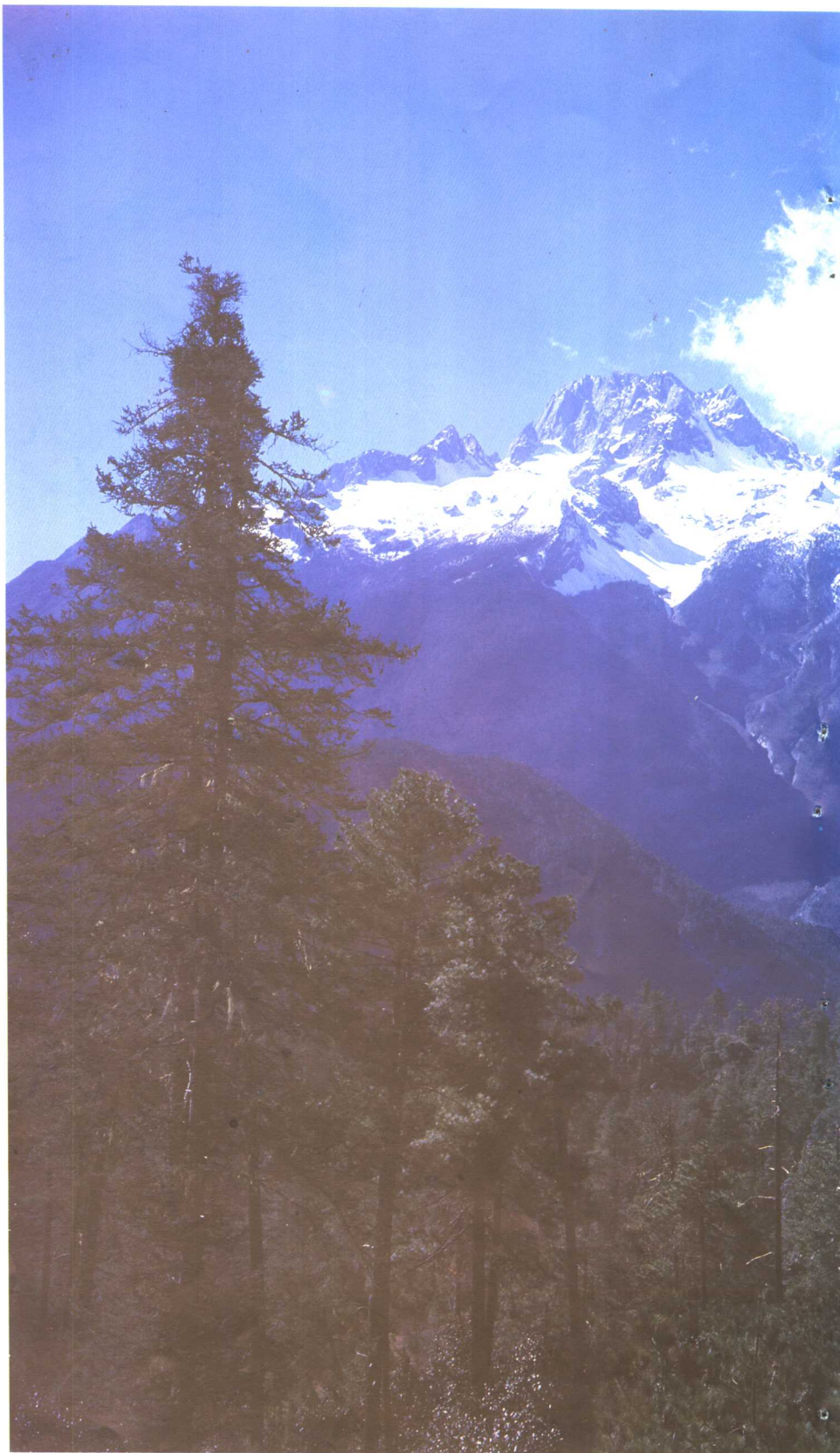
注:英文图注见 162 页。



1.1.1 a



1.1.1 b



1.1.1 c



1.1.2

1.1.2 玉龙雪山与哈巴雪山高耸于举世闻名的虎跳峡两侧,最高海拔 5596m,是终年积雪的旅游胜地,每年吸引成千上万的国内外游人到此观光、科学考察。这是哈巴雪山主峰全景。

1.1.3 湿热环境下的高原山地,特别是干季前期,由于冷空气下沉,形成云雾笼罩的奇特环境,俗称“云海”,是热带、亚热带山区常见的自然景观。这是滇东北乌蒙山海拔 1100m 处之云海景色。



1.1.3



1.1.4 石灰岩岩溶地貌, 遍布于滇东南地区, 是一种别具特色的地貌类型。这是广南县八宝附近的景观风姿。

1.1.5 滇中高原的地貌特点, 是在广阔的夷平面上, 有无数的低山、丘陵和盆地、湖泊组成复合的单元景观类型。这是呈贡县海拔 1810m 的高原地貌综合体特征。

1.1.6a. b. c 滇西北横断山区, 高山林立, 河谷深切, 植被垂直分布明显, 其中德钦县西侧的梅里雪山为全省的最高点, 山高连绵, 终年积雪(a), 其主峰——卡格博峰海拔 6740m, 终年白雪皑皑, 现代冰川相当发育(b), 冰舌可下延到海拔 3800m 的冷杉林内(c)。



1.1.4



1.1.5



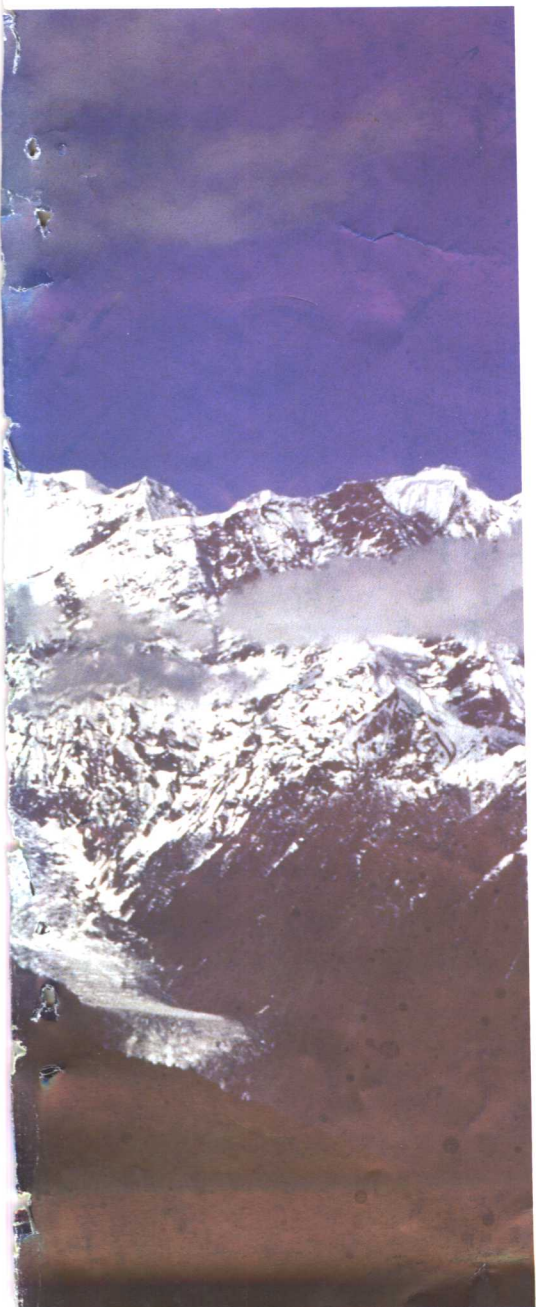
1.1.6 a





1.1.6 c

1.1.6 b



1.1.7 滇西北高山峡谷地区,山地平均海拔在 5000m 左右,河谷下切多在海拔 2000m 以下,大约在海拔 3000—3500m 地段有辽阔的高原盆地发育,适宜农耕和放牧。目前,不少地段仍有大片的耐寒高山及亚高山草甸植被分布。但由于过度放牧,迄今不少地区大狼毒(*Euphorbia nematocypha*)、西南鸢尾(*Iris bulleyana*)等大量繁衍,草场极度退化。这是小中甸退化草场中长出大狼毒之入秋景色。

1.1.7

