

长江流域 水体环境背景值研究图集

Atlas of Study on Background Value of Aquatic Environment
of the Changjiang River Valley

中国科学院长春地理研究所 主编

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序

长江流域是我国著名的产业带，同时也是我国重要的经济建设和开发区域。合理利用长江流域的资源，保护自然环境，维持生态平衡，促进长江流域的社会、经济持续发展，是一项紧迫的战略任务。《长江流域水体环境背景值研究图集》正是为了适应这种要求而编制的。该图集可为中央和地方各级政府宏观掌握长江流域水环境现状，预测变化趋势，为区域环境规划、工农业合理布局提供科学依据；特别是为正在建设的三峡工程提供基础数据的重要文献资料。因此，图集的编制出版对长江流域的社会、经济可持续发展具有重要的实用意义和学术价值。

《长江流域水体环境背景值研究图集》以地图特有的语言，形象直观的手法，全面、系统地分析和表现了我国最大的河流——长江流域水体环境背景值的空间分布规律、区域分异特点等，它反映我国水体环境背景值研究的最新成果和水平，同时也展示了与水环境背景值形成有密切关系的自然与人文方面的内容，为今后研究长江流域水环境容量、水质评价、全球环境质量变化等提供系统的资料。

该图集系统总结和利用 300 多位科研人员实地考察所获的 465 个点位 10 万余个实测数据，所表示的元素背景值包括水相、沉积相和生物相三大部分；既有全流域的成果图，也有区域典型图以及剖面图，同时还有照片和文字说明，内容十分丰富、翔实，具有较高的可靠性 and 权威性。在内容与表现形式上，图文并茂，图型新颖，其科学价值更为可贵。

中国科学院院士
中国科学院副院长

徐宝璜

1998 年 1 月

为长江流域水体环境背景值研究图集作序

徐宝璜

徐宝璜

PREFACE

The world is undergoing drastic changes, and mankind is at the crossroads. We are faced with a serious task of making a strategic decision—to go further along the road we have so far traversed, a road leading to human progress only in a number of places for a number of years, or to take another road which will support progress of all mankind from now until the distant future.

—from *Our Common Future* by the World Commission on Environment and Development

The Changjiang River valley is a famous industrial zone in China, and also an important region of economic construction and development. How to utilize the resources of the Changjiang River valley rationally, to protect natural environment, to maintain ecological equilibrium, to promote the sustainable development of society and economy in the Changjiang River valley is an urgent strategic task. *Atlas of Study on Background Value of Aquatic Environment of the Changjiang River Valley* is compiled just for this requirement. This atlas can provide the scientific basis for the central and local governments macroscopically mastering the present aquatic environment of the Changjiang River valley, predicting the environmental change trend, and for regional environment planning and rational distribution of industry and agriculture, and particularly provide important basic data and materials for the Three Gorges Project. Therefore, the compilation of this atlas has important practice meaning and academic value for the sustainable development of society and economy in the Changjiang River valley.

Atlas of Study on Background Value of Aquatic Environment of the Changjiang River Valley overall and systematically analyzed and expressed the spatial distribution law and regional differential characteristics of background value of aquatic environment of the largest river in China—the Changjiang River valley, in the special language of maps, and vivid and visual manner, thus reflecting the latest result and level of the study on background value of aquatic environment in China. At the same time, this atlas has presented the natural and human contents which are closely related to the formation of background value of aquatic environment. It provides the systematic materials for the further study on aquatic environment capacity of the Changjiang River valley, water quality evaluation and global environment quality change.

This atlas systematically summarized and used more than 100 000 determined data which were obtained by over 300 scientific personnel from 465 sampling points. The background value of elements expressed includes three parts of water facies, sedimentary facies and biological facies. The atlas not only contains the result maps of the whole river valley, but also includes typical maps of the region and profile maps, as well as photos and instruction, the content is described in full and with satisfactory accuracy, having high credibility and authority, and both pictures and texts are excellent, maps are expressed in a new and original manner.

Chen Yipu

Academician of the Chinese Academy of Sciences
Vice-President of the Chinese Academy of Sciences

January 1998

前言

长江是我国第一大河，也是世界著名的第三巨川，干流全长 6 300km，流域面积 $1.8 \times 10^6 \text{ km}^2$ ，年入海径流量高达 $1.0 \times 10^{12} \text{ m}^3$ ，占全国总径流量的 1/3 强。

长江流域又是我国著名的产业带，也是我国正在进行的重点经济建设和开放区域，如何利用自然资源，保护自然环境，维持生态平衡，促进这一地区社会、经济持续发展是一项紧迫的战略任务。为此，国家在“七五”期间，组织中国科学院、国家环境保护局和国家教育委员会系统 13 个单位的科技人员，开展了“长江水系水体环境背景值研究”的科技攻关。该攻关项目的专题任务之一是要编制数幅长江流域环境背景值研究成果图，攻关目标没有明确提出完成图集编制任务的要求。为了形象、直观、系统、充分地反映长江流域自然环境特征和水体环境背景值研究的各项成果，课题组在经费十分困难、时间特别紧迫的情况下，提前完成了《长江流域水体环境背景值研究图集》的影印样本编制任务。由于事先没有预留图集出版经费，成果鉴定后一直未能出版。为了让这部重点反映长江水系水体环境背景研究成果的图集尽快出版，我们在国家科学技术著作出版基金、中国科学院院长基金和中国科学院长春地理研究所所长基金等多方资金资助下，用较短的时间对图集的部分图幅进行调整，修订文字说明，增补英文内容，使图集能更好地为流域水环境容量研究、环境影响评价与规划、水资源合理利用、工农业合理布局提供科学依据，为世界环境保护事业做出积极贡献。

《长江流域水体环境背景值研究图集》以背景值研究成果为依据，充分利用地图表现直观的优势，系统地展示长江水体系水体环境背景值的空间分布规律，充分体现我国水环境背景值研究的深度和广度，特别体现了长江流域水体背景值研究的最新成果和水平。编图采用的基础资料主要来源于 465 个点位约 10 万多个实际调查、监测数据，极小部分取自长江水文年鉴统计资料，全部数据均进入计算机数据库，定位准确、数据完整，具有较高的权威性。

图集共收编 95 幅专题地图，按图面负载分别用 1:850 万和 1:1 250 万两种比例尺展示。其中序图 18 幅，主要反映制图区域的自然、环境特征和产业开发特点，以提示其与环境背景值形成之间的联系；元素背景值图是图集的重点，共有

77 幅图，按水相、沉积相、生物相中各元素测定值的统计结果依元素种类编制，每幅图除反映采样点位的含量级别外，还显示出元素的含量分区，对地表水元素背景值还有剖面图，既直观展示长江流域各水系元素含量的分异特点，又准确反映元素总量与可溶态含量之间的关系。此外，图集尚有反映流域自然景观和环境特征、展示长江水系经济鱼类生态特性的照片 42 幅，增强了图集的直观性和表现力。为了增加图集的信息量，对用地图形式难以表达的内容尽可能以文字形式表达，做到图文并茂，相互补充。

《长江流域水体环境背景值研究图集》是一部大型专题地图集，专业性比较强。它的编制完成是 300 多名科技人员历时 5 年献出的一项集体成果，也是全国许多相关专业单位大力支持和帮助的结果；在本图集编制出版时又得到了中国科学院资源环境科学与技术局“九五”重点项目的资助。在此，我们对为本图集编制、出版给予热情关怀和付出艰辛劳动的所有单位和同志表示衷心的感谢！本图集将以印刷地图版和电子光盘版两种版本向国内外公开发行。编辑出版这样的专题地图集，对我们来说是属首次，缺乏经验，希望广大读者在喜欢它的同时，提出宝贵意见。

编者

1998 年 1 月

INTRODUCTION

The Changjiang River is the largest one in China, and the third largest one in the world. Its mainstream is 6 300 km long, and the drainage area is 1 800 000 km². Its annual runoff to the sea reaches 1 000 billion m³, making up more than one third of the total runoff in China. The Changjiang River valley is a famous industrial zone in China, and also the key region of economic construction and development, so how to utilize the natural resources rationally, to protect natural environment, to maintain ecological balance and to promote the sustainable and stable development of society and economy of this region is an urgent strategic task.

Atlas of Study on Background Value of Aquatic Environment of the Changjiang River Valley was based on the research results of background value, made full use of the superiority that a map has a visual expression, systematically showed the spatial distribution law of background value of aquatic environment of the Changjiang River water system, fully expressed the depth and width of the study on background value of aquatic environment of China, particularly presented the latest result and level of the study on background value of aquatic environment of the Changjiang River valley. The basic data used in compiling the atlas were mainly from more than 100 000 data of field investigation and monitoring for 465 sampling points, only very small amount of data were from the statistics of *Hydrological Yearbook of the Changjiang River*, all data have entered the computer database, the sampling points locations are accurate, and the data are complete, so the atlas is very authoritative.

The atlas consists of 95 maps, which express in the scale of 1:8 500 000 and 1:12 500 000 respectively according to the map covering range. Among these maps there are 18 introductory maps, which mainly reflect the natural environment features and industrial development characteristics of the covered region, so as to reveal the internal relation with the formation of environment background value. The maps of element background value are the major part of the atlas. There are 77 maps which were compiled based on the statistical result of determined values of elements in water factors, sedimentary factors and biological factors, and element types, each map not only reflects the content level of sampling points but also shows the content division of elements.

As for background values of elements in surface water, we designed corresponding content profile-line maps from point to point, which illustratively show the differential characteristics of element contents in river systems of the Changjiang River valley, and

also accurately reflect the relationship between element contents and soluble contents. Besides, the atlas also includes 42 photos which reflect the natural landscape and environmental features of the Changjiang River valley, and present the ecological features of camps in the Changjiang River water system, enhancing visualization and expression of the atlas. In order to increase the information amount of the atlas, the content which can hardly be expressed in the form of map, is expressed in words as far as possible, so that both pictures and texts are excellent, complement each other.

The Editors
January 1998

长江流域水体环境背景值研究图集

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ATLAS OF STUDY ON BACKGROUND VALUE OF AQUATIC ENVIRONMENT OF THE CHANGJIANG RIVER VALLEY

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目 录

序次	图 名	比例尺	图 名	比例尺	
1	长江流域陆地卫星影像图	1:8 500 000	26	长江流域地表水铜含量分布图	1:8 500 000
2	长江流域政区图	1:8 500 000	27	长江流域地表水镉含量分布图	1:8 500 000
3	长江流域人口密度图	1:8 500 000	28	长江流域地表水镉含量分布图	1:8 500 000
4	长江流域岩石类型图	1:8 500 000	29	长江流域地表水汞含量分布图	1:8 500 000
5	长江流域土壤图	1:8 500 000	30	长江流域地表水铅含量分布图	1:8 500 000
6	长江流域植被图	1:8 500 000	31	水背景研究元素在周期表中位置	
7	长江流域水文地质图	1:8 500 000	32	长江流域地表水钼含量分布图	1:12 500 000
8	长江流域多年平均降水量图	1:12 500 000		长江流域地表水铈含量分布图	1:12 500 000
9	长江流域多年平均干燥度图	1:12 500 000	33	长江流域地表水铈含量分布图	1:12 500 000
10	长江流域径流深等值线图	1:12 500 000	34	长江流域地表水铈含量分布图	1:12 500 000
11	长江流域气候区划图	1:12 500 000		长江流域地表水铈含量分布图	1:12 500 000
12	长江流域水化学类型图	1:8 500 000	35	长江流域地表水铈含量分布图	1:12 500 000
13	长江流域地表水 pH 值分区图	1:12 500 000	36	长江流域地表水铈含量分布图	1:12 500 000
14	长江流域地表水离子总量分区图	1:12 500 000	37	长江流域地表水铈含量分布图	1:12 500 000
15	长江流域地表水化学耗氧量分区图	1:12 500 000	38	长江流域地表水铈含量分布图	1:12 500 000
16	长江流域主要经济鱼类分布图	1:8 500 000	39	长江流域地表水铈含量分布图	1:12 500 000
17	长江流域主要工业采样点分布图	1:8 500 000	40	长江流域地表水铈含量分布图	1:12 500 000
18	长江流域地表水铜含量分布图	1:8 500 000	41	长江水系沉积物采样点分布图	1:8 500 000
19	长江流域地表水铬含量分布图	1:8 500 000	42	长江水系沉积物铬含量分布图	1:8 500 000
20	长江流域地表水锰含量分布图	1:8 500 000			
21	长江流域地表水铁含量分布图	1:8 500 000			
22	长江流域地表水镍含量分布图	1:8 500 000			

CONTENTS

Order		Maps	Scale
1	Lanbat Image	Map of the Changjiang River Valley	1:8 500 000
2	Administrative Division	Division of the Changjiang River Valley	1:8 500 000
3	Population Density	of the Changjiang River Valley	1:8 500 000
4	Rock Types	of the Changjiang River Valley	1:8 500 000
5	Soils	of the Changjiang River Valley	1:8 500 000
6	Vegetation	in the Changjiang River Valley	1:8 500 000
7	Hydrogeologic Division	in the Changjiang River Valley	1:8 500 000
8	Average Annual Precipitation	in the Changjiang River Valley	1:12 500 000
9	Average Annual Aridity	in the Changjiang River Valley	1:12 500 000
10	Isogram of Runoff Depth	in the Changjiang River Valley	1:12 500 000
11	Climatic Division	in the Changjiang River Valley	1:12 500 000
12	Division of Hydrochemical Types	in the Changjiang River Valley	1:8 500 000
13	Division of Hydrogen-Ion Concentration	Value in Surface Water of the Changjiang River Valley	1:12 500 000
14	Division of Total Hardness	in Surface Water of the Changjiang River Valley	1:12 500 000
15	Division of Total Ion Content	in Surface Water of the Changjiang River Valley	1:12 500 000
16	Division of Chemical Oxygen Demand	in Surface Water of the Changjiang River Valley	1:12 500 000
17	Distribution of Main Industry	in the Changjiang River Valley	1:8 500 000
18	Distribution of Major Economic Fishes	in the Changjiang River Valley	1:8 500 000
19	Distribution of Sampling Sites for Surface Water	in the Changjiang River Valley	1:8 500 000
20	Distribution of Fluorine Content	in Surface Water of the Changjiang River Valley	1:8 500 000
21	Distribution of Vanadium Content	in Surface Water of the Changjiang River Valley	1:8 500 000
22	Distribution of Chromium Content	in Surface Water of the Changjiang River Valley	1:8 500 000
23	Distribution of Manganese Content	in Surface Water of the Changjiang River Valley	1:8 500 000
24	Distribution of Iron Content	in Surface Water of the Changjiang River Valley	1:8 500 000
25	Distribution of Cobalt Content	in Surface Water of the Changjiang River Valley	1:8 500 000
26	Distribution of Nickel Content	in Surface Water of the Changjiang River Valley	1:8 500 000
27	Distribution of Copper Content	in Surface Water of the Changjiang River Valley	1:8 500 000
28	Distribution of Zinc Content	in Surface Water of the Changjiang River Valley	1:8 500 000
29	Distribution of Arsenic Content	in Surface Water of the Changjiang River Valley	1:8 500 000
30	Distribution of Selenium Content	in Surface Water of the Changjiang River Valley	1:8 500 000
31	Distribution of Molybdenum Content	in Surface Water of the Changjiang River Valley	1:8 500 000
32	Distribution of Cadmium Content	in Surface Water of the Changjiang River Valley	1:8 500 000
33	Distribution of Mercury Content	in Surface Water of the Changjiang River Valley	1:8 500 000
34	Distribution of Lead Content	in Surface Water of the Changjiang River Valley	1:8 500 000
35	Some Chemical Elements in the Periodic Table for Background Investigation of Aquatic Environment		
36	Distribution of Sampling Sites of Surface Water for Rare-Disperse Elements Analysis		1:12 500 000

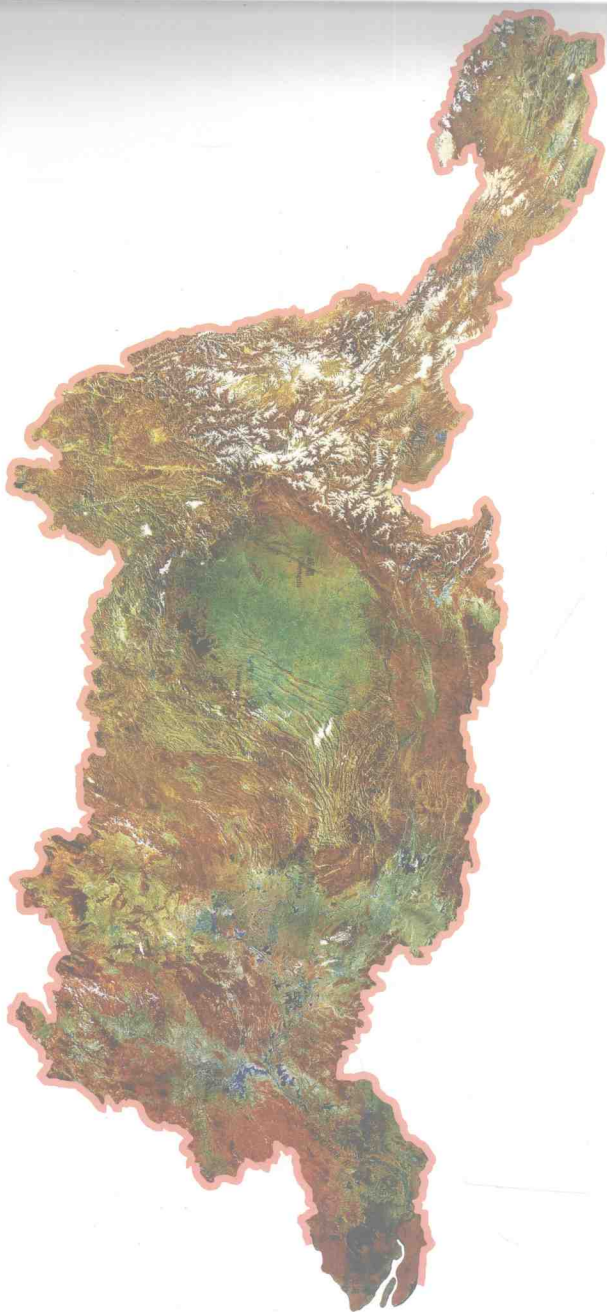
32	Distribution of Rubidium Content in Surface Water of the Changjiang River Valley	1:12 500 000	40	Distribution of Sampling Sites of Sediment in the Changjiang River Valley	1:8 500 000
	Distribution of Cesium Content in Surface Water of the Changjiang River Valley	1:12 500 000	41	Distribution of Chromium Content in Sediment of the Changjiang River Water System	1:8 500 000
33	Distribution of Strontium Content in Surface Water of the Changjiang River Valley	1:12 500 000	42	Distribution of Manganese Content in Sediment of the Changjiang River Water System	1:8 500 000
	Distribution of Barium Content in Surface Water of the Changjiang River Valley	1:12 500 000	43	Distribution of Iron Content in Sediment of the Changjiang River Water System	1:8 500 000
34	Distribution of Scandium Content in Surface Water of the Changjiang River Valley	1:12 500 000	44	Distribution of Cobalt Content in Sediment of the Changjiang River Water System	1:8 500 000
	Distribution of Sulfur Content in Surface Water of the Changjiang River Valley	1:12 500 000	45	Distribution of Nickel Content in Sediment of the Changjiang River Water System	1:8 500 000
35	Distribution of Lanthanum Content in Surface Water of the Changjiang River Valley	1:12 500 000	46	Distribution of Copper Content in Sediment of the Changjiang River Water System	1:8 500 000
	Distribution of Cerium Content in Surface Water of the Changjiang River Valley	1:12 500 000	47	Distribution of Zinc Content in Sediment of the Changjiang River Water System	1:8 500 000
36	Distribution of Lutetium Content in Surface Water of the Changjiang River Valley	1:12 500 000	48	Distribution of Arsenic Content in Sediment of the Changjiang River Water System	1:8 500 000
	Distribution of Neodymium Content in Surface Water of the Changjiang River Valley	1:12 500 000	49	Distribution of Cadmium Content in Sediment of the Changjiang River Water System	1:8 500 000
37	Distribution of Samarium Content in Surface Water of the Changjiang River Valley	1:12 500 000	50	Distribution of Mercury Content in Sediment of the Changjiang River Water System	1:8 500 000
	Distribution of Europium Content in Surface Water of the Changjiang River Valley	1:12 500 000	51	Distribution of Lead Content in Sediment of the Changjiang River Water System	1:8 500 000
38	Distribution of Terbium Content in Surface Water of the Changjiang River Valley	1:12 500 000	52	Some Chemical Elements in the Periodic Table for Background Investigation of Sediment	
	Distribution of Ytterbium Content in Surface Water of the Changjiang River Valley	1:12 500 000		Rare-dispers Elements Analysis	1:12 500 000
39	Distribution of Uranium Content in Surface Water of the Changjiang River Valley	1:12 500 000	53	Distribution of Radium Content in Sediment of the Changjiang River Water System	1:12 500 000
	Distribution of Thorium Content in Surface Water of the Changjiang River Valley	1:12 500 000		Distribution of Cesium Content in Sediment of the Changjiang River Water System	1:12 500 000

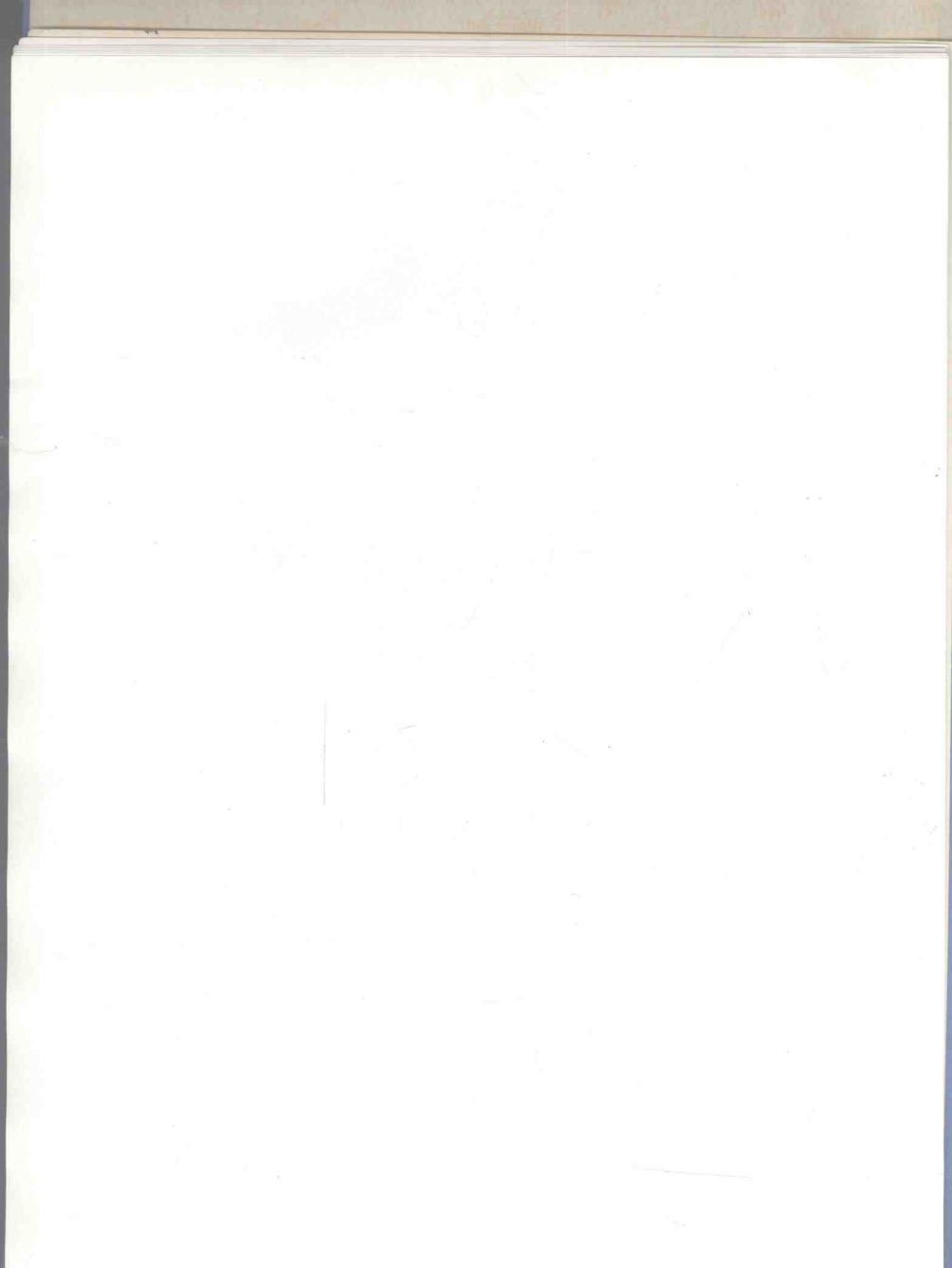
54	Distribution of Strontium Content in Sediment of the Changjiang River Water System	1:12 500 000	62	Distribution of Chromium Content in Carps in the Changjiang River Water System	1:12 500 000
	Distribution of Barium Content in Sediment of the Changjiang River Water System	1:12 500 000		Distribution of Fluorine Content in Carps in the Changjiang River Water System	1:12 500 000
55	Distribution of Scandium Content in Sediment of the Changjiang River Water System	1:12 500 000	63	Distribution of Manganese Content in Carps in the Changjiang River Water System	1:12 500 000
	Distribution of Strontium Content in Sediment of the Changjiang River Water System	1:12 500 000		Distribution of Iron Content in Carps in the Changjiang River Water System	1:12 500 000
56	Distribution of Lanthanum Content in Sediment of the Changjiang River Water System	1:12 500 000	64	Distribution of Cobalt Content in Carps in the Changjiang River Water System	1:12 500 000
	Distribution of Cerium Content in Sediment of the Changjiang River Water System	1:12 500 000		Distribution of Nickel Content in Carps in the Changjiang River Water System	1:12 500 000
57	Distribution of Lutetium Content in Sediment of the Changjiang River Water System	1:12 500 000	65	Distribution of Copper Content in Carps in the Changjiang River Water System	1:12 500 000
	Distribution of Neodymium Content in Sediment of the Changjiang River Water System	1:12 500 000		Distribution of Zinc Content in Carps in the Changjiang River Water System	1:12 500 000
58	Distribution of Samarium Content in Sediment of the Changjiang River Water System	1:12 500 000	66	Distribution of Arsenic Content in Carps in the Changjiang River Water System	1:12 500 000
	Distribution of Europium Content in Sediment of the Changjiang River Water System	1:12 500 000		Distribution of Selenium Content in Carps in the Changjiang River Water System	1:12 500 000
59	Distribution of Ytterbium Content in Sediment of the Changjiang River Water System	1:12 500 000	67	Distribution of Cadmium Content in Carps in the Changjiang River Water System	1:12 500 000
	Distribution of Uranium Content in Sediment of the Changjiang River Water System	1:12 500 000		Distribution of Lead Content in Carps in the Changjiang River Water System	1:12 500 000
60	Distribution of Thromium Content in Sediment of the Changjiang River Water System	1:12 500 000	68	Distribution of Organic Mercury Content in Carps in the Changjiang River Water System	1:12 500 000
	Some Chemical Elements in the Periodic Table for Background Investigation of Fish Body			Distribution of Total Mercury Content in Carps in the Changjiang River Water System	1:12 500 000
61	Distribution of Sampling Sites of Carps in the Changjiang River Water System	1:12 500 000	69	Environmental Photos of Sampling Sites, Typical Photos of Fishes	

长江流域陆地卫星影像图

LANDSAT IMAGE MAP OF THE CHANGJIANG RIVER VALLEY

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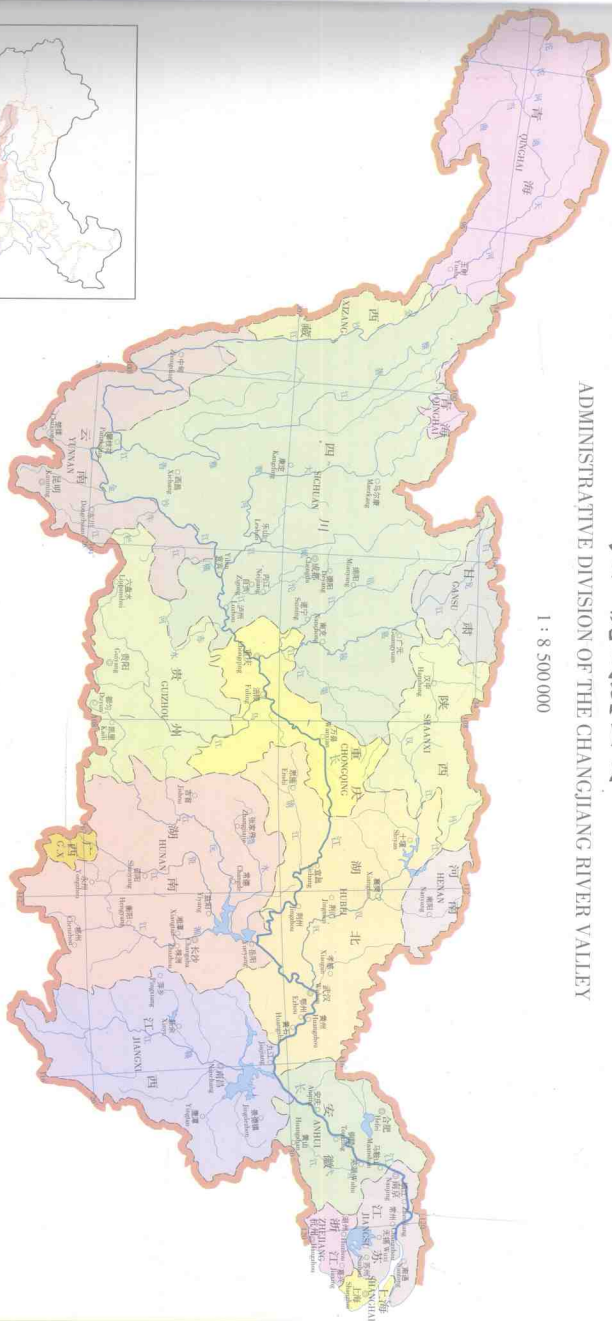




长江流域政区图

ADMINISTRATIVE DIVISION OF THE CHANGJIANG RIVER VALLEY

1 : 8 500 000



● 省、自治区行政中心 ● 地级行政中心 — 省、市界 — 流域界线 — 河流 — 湖泊

长江流域
的地理位置

LOCATION OF
THE CHANGJIANG RIVER VALLEY

