

2004年度西南师范大学出版基金资助项目

STUDY ON RESOURCES AND ENVIRONMENT
FOR URBAN DEVELOPMENT AND PLANNING IN
MOUNTAINS

山地城市发展和规划

的 资源环境研究

刁承泰 赵纯勇 等著

西南师范大学出版社

图书在版编目(CIP)数据

山地城市发展和规划的资源环境研究/刁承泰等著.
重庆:西南师范大学出版社,2005.8
ISBN 7-5621-3409-X

I. 山… II. 刁… III. 山地—城市环境:生态环境—环境规划—研究 IV. X21

中国版本图书馆 CIP 数据核字(2005)第 087953 号

山地城市发展和规划的资源环境研究

刁承泰 赵纯勇 等著

责任编辑:卢旭 王宁

封面设计:谭玺

出版、发行:西南师范大学出版社

(网址:<http://www.xscbs.com>)

印 刷:合川市文华印刷厂

开 本:787mm×1092mm 1/16

印 张:11

插 图:8页

字 数:313千字

版 次:2005年8月第1版

印 次:2005年8月第1次印刷

书 号:ISBN 7-5621-3409-X/K·115

定 价:30.00元

内 容 简 介

本书以重庆直辖市都市区的自然资源和环境为研究对象,从山地城市的自然资源、环境与人类活动这两个系统的矛盾运动中,分析山地城市发展、规划与自然资源、环境的相互联系和作用,从理论、方法、技术和实践方面对山地城市发展和规划的资源环境研究进行了探讨。在建立山地城市自然环境的基础数据和空间数据平台的基础上,重点研究山地城市自然环境对城市可持续发展的影响和城市发展对自然环境的影响及调控途径,进行山地城市建设用地适宜性评价和生态环境功能分区,论述山地城市生态景观建设布局模式和生态城市发展的地域空间布局模式,在此基础上,提出山地城市空间发展布局和发展规模的策略。

本书从人地关系、资源利用与生态环境的角度,以可持续发展理论为指导思想,结合多年来对山地城市的城市地貌、城市生态等研究工作,对影响山地城市发展和布局的自然条件、资源与生态环境进行科学论述和评估。

本书可作为城市规划、城市建设、地理科学、地图与地理信息系统、资源与环境等领域的研究工作者和高等院校教师、研究生及高年级学生的参考书。

中文提要

一、研究的意义

自然条件、资源与生态环境,是人类生活、社会生存和发展的自然基础。城市是一个以人为主体的自然—社会—经济系统,自然资源和环境既是城市的立地条件,又是社会经济发展的依托,成为控制城市发展、城市布局和城市建设的重要因素。同时,城市的发展也影响和改变着自然条件、资源与生态环境。

城市发展中出现的问题,有的在一定程度上是利用自然环境时需要付出的代价。但在大多数情况下,这些问题的出现原因,部分或全部是城市规划和城市建设中对利用自然环境的理论和方法研究不够全面、不够深入的结果,常常是由于在城市规划和城市建设中忽视自然环境的特点所造成的。

我们认为,城市自然环境不仅是一种可利用的自然资源,更是一种脆弱的、在合理利用的同时需要予以保护的资源。随着社会生产力的发展,城市对自然条件、资源与生态环境的影响日益广泛和深刻。从人地关系、资源利用与生态环境的角度,对特定地域影响城市发展和布局的自然条件、资源与生态环境进行综合性的研究和评估,应该成为区域规划和城市发展规划的基本内容之一。

所以,研究城市规划和城市建设中如何利用自然环境,如何结合自然环境的特点进行城市规划与城市设计,对现代城市的健康发展具有重要意义。

二、研究的重点

重庆市是长江上游的经济中心和西部地区的直辖市,又是有名的山城和江城。重庆都市区地处四川盆地东部的平行岭谷和低山丘陵区,又是长江、嘉陵江汇流地带。在重庆都市区,以近南北走向的山地为经,以近东西流向的长江、嘉陵江干流及其支流为纬,组成了以山水为主的自然城市环境,形成了有名的山城和江城。自然山水既是城市发展的基础和资源,又成为城市建设和发展的阻碍。受到自然条件的影响和资源环境的制约,城市的发展具有特色和个性。

山地城市的建设和发展,受到地形地貌的重大影响。各种地貌类型,通过其特有的形态(如坡度、方位、水平切割度和垂直切割度等)、地貌组成物质和地貌过程,影响城市的方方面面,如城市规划中建筑物和构筑物的布置,城市交通联系的实现,城市环境的舒适卫生宜人性,城市景观中建筑艺术风貌的形成,等等。而都市区内由各种地貌类型组合而成的区域地貌,则通过其区位条件、空间分布和组合,对城市的总体布局、城市结构和扩展方式起着限制、聚合、



引导、分割等作用。例如,都市区内南北走向的山地,以其高出两侧谷地数百米的山地形态成为能量流、物质流和信息流的分水岭,对山地两侧的城市发展具有阻滞和减缓作用,阻碍东西向的交通,对城市造成竖向分割和封闭;同时,又引导城市沿着山岭之间的谷地向南、北发展,形成了都市区内的若干片区。

山地城市中的河流,既是城市水资源的主要来源和发展水运的基础,对分布在河流上下游的城区具有连通作用;同时,河流又对城市的发展起着限制、分割和阻隔作用。纳河流于其中的河谷和山间盆地等地貌类型,其空间形态具有较强的聚合力,使城市发展具有强烈内向感和紧凑感,形成与地貌形态基本一致的带状、串珠状布局。山地河流以冲刷、切割为主,下切侵蚀和侧方侵蚀强烈,岸坡容易变形,在一定程度上增大了河流对城市的分割和阻隔作用。

山水组合的自然环境,使重庆市的空间布局、形体特征和建筑风格具有鲜明的山城和江城特色,都市区的城市扩展具有不均衡性、跳跃性和立体性,形成了组团式的城市结构。

我们认识到,城市生态环境是自然环境和人类活动共同形成的。山地城市地表高低起伏大,坡地多,自然环境复杂,城市用地破碎。特别在城市近域推进和广域扩展的城市边缘区,人为建筑活动频繁而集中,自然环境的破坏和变化十分迅速,使得这里的生态环境出现变异敏感度增高、持续利用性降低、对灾变的承受弹性降低的趋势,生态环境表现出明显的脆弱性。

本书以重庆直辖市都市区的自然资源和环境为研究对象,从城市的自然资源、环境与人类活动这两个系统的矛盾运动中,分析城市发展、规划与自然资源、环境的相互联系和作用,以期在自然资源可支撑、自然环境可容忍的限度内,保证城市社会经济和自然环境之间的协调持续发展。

三、研究的总体构思

(一)研究内容

依据重庆都市区的自然环境特点,我们将主要研究内容定位为:分析评价影响和制约城市发展的自然条件、资源与生态环境的现状及未来的可持续性,提供都市区自然条件、资源与生态环境的空间数据平台;在生态分区的基础上,预测城市发展中需要注意的生态环境问题并寻求解决策略,从而为总体规划确定城市发展目标、发展规模和生态环境保护措施提供依据。

(二)研究的理论和方法

根据现代生态城市发展的要求,以生态学基本理论和可持续发展原则为指导,将自然科学研究的理论、方法与社会科学、人文科学的理论、方法有机融合,采用宏观定性分析与微观定量研究相结合、典型区实地考察剖析和室内遥感信息解译相结合、专家咨询与数理建模相结合,运用“3S”(RS、GPS、GIS)技术等现代手段,通过实地调研、专家咨询、室内数据综合分析等方法,进行定性、定量和空间定位相结合的分析评价。

评价自然条件、资源与生态环境,主要依据自然科学的调查研究技术所获取的各种数据基础,从科学的发展观和经济、综合、历史的观点,评价自然条件、资源与生态环境对人类生活与生产所需要的保证和有利程度,以及对人类开发利用的限制程度。鉴于自然条件的多个因子互为制约,资源利用又具有多宜性特点,往往在不同的利用方式下可以以不同的深度介入社会经济的发展中,并向不同的方向演变,所以在评价自然条件、资源与生态环境时,必须依据科学



的发展观,根据一定的历史条件和技术条件,把自然生态的可能性、环境的限制性和经济发展的合理性相结合;在评价时既要具体评价不同的自然因子,更要综合评价其在不同地域内的相互配合、组合与制约的关系,分析影响其开发利用价值的主要因素,从而为城市发展提供自然条件、资源与生态环境的空间数据平台和地理空间框架,为确定城市发展目标、发展规模和布局以及需要采取的生态环境保护措施提供依据,促进资源、环境和社会经济的可持续发展。

(三)技术路线

在此基础上,课题组精心设计了研究方案(见图1)。在收集重庆都市区多年以来的地质、地貌、水文、气象、植被、土地利用、环境监测、自然灾害及社会经济发展方面的资料和遥感数据图像等的基础上,应用遥感信息和系列专题地图,提取影响因子的遥感数据和图像,建立基础信息图层、初级派生信息图层和高级派生信息图层。同时,利用 ArcGIS 平台建立空间数据库、属性数据库和多功能的信息管理系统,为研究工作提供了有力支撑。

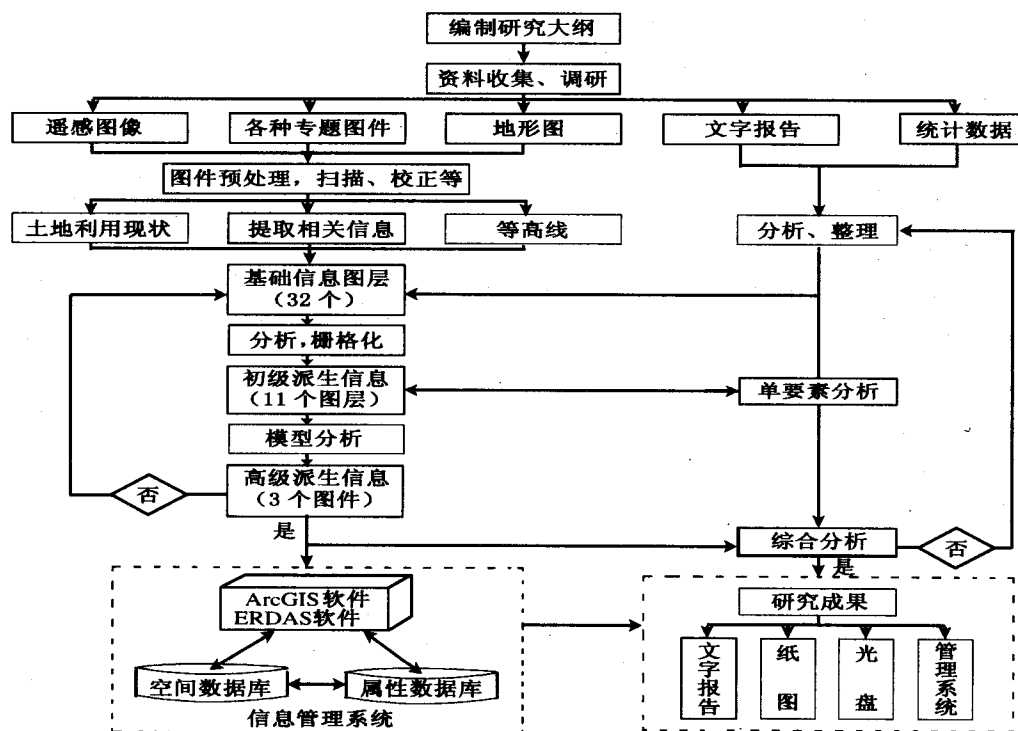


图1 技术路线流程图

四、研究进展

本书以重庆市都市区为实证研究,从理论、方法、技术和实践方面对山地城市发展和规划进行的资源环境研究进行了探讨。



(一)建立自然环境的基础数据和空间数据平台

我们收集了重庆都市区多年以来的地质、地貌、水文、气象、植被、土地利用、环境监测、自然灾害及社会经济发展方面的资料、遥感数据图像等,系统分析了影响城市发展和规划的自然条件、资源和环境;并应用遥感信息和系列专题地图,提取各主要影响因素的有关数据,利用 ArcGIS 平台建立了空间数据库、属性数据库和具备了输入、查询、阅读、分析、输出等多种功能的都市区生态环境信息管理系统,为城市规划工作提供了自然条件、资源和环境的基础数据和空间数据平台。

(二)自然环境对都市区可持续发展的影响研究

从分析都市区资源、生态和环境条件入手,首先对自然条件中制约城市发展的要素进行分析,特别是地形地貌特点、水系分布、气候条件、地质条件、自然灾害等;而后对自然资源中制约城市发展的要素进行分析,重点是水资源、土地资源、生物资源等,并对各要素的现状及其可持续性进行评价。

(三)都市区发展对自然环境的影响及调控途径研究

目前,经济持续增长和高速城市化与生态环境日益脆弱的尖锐矛盾已凸现于重庆都市圈。在都市区的未来发展中,如果对资源和环境的不合理利用进一步破坏城市发展与自然环境的协调关系,将形成对自然环境的负面影响。例如:人口的增长和经济的发展超出了环境承载能力和环境容量;在资源利用率得不到大幅度提高的情况下,城市发展可能导致更多的资源被浪费和自然环境的不合理利用;城市的发展可能增加废弃物的排放。同时,三峡水库蓄水后,长江上游重庆段的水流流速降低,污染承受能力将急剧下降。

未来对自然环境的负面影响将主要表现为:大气污染、水污染和自然灾害可能加重;化学事故和传染性疾病将可能突发;交通拥挤可能加剧;城市热岛、浊岛现象将会加剧,局部地段的居住环境可能恶化。

(四)都市区建设用地适宜性评价和生态环境功能分区

利用自然环境的空间数据平台提供的空间多源信息,经建模分析,生成了城市建设用地适宜性评价和都市区生态功能分区等高级派生信息图层。在进行都市区城市建设用地适宜性评价时,应用逆向思维的“反用地规划”途径,首先将禁止建设用地和不适宜建设用地进行空间定位,再将海拔高度、地形坡度和地表起伏度的图层进行叠加分析,将适宜建设用地进一步细分。在分析都市区面临的主要生态环境问题的基础上,遵循生态城市建设的相关理论和实践,进行生态环境功能分区,提出各区的生态功能和保护要求。

(五)都市区生态城市发展地域布局模式研究

在都市区生态环境功能分区和土地适宜性评价的基础上,预测了都市区生态城市的未来可能发展规模,提出了都市区生态景观建设布局模式和生态城市发展的地域空间布局模式。根据可持续发展的理论和方法,对都市区自然条件、资源与生态环境进行综合分析,划分都市区生态城市功能区,提出都市区生态环境问题的解决途径。



(六)都市区生态城市空间发展策略研究

都市区生态城市的建设要坚持科学的发展观,将生态城市的建设理念融入城市的空间布局。根据重庆市都市区自然环境的特点和城市发展的要求,我们认为,都市区发展的空间布局思路是:根据都市区产业布局趋势和生态城市空间结构要求,按照“点轴状网络组团式”用地布局模式,拓展都市区城市骨架。即在调整、充实中部,向北发展,适度南扩的同时,实现跨越式外拓。

根据都市区自然条件、自然资源和生态环境的分析,结合生态城市的建设理念和空间布局思路,将都市区城市空间分为核心城区、优先发展区、次优发展区、引导发展区、控制发展区和生态保护区等6个区域,对各区内影响城市发展的各种因素,如自然条件、资源状况、交通条件等及其时间变化和空间配置情况等方面进行了系统评价,对优先发展区的6个亚区和次优发展区的10个亚区作了重点评述,在此基础上,提出都市区生态城市空间发展布局和发展规模的建议。

五、结语与讨论

进入21世纪的中国城市发展面临着人口、资源和环境的巨大压力和挑战。挑战的深刻性在于决策者既无法在已有的经验中获得现成的答案,也难以在现有的城市发展研究中找到适宜的解决方法。因此,城市研究本身必须实行一系列的变革,在实践的基础上加强理论、方法的探索和创新。目前要做的是,需要纠正城市研究中长期忽视的对城市发展所必需的自然资源和环境的研究。要按照全面、协调、可持续发展的科学发展观,将城市自然环境和资源的研究作为城市研究的重要基础,进而探讨城市自然环境的最佳利用方式和最佳利用结构。

其次,需要加强城市生态环境的研究。城市生态环境是自然环境和人类活动共同形成的。城市生态环境问题是由人类经济、社会发展与环境的协调关系被破坏,主要是资源的不合理利用和浪费所造成的。城市的可持续发展需要城市工作者关注资源与城市环境、人口与城市环境、经济发展与城市环境的关系及其协调。本书对此进行了思考,在实践中运用资源有限观、环境资源观、环境经济观和环境机会成本观等观点进行了探索。

再次,需要加强山地城市的研究。我国是一个多山的国家,矿产、水能、生物等资源大部集中于山区,山地又是河流的发源地和平原的生态屏障。山地城市的发展和规划,必将成为我国未来发展全局的一个重大问题。由于山地环境的特殊性和复杂性,山地城市的发展和规划面临着比平原城市更大的挑战。山地城市中山水组合的自然环境,对城市建筑、交通、环境和城市景观的艺术构成具有重大影响,使城市的空间布局、形体特征和建筑风格具有特色;而复杂的地形和水文条件,既在一定程度上限制了城市的发展,也使城市生态环境表现出明显的脆弱性。所以,山地城市的发展和规划,需要城市工作者综合运用自然科学、社会科学,包括基础学科、技术基础学科、专业技术学科的理论和方法,从经济效益、生态环境效益和景观美学诸方面,系统研究山地城市的自然环境,对自然环境进行质量评价,进而对自然环境的合理利用提出建议。本书以重庆都市区为实证研究,对山地城市的自然环境进行了理论、方法和实践相结合的研究和评价。

Summary

I. Significance of Study

Natural condition, resources and ecological environment comprise the natural basis for human life, social existence and development. City is a natural-social-economic system with human in the central part. Natural resources and environment are the establishment precondition for the city foundation and social economic development as well, which have become important factors to control the urban development, urban layout and urban construction. Meanwhile, development of the city affects and changes the natural condition, resources and ecological environment.

To some extent, the problems in the process of city development might be the price paid for using natural environment. In most cases, the problems encountered partly or fully result from the partially and shallow study on the natural environment theory and method during the city planning and construction, usually being the results of ignoring the characteristics of natural environment during the urban planning and construction.

We strongly hold that urban natural environment is not only a usable natural resource, but also a frail and protection-needed resource during reasonable utilization. With the development of social productivity, city exerts an increasingly wide and far-reaching influence upon the natural condition, resources and ecological environment. An integrated study and evaluation based on the perspective of relation between human and land, resources utilization and ecological environment shall be one of the most basic parts for regional planning and urban development planning.

Therefore, study on how to utilize natural environment during urban planning and construction and how to combine the features of natural environment to carry out urban layout and design will have a far-reaching significance for the healthy development of a modern city.

II. The Emphasis of Study

Chongqing city is the economic center of the upper reaches for Yangtze River and the municipality directly under the jurisdiction of the central government in the western region, and it is a famous mountainous city and river city. The urban area of Chongqing is located in the parallel mountain ranges and valleys and low hilly area in the east Sichuan basin, at which the Yangtze River and Jialing River confluence. In Chongqing urban area, with the



roughly south-northward mountain range as the longitude and the roughly east-westward Yangtze River and Jialing River and their tributaries as the latitude, the urban natural environment mainly based on mountains and waters has been established, which characterizes the city as famous mountainous and river city. Natural mountain and river are not only the basis and resources for urban development, but also the barrier for urban construction and development. Urban development is strongly featured by the influence of natural condition and limitation of resources environment.

The construction and development of mountainous city is strongly influenced by topography. The various types of topography, through their unique forms (such as gradient, azimuth, horizontal incision and vertical incision), its composing substance and forming process, greatly influences the aspects of the city, such as the layout of building and construction during urban planning, the realization of urban transportation link, the comfortable and hygiene amenity of urban environment, and the establishment of architecture artistic style of urban scenery. The district topography made up by the combination of topography types in urban area, through its regional condition, space distribution and combination, acts to limit, aggregate, guide and separate the overall urban layout, urban structure and expansion manner. For instance, by the economic dividing line formed by mountains rising hundreds of meters above the either side of valley, the south-northward mountain and valley in the urban area acts to slow and block the development of cities along its either side, barriers the east-westward transportation, which, as a result, vertically separates and blocks the city; meanwhile, it leads the city to develop south-northwards along the valley between the mountains and forms the several sectional districts in the urban area.

The river in the mountainous city is not only the main source of urban water resources and basis for development of waterborne transportation, but is link between the urban district along the upper and lower reaches of the river. On the other hand, the river also acts to limit, separate and block the urban development. The topography type of river valley and basin consisted of river has been endowed with rather strong aggregation power for its space form, which makes the urban development have strong inwardness and compactness and forms strip shape and pearl string shape layout consistent with the topography. The mountainous river mainly washes and incises, having especially strong downward incision erosion and sideward erosion, so the bank slope becomes easily deformed, which, to some extent, increases the separation and obstruction for the city.

Natural environment, combined by mountain and water, has endowed a distinctive feature of mountainous city and river city in the space layout, form and structure, and architecture style in Chongqing city. The urban expansion in urban area is featured by imbalance, leaping and solidness, and has come to form an urban structure of grouping style.

We come to learn that urban ecological environment consists of natural environment and human activity. The land surface of mountainous city rolls much, it is much occupied by sloping field, the natural environment is complex, and the urban using land is fragmented. Human construction activity is especially frequent and intense in the urban outskirts where



city close area boosts or city wide area expands, where natural environment is damaged and changed rapidly, which has, in turn, made the ecological environment increase its variation sensitivity, reduce its sustainable utilization and reduce its tolerable flexibility for disaster and change; therefore, natural environment has manifested great frailty.

The book makes the natural resources and environment in the urban area of Chongqing city as its study objective. Based on the contradictory interaction of the two systems, that is, the urban natural resources and environment, and human activity, the book has made a tentative analysis of the interaction and impact between the urban development, planning and natural resources and environment, with a hope that within the limit that natural resources can support and natural environment can tolerate, the harmonized and sustainable development between urban social economy and natural environment can be ensured.

III. The Overall Concept of the Study

A. Study Objective

According to the features of natural environment in Chongqing urban area, the focus of our study is on: analyze and evaluate the natural condition influencing and limiting urban development, the current situation of resources and ecological environment and their future sustainability, supply a space data platform for urban natural condition, resources and ecological environment; on the ecologically divisional base, predict the ecological problem needed to stress on during urban development and seek its solution as to determine the urban development goal and scale for an overall layout and to provide basis for ecological environmental protection measures.

B. Theory and Method of Study

According to the development of modern ecological city, guided by the basic theory of ecology and the principle of sustainable development, the study combines theory and method of natural science with those of social science and humanities, combines macro-qualitative analyses with micro-quantitative analyses, combines typical area practical investigation with indoor remote sense information interpretation, combines experts consultancy with math theory modeling, and adopts modern method such as 3S(RS, GPS, GIS). Through on-spot investigation, experts' consultancy and indoor data integrated analysis, the study has conducted a qualitative, quantitative and orientation analysis and evaluation.

Evaluation of the natural condition, resources and ecological environment mainly relies on the various data obtained from natural science research and study, which, based on the perspective of scientific development, economy, integration and history, evaluates the needed guarantee and favorable extent for human life and production by the natural condition, resources and ecological environment and its limitation on human development and utilization as well. Due to the interaction between the several factors of natural conditions and the multi



features of resources utilization, different depths of interference with the social economic development vary with the different utilization manner, and it will develop toward different directions; therefore, the evaluation of natural condition, resources and ecological environment must be based on the perspective of scientific development and given historical and technical conditions and combine the possibility of natural ecological environment and environment limitation and reasonability of economic development; not only detailed evaluation shall be done to every factors, but the integrated evaluation shall be done to their cooperation, combination and limitation in different areas, and analyze the main factors affecting its development and utilization value; therefore, it can offer a space data platform and geographical space frame work of natural condition, resources and ecological environment for urban development and determine the urban development goal, scale and layout and provide the basis for the needed ecological environment protection measures and promote the sustainable development of resources, environment and social economy.

C. Technical Route

Based on the above, the study group has carefully designed the study scheme (see the flow chart of the technical route).

On the basis of collecting the material and data in field of geology, topography, hydrography, weather, vegetation, land use, environment detection, natural disaster and social economic development and remote sense data diagram, the study applies remote sense information and series thematic maps to pick up the remote sense data and diagram of affecting factor and establish the basic information chart, preliminarily derived information chart and advanced derived information chart. Meanwhile, space database, attribute database and multifunctional information management system is established by ArcGIS, which has provided the study a strong support.

IV. Development of Study

The book takes Chongqing urban area as demonstration study, and the research and study center on resources environment during the development and planning of mountainous city from the aspects of theory, method, technique and practice.

A. Establish Basic Data and Space Data Platform for Natural Environment

We have collected data in the field of meteorology, topography, land utilization, environment detection, natural disaster and social economic development and remote sense data picture in recent years, and systematically analyzed the natural condition, resources and environment affecting urban development and planning. We have adopted the remote sense information and series thematic maps and obtained the concerned data of the different main influencing factors and conducted a positioning quantitative and qualitative study. On this ba-



sis, we have established space database, attribute database by ArcGIS and completed the urban ecological environment information management system with various functions such as input, search, read, analyze, and output, which has provided the basic data and space data platform of natural condition, resources and environment for urban planning.

B. Study of the Influence by Natural Environment on Urban Sustainable Development

Based on the analyses of the urban area resources, ecology and environment, factors of natural conditions affecting urban development will be analyzed first, especially the features of topography, water system distribution, climate condition, geological condition and natural disaster; then analyses will extend to factors of natural resources affecting urban development, especially water resources, land resources, and biological resources; evaluation on the current situation of the several factors and their sustainability is followed.

C. Study of Influence by Urban Development on Natural Environment and Regulation Manner

Presently, the contradiction between the economic increase and momentous urbanization and the impairing ecological environment has appeared in the urban circle of Chongqing city. In the future urban development, if unreasonable use of resources and environment continues to destroy the harmonized relation between urban development and natural environment, negative impact on natural environment will surely be followed. For instance, the increase of population and development of economy have exceeded the environment load and environment capability; if the resources utilization rate cannot be highly improved, urban development will probably lead to more resources waste and unreasonable use of natural environment; urban development may increase waste discharge, meanwhile, when the three gorges dam begins to store water, the flow speed of Chongqing section in the upper reaches of Yangtze River will slow down and pollution intolerability will dramatically decrease.

The future negative impact on natural environment will mainly manifest as: possible increase of air pollution, water pollution and natural disaster; sudden occurrence of chemical accident and infectious disease; increase of traffic; increase of hot island and turbid island phenomenon; and worsening of sectional living conditions.

D. Fitness Evaluation of Urban Construction Land and Ecological Environment Functional Division

Advanced derived information diagram such as urban construction land fitness evaluation and urban ecological function division is generated using the space multi-sources information provided by the space data platform of the natural condition. During the fitness evaluation of urban construction land, the method of converse reasoning, "Opposition to land use plan", is adopted. First, the space position is conducted to the forbidden construction land and unfit construction land; then overlapping analyses of altitude, land gradient and addition of land



surface gurgitation diagram are conducted to further analyze the fit construction land. Based on the analyses of the main ecological environment problems facing the urban area, and followed the concerned theory and practice of ecological city construction, ecological environment function division is conducted as to put forward the ecological function of the divisions and the needed protection measures.

E. Study on Ecological City Development Regional Layout Mode in Urban Area

On the basis of urban ecological environment function division and land fitness evaluation, the future possible development mode of ecological city in urban area is predicted, and urban ecological sight construction layout mode and land and space layout mode of ecological city development is put forward. In accordance with the theory and method of sustainable development, an integrated analysis is done to urban natural condition, resources and ecological environment, a functional division of the ecological city is divided, and the solution of urban ecological environment problems is provided.

F. Study on Ecological City Space Development Strategy in Urban Area

Perspective of scientific development shall be held in the ecological city construction in urban area so as to combine the construction concept of ecological city into the city space layout. According to the urban natural condition features in Chongqing and requirements for city development, we hold that the space layout reasoning of urban area development shall be in accordance with urban industry layout trend and ecological city space structure requirement, and land use layout mode of "point axial shape, network type, grouping style" so as to expand the urban city frame, that is, realizing the spanning out-expansion, while adjusting, enriching the mid part and developing northward and expand southward appropriately.

Based on the analyses of urban area natural condition, natural resources and ecological environment, and in accordance with the ecological city construction concept and space layout thought, the space of urban area is divided into six zones, that is, the core zone, prior development zone, secondarily prior development zone, guiding development zone, control development zone and ecological protection zone. Systematic evaluation covers the several factors affecting urban development, such as natural condition, resources condition, transportation conditions and their change of time and space disposition. The stress of the evaluation lies upon the six subordinate zones of prior development and ten subordinate zones of secondarily prior development. Based on the above, the space development layout and development scale of urban ecological city are suggested.

V. Conclusion and Discussion

As we enter the 21st century, cities in China are encountering the great pressure and



challenge from population, resources and environment. The depth of challenge lies in that the decision makers can not find the ready answer from the past experience, nor can they find an appropriate solution in the present study on urban development. Therefore, a series of reforms must be done to the urban study, and research and innovation of theory and method must be strengthened on the basis of practice. At present what is urgent to do is correct the attitude and manner that have for long ignored the study on natural resources and environment necessary for urban development. The scientific development perspective of overall, harmonized and sustainable development shall be followed; the urban study shall first base on the study of urban natural environment and resources, and then searches a best utilizing manner and best utilizing structure for urban natural environment.

Secondly, the study of urban ecological environment shall be strengthened. Urban ecological environment consists of natural environment and human activities. Urban ecological environment problem is caused by the damage of harmonized relation between human economy, social development and environment, which, in turn, mainly results from the unreasonable use and waste of resources. The sustainable urban development requires the urban workers to concern about the relation and cooperation between resources and urban environment, population and urban environment, economic development and urban environment. The book has conducted a tentative study on this, and conducted a research by concept of limited resources, concept of environment resources, concept of environment economy and environment opportune cost in the practice.

Thirdly, the study of mountainous city shall be strengthened. Our country is one enriched with mountains, in which most of the resources such as mine, water energy and biology are gathered. Mountain is also the headstream for rivers and the ecological barrier for plain. The development and planning of mountainous city will certainly become a main problem in our future development. Due to the specialty and complexity of mountainous city, the development and planning of mountainous city is facing greater challenge than plain city. The natural environment composed of mountain and river in the mountainous city exerts a great impact on the urban construction, transportation, environment and artistic composition of urban scenery, which has greatly characterized the urban space layout, physical features and architecture style; while, on the other hand, the complex topographical and hydrographical conditions have limited the urban development to some extent, which has made the urban natural environment become obviously frail. Therefore, the development and planning of mountainous city requires the scholar and researcher to integrate the research and study of natural science and social science, including the theory and method of basic subjects, technical basic subjects, professional technical subjects, and to systematically study the natural environment of mountainous city from the perspective of economic benefit, ecological environment benefit and esthetics of urban sight. The study in the book is based on the practical study and research of Chongqing urban area and has proposed a valuable study and evaluation combined with theory, method and practice on the natural environment in mountainous city.

前 言

人口、资源、环境与发展是当今全球共同关注的重大问题。我国自然资源紧缺与人口众多的矛盾尤其突出,自然资源和自然环境利用的可持续性已经成为最紧迫的科学研究和知识创新内容。城市是地球表面最大的聚落,占有广阔的自然空间,是人类活动聚集而活跃的地域。自然环境是由地质地貌、气候、水文、生物等因子共同组成的综合体,在人类的生产生活中具有生态功能和资源功能。自然环境为城市提供了下垫面和基础,在城市长期的形成过程中,自然环境作为一个基本的立地条件深刻地影响着城市的产生与发展。城市发展的实践要求对城市的自然资源和自然环境及其利用进行系统研究。

城市发展的历史表明,将城市建于一个与之完全适应的自然环境之中是很困难的。但是,在城市的发展中,自然环境的局限性(特别是用地条件的制约)虽然给城市发展造成阻碍,但不能阻止城市的发展。例如,在城市的适宜用地不足的情况下,就不得不利用自然条件较差的土地并加以改造。所以,城市发展必然要利用和改造自然环境。

人类对自然环境的认识利用,通常可以分为选择利用和改造利用。选择利用是人们根据对自然环境的不同需求,从有利和安全的角度去考虑选择和利用自然环境,是人类对自然环境的被动利用。随着社会生产力和科学技术的发展,人类对自然环境的选择能力和改造能力不断提高,对自然环境的利用也逐渐从避害趋利的角度发展到试图利用自然规律改造自然的主动利用。从人类活动的历史发展来看,古代是以选择利用为主,然后改造利用的因素逐渐增加。如中国历代都城大邑的建设,大都选择山环水足、具有良好自然环境的地方,也是自然环境阻力最小的地方,表现了尊重自然的思想。

在选择利用自然环境时,通常从两个方面进行选择:首先是选择有利的自然环境,以自然环境对人们要求的适合程度作为选择的标准,即有利选择或适度选择;另一方面,是要避免危险较多的自然环境,也就是把安全性作为选择的标准,这称为安全选择。这两类选择相一致和相矛盾的情况都存在,更多的是二者相矛盾的情况,即人们在选择时面临的是有利但有危险的自然环境。这就需要分析自然环境的特点和认识自然环境的变化规律,在此基础上进行正确的判断,选择正确的利用方向和利用地点。这时进行的自然环境研究,应将自然规律的研究与实际应用相结合,即与人们的利用方式对自然环境的要求相结合;而判断则是以对自然环境的不同需求为依据,判断的标准可以是相对变化的。这可称为自然环境诊断。

自然环境诊断可以分为3种:一是对应于有利选择或适度选择的,即把自然环境作为人类重要的资源来分析的自然环境资源研究。二是对应于安全选择的自然环境分析,称为自然环境灾害分析,因为安全选择和回避危险是一样的,自然环境的危险性就是自然环境的危害性。三是对应于改造利用的自然环境研究,即分析评价人类对自然环境的改造活动的合理程度和潜在影响。在利用自然环境时,城市中的人类活动相当强烈,干扰、破坏甚至改变了自然环境和自然过程,结果是城市环境表现出不同的脆弱性,而城市边缘区则成为城市环境脆弱带。



我们认识到,城市自然环境不仅是一种可利用的自然资源,更是一种脆弱的、在合理利用的同时需要予以保护的资源。城市化的迅速发展,将使人口、资源、环境问题更为加剧,对城市的自然环境产生了猛烈的冲击。解决问题的根本途径是实施可持续发展战略,也就是要在自然资源、自然环境可以支撑的条件下,在不危害子孙后代生存和发展的前提下,推动城市的发展。这就要求我们必须重新审视作为城市发展基础的自然资源、自然环境,为可持续发展战略的制订,构筑坚实的科学基础。

重庆市是长江上游的经济中心和西部地区的直辖市。都市区包括都市核心区的渝中、大渡口、江北、沙坪坝、九龙坡、南岸 6 区和外围都市圈的北碚、渝北、巴南 3 区,面积 5 473km²。重庆都市区地处四川盆地东部的平行岭谷低山丘陵区 and 长江、嘉陵江的汇流地带,又位于三峡水库末端。受到自然条件的影响和资源环境的制约,城市的发展具有特色和个性。

2

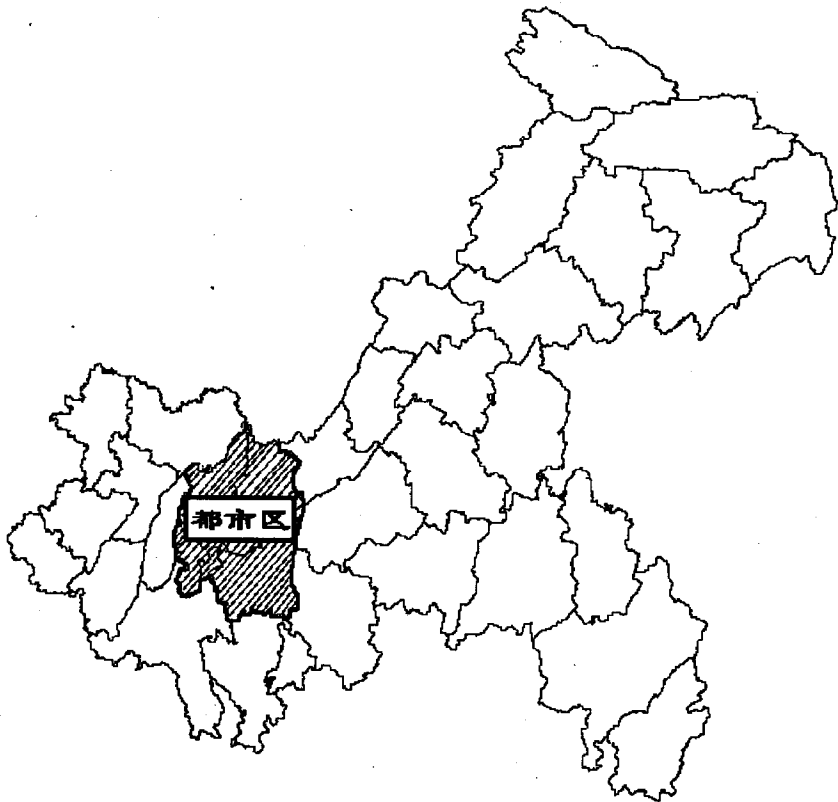


图 1 都市区在重庆市的位置

在重庆都市区,以近南北走向的山地为经,以近东西流向的长江、嘉陵江干流及其支流为纬,组成了以山水为主的自然城市环境,形成了有名的山城和江城。自然山水既是城市发展的基础和资源,但复杂的自然条件也使城市建设的投资增加,又成为城市建设和发展的障碍。

山地城市的建设和发展,受到地形地貌的重大影响。各种地貌类型,通过其特有的形态(如坡度、方位、水平切割度和垂直切割度等)、地貌组成物质和地貌过程,影响城市的方方面面,如城市规划中建筑物的布置,城市交通联系的实现,城市环境的舒适卫生宜人性,城市景观中建筑艺术风貌的形成等等。而都市区内由各种地貌类型组合而成的区域地貌,则通过其区位条件、空间分布和组合,对城市的总体布局、城市结构和扩展方式起着限制、聚合、引导、分割