

黄河流域

水土保持

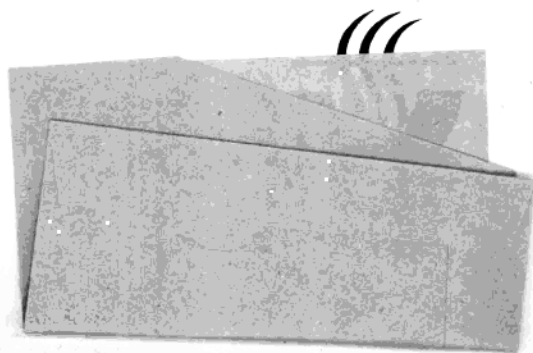


SOIL AND WATER CONSERVATION IN THE HUANGHE RIVER VALLEY

黄河流域水土保持

水利电力部黄河水利委员会编

上海教育出版社



SOIL AND WATER CONSERVATION IN THE HUANGHE RIVER VALLEY

Edited by

Huanghe River Conservancy Commission
Shanghai Educational Publishing House

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在本画册的拍摄和编辑过程中,得到王化云、袁隆、龚时暘等有关领导同志的指导和支持。编辑过程中,蔡志恒、刘春萱、阎胜芳、李晓郎等同志参加了部分工作;孟庆枚、冯国安、焦清泰等同志提出过宝贵意见;在图片的拍摄过程中,得到黄河水利委员会黄河中游治理局、绥德水土保持科学试验站、西峰水土保持科学试验站、天水水土保持科学试验站、吴堡水文总站、兰州水文总站和陕西省榆林行署水利水保局、延安行署水利水保局以及中国人民解放军 39897 部队等单位的支持。在此谨表谢意。

前言

黄河流域水土流失严重。黄河流经世界上最大的黄土高原。黄土高原西起日月山,东迄太行山,南抵秦岭,北界阴山,总面积约60万平方公里,水土流失面积达43万平方公里,是黄河流域水土流失最严重的地区。这里沟壑密布,土质疏松,植被稀少,暴雨集中。每遇暴雨,土壤被侵蚀,水与土由成千上万条沟川流入黄河,使黄河成为世界上含沙量最大、输沙量最多的河流。

严重的水土流失,使当地农林牧业生产和生态环境遭到破坏,也影响了水土、矿产资源的开发利用。同时,大量泥沙淤积在黄河下游河道,使其成为地上“悬河”,严重地威胁华北平原的安全。所以,防治水土流失,积极开展水土保持工作,是治理黄河,改变黄河流域水土流失区面貌,保护和合理利用水土资源,减少水旱风沙灾害,建立良好的生态环境,发展农林牧业生产的根本措施,是国土整治的重要内容。

水土流失的危害在世界上已引起广泛的重视,保持水土、整治国土是世界各国政府日益关心的课题。我国政府十分重视黄河流域的水土保持工作,从50年代初就把它列为全国水土保持工作的重点,多次组织对水土流失地区的考察,并建立了一系列的工作和研究机构,制定规划,发动群众,采用生物、工程、耕作等措施进行综合防治,取得了显著的成就。

本图片集从水土流失的状况、成因、危害、防治和水土保持的效益等几个方面,用图片的形式,向读者介绍黄河流域水土流失和水土保持方面的知识和治理成就。

Foreword

The loss of water and soil in the Huanghe River valley is serious. The largest loess plateau in the world is drained by the Huanghe River. Something like 430 000 km² of land out of the 600 000 km² or so extending from Riyue Mountain in the west to the Taihang Mountains in the east, and from Qinling Mts as the southern border to Yinshan Mts along the northern edge of the plateau, susceptible to loss of soil and water, comprise the main source of sediment in the Huanghe River. The criss-crossing gullies and sparse vegetation on soils of loose structure almost unprotected against concentrated rains lead to very severe erosion, soil and water delivered into the Huanghe River via thousands of gullies, making it the water course with the highest silt charge the world ever knows.

Severe loss of soil and water has its devastating effect on farming, forestry and stock-breeding as well as ecological environment of the area concerned. It also bears on the exploitation of water, land and mineral resources. Huge quantities of sediment deposited in the lower reaches have rendered the river "suspended" above the adjacent land surface, seriously menacing life and property in the North China Plains. Control of soil erosion through conservation practice in a positive way will therefore be instrumental to remaking nature and remoulding life in the related area, preserving and rationally utilizing land and water resources, developing production in agriculture, forestry and animal husbandry, and harnessing the Huanghe River—once the Sorrow of China. Such will certainly be a main constituent part of the work of managing the land to the benefit of generations after generations, having reduced natural calamities of floods, droughts and wind-blown sand and set up optimal ecological environment once and for ever.

Importance has been attached to prevention of harms from loss of water and soil by all governments which are increasingly concerned with the problem. In China, stress has been laid on conservation practice, in the Huanghe River valley in particular, ever since the founding of the People's Republic of China. Investigations were carried out here as a focal point, research institutions and services at all levels were set up, much work has been done in drawing up programs of improvement and effecting prevention and remedy of soil erosion in a comprehensive way, resorting to biological and engineering control measures and conservation farming, and relying on organized masses. Marked achievements have been attained.

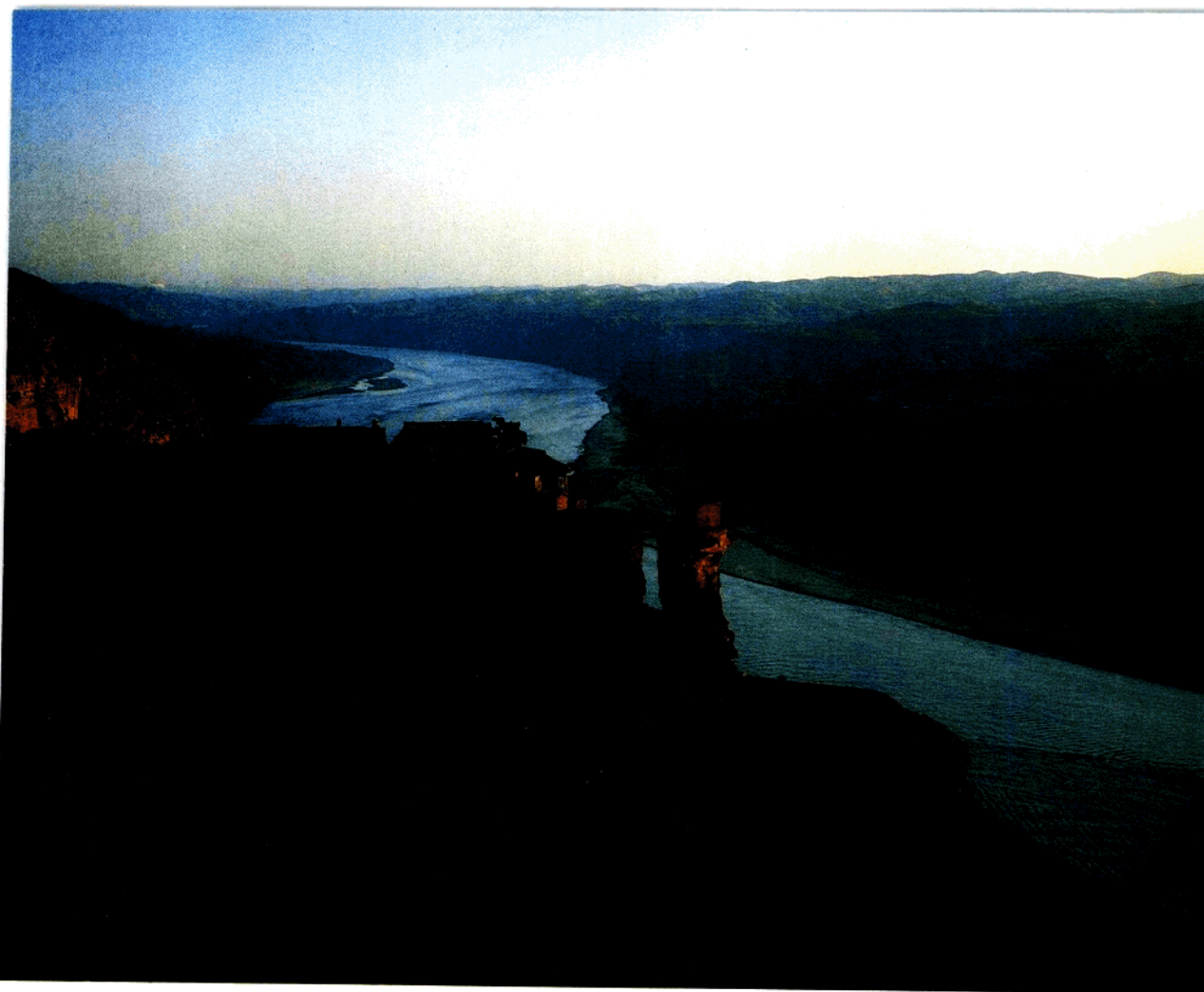
The album is to present in pictures the present status and genesis of soil erosion, its harms, ways of prevention and control as well as benefits already acquired, to acquaint the readers with soil erosion in the Huanghe River and conservation practice, as also the accomplishments.

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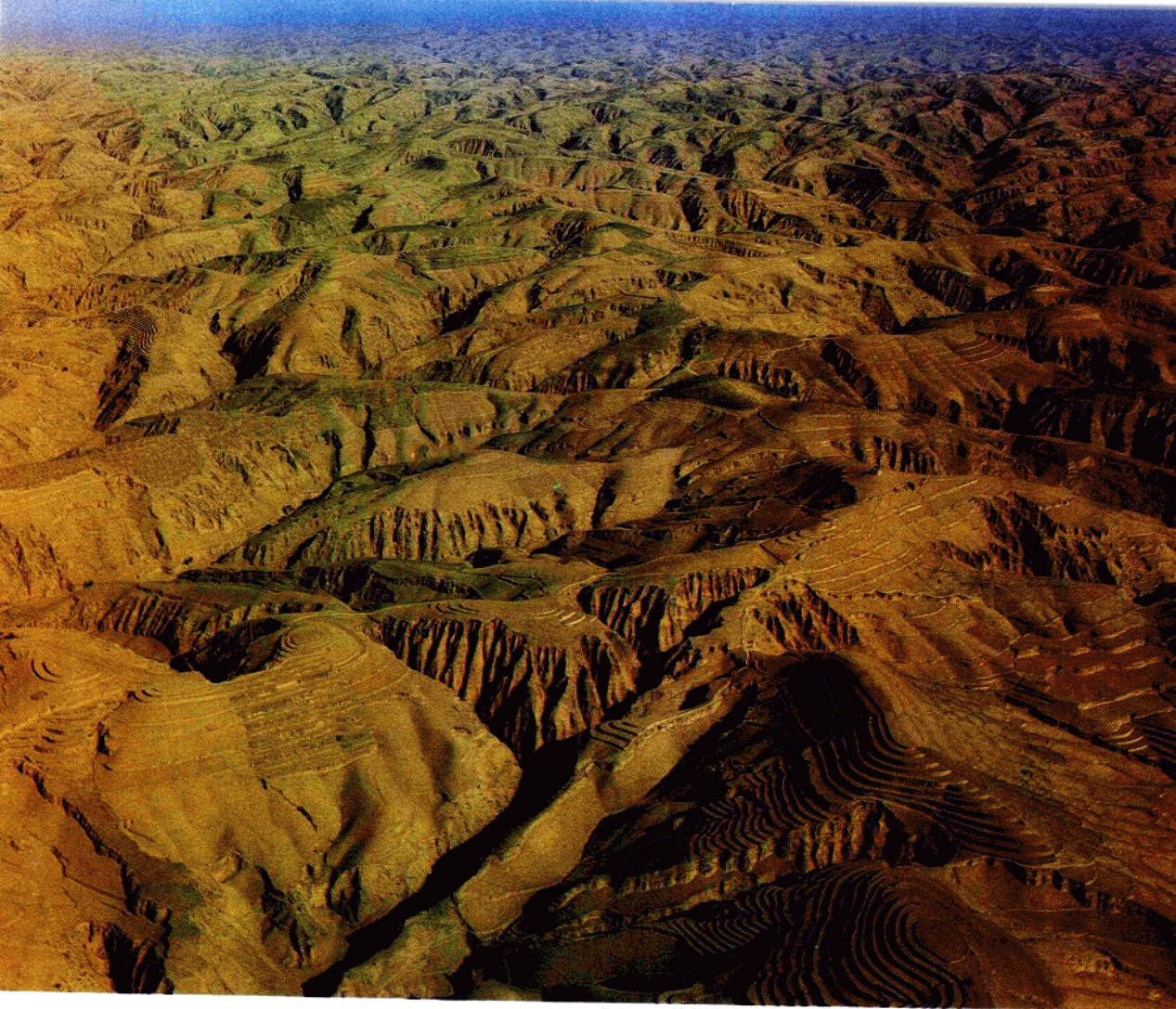
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美丽而古老的黄河,是中华民族摇篮。黄河发源于青海省巴颜喀拉山北麓的约古宗列盆地,流经青海、四川、甘肃、宁夏、内蒙古、山西、陕西、河南、山东九个省、自治区,注入渤海,全长5 464公里。流域面积75万多平方公里,多年平均年降水量478毫米,年径流量574亿立方米。流域内有耕地1.9亿亩,人口8 800万。图为晋陕峡谷黄河景色(图片除署名者外均为殷鹤仙摄)。

The Huanghe River, beautiful as of old, is the cradle of ancient civilization of the Chinese nation. It takes source from the Yueguzongli basin at the northern slopes of Bayankela Mountain in Qinghai province, flowing through or along Qinghai, Sichuan, Gansu, Ningxia, Nei Mongol, Shanxi, Shaanxi, Henan and Shandong to empty itself into the Bohai Sea, having traversed a total distance of 5 464 km in a drainage basin of over 750 000km². The mean annual precipitation is 478 mm and total yearly runoff 57.4 billion m³. Cropland within the valley totals 190 million mu and the drainage area is inhabited by a population of 88 million.

The picture gives a bird's-eye view of the Huanghe River along the gorgeous Shanxi-Shaanxi border.



黄土高原是黄河流域的重要组成部分，高原地表覆盖着数十米至二三百米厚的黄土层，质地疏松，植被稀少，抗冲力低。夏秋之际，暴雨频繁，水土流失十分严重，地表不断遭到破坏，形成梁峁状丘陵地貌。图为广袤无垠的黄土高原景观。

Loess plateau as a main constituent part of the Huanghe River valley has overburden of loess strata several scores to two or three hundred meters in thickness, of rather loose structure and sparsely covered by vegetation. The resistance to erosion is extremely low, so that loss of soil and water is severe during frequent storms in summer and early autumn, the land being constantly subject to devastation, resulting in typical rolling area of ridges and mounds.

The picture is a panorama of the boundless expanse of loess plateau.



梯田可以保持水土, 增加农作物产量, 是水土保持工作中的重要工程措施之一。图为黄河岸边绵亘的层层梯田。

The terraced fields are effective in preserving soil and water, thus increasing crop yield. Terracing is therefore known as one of the most important means in engineering measures. Slopes beyond slopes along both banks of the Huanghe River are remade into terraces.

一、水土流失类型区划

水力、风力和重力是造成水土流失的主要营力。气候、地形、地质、土壤、植被及人类活动是水土流失的重要因素。

黄河流域降水的时空分布极不均衡,由西北部年平均降水量 200 毫米,向东南递增至 700 毫米以上,6~10 月降水量占全年 65~85%;黄河流域地势西高东低,地形复杂,在黄土高原的古地形上覆盖着一层很厚的黄土层,最厚处达 400 米;黄土颗粒的中数粒径由西北的 0.05 毫米向东南逐渐变细到 0.015 毫米。由于这些因素,造成了黄河流域地形、土壤侵蚀模数、植被、人口密度及土地利用等差异。

根据水土流失的轻重程度及地形、气候、土壤、植被等特点,将黄河流域水土流失区划分为:黄土丘陵沟壑区、黄土高原沟壑区、风沙区、土石山区、黄土阶地区、冲积平原区、干燥草原区、高地草原区、森林区九个类型区。其中,黄土丘陵沟壑区范围最广,水土流失最为严重,因其内部差异较大,故又分五个副区。

黄河流域水土流失类型区划,为这一地区开展水土保持工作,提供了战略性布局及水土保持措施综合配置的科学依据。有利于因地制宜,因害设防,合理利用水土资源,发挥当地自然资源及生产优势,发展生产,改善生态环境。

1 Inventory of erosion zones

Water, wind and gravity are the three main external agents of soil erosion, whereas climate, topography, geology, soil condition, vegetative cover and human activities are factors of significant influence.

Distribution of rainfall in time and in space is very uneven in the Huanghe River valley, ranging from an average of 200 mm in the northwest to more than 700 mm in the southeast, 65—85% of annual rainfall occur in the months June through October. The elevation of land surface, on the contrary, drops in the direction toward southeast. The complicated topography is due to presence of very thick overburden of loess, up to a maximum thickness of 400 m, above the ancient landform. The median size of grain diminishes from 0.05 mm in the northwest to 0.015 mm in the southeast. All the aforesaid lead up to substantial differences in topography, modulus of erosion, vegetative cover, density of population and land utilization in the Huanghe River valley.

In accordance with the degree of soil erosion and particularities of landform, morphology, climate, soil condition and vegetative cover, among others, the drainage area may be gullied rolling loess region, gullied loess plateau, dune area, earth and rock mountains, loess terraces, alluvial plain, arid grassland, highland prairie and forests, nine in all, of which the first-mentioned is most extensive and loss of soil and water there is most severe, differing in extent most widely, and is therefore further divided into 5 sub-zones.

Zoning of the basin serves as scientific basis for strategic arrangement and integrated disposal of conservation measures appropriate to local conditions, preventive steps to be taken where harms are most liable to take place, thus favouring rational utilization of land and water resources, giving full play to predominance of each locality in natural resources and production, increasing produce and improving ecological environment.

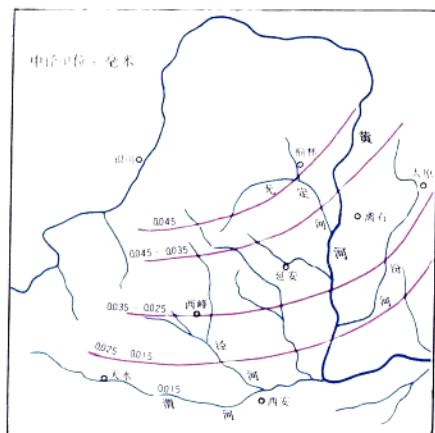


图 1 黄河中游黄土颗粒中径变化图
Fig. 1 Variation of median size of loess particles on the middle reaches of the Huanghe River (mm)

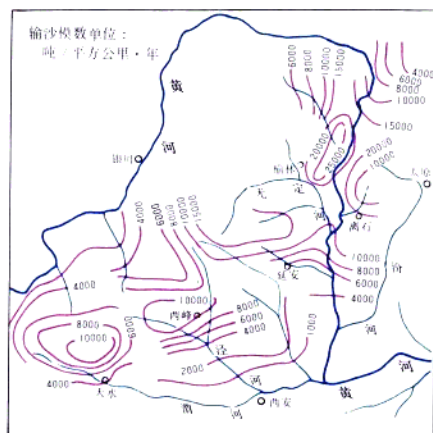


图 2 黄河中游输沙模数图
Fig. 2 Modulus of sediment delivery on the middle reaches of the Huanghe River ($t/km^2 \cdot yr$)

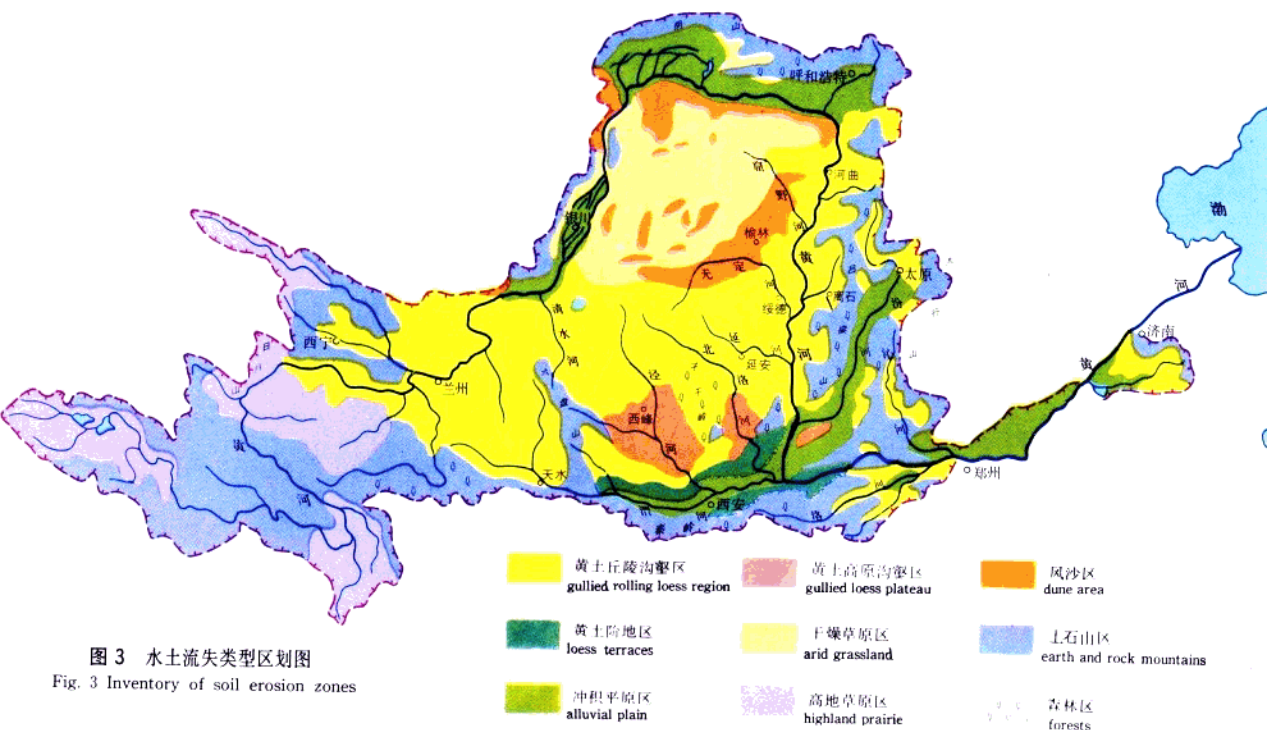
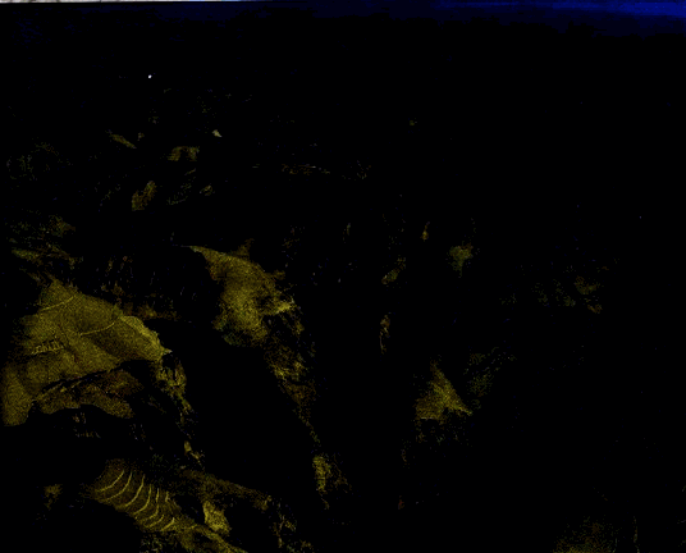


图 3 水土流失类型区划图
Fig. 3 Inventory of soil erosion zones



黄土丘陵沟壑区是黄土高原的主体,面积达 23.7 万平方公里。面蚀、沟蚀均很严重,是黄土高原水土流失最严重的地区。沟壑密度 1.8~7 公里/平方公里。土壤侵蚀模数 5 000~25 000 吨/平方公里·年。图为黄河穿行在晋陕间黄土丘陵沟壑区。

Gullied rolling loess region is the main constituting part of loess plateau. It covers an area of 237 000 km², severely affected by surface and gully erosion. Gully density is as high as 1.8~7 km/km² and erosion modulus 5 000~25 000 t/km²·yr. The picture shows gullied rolling loess region along the Huanghe River flowing by Shanxi and Shaanxi province.



黄土丘陵沟壑区丘陵起伏, 沟壑纵横, 黄土覆盖在起伏不平的古地形上, 经流水切割后, 地形呈梁、峁状。峁是圆形或椭圆形的穹状地形。本页两图均为陕西省米脂县的黄土峁。这里水力侵蚀强烈。

Undulating terrain in gullied rolling loess region is typified by criss-crossing gullies dissecting thick loess overburden on top of ancient landform, to form ridges and mounds, the latter being domed in shape, round or elliptical.

Pictures shown on this page display loess mounds in Mizhi county, Shaanxi province, where erosion by hydraulic action is most severe.



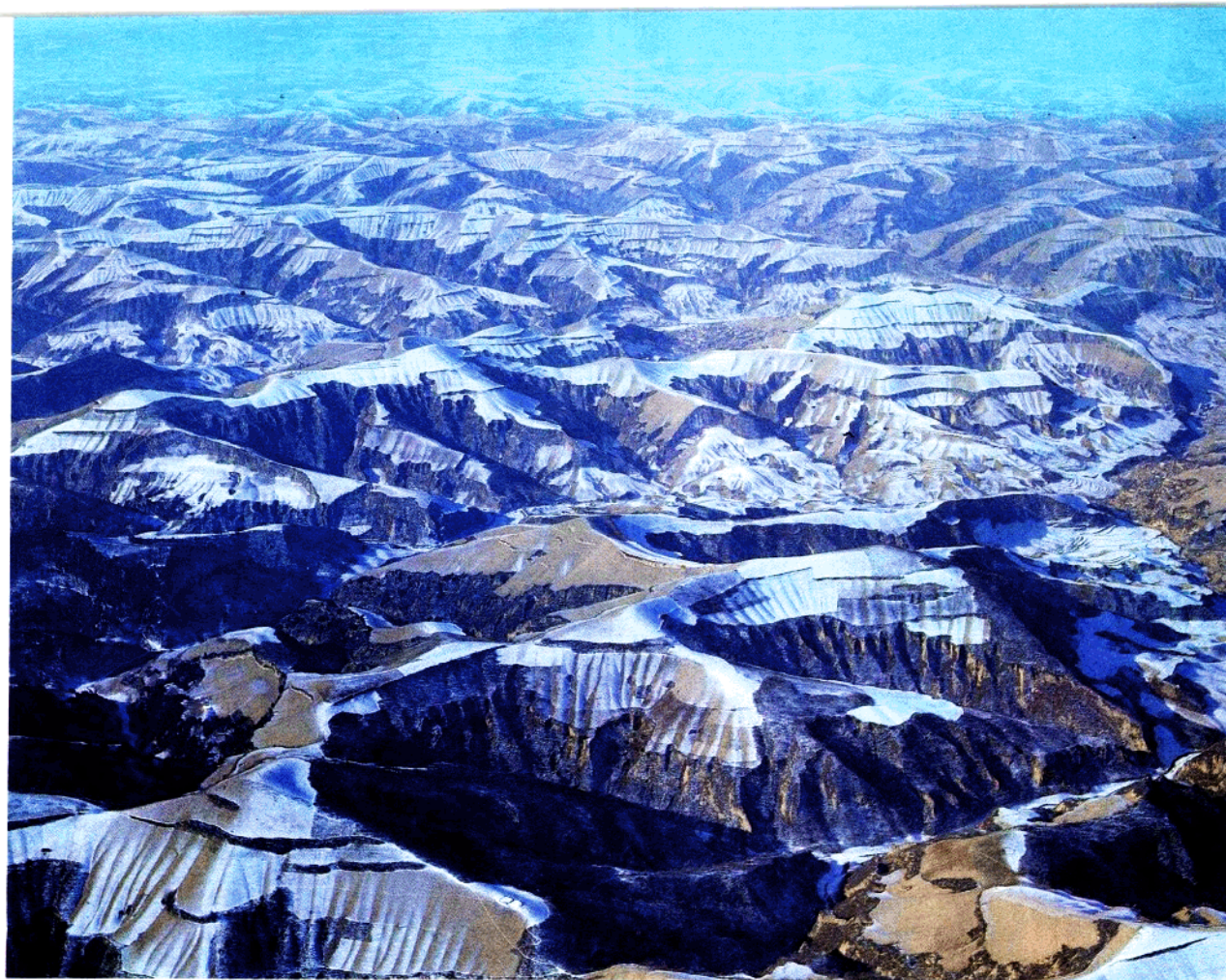


山西省兴县黄土梁峁地形。这里耕垦指数高,侵蚀严重,沟壑密度大。
Ridge-and-mound landform in loess region in Xingxian county, Shanxi province, dissected by dense network of gullies, bears testimony to severe erosion and high index of cultivation.

陕西省绥德县黄土梁峁景观。黄土高原上的长条状地形称梁。黄土梁宽数十到数百米,长可达数十公里。

A sight of loess ridges and mounds in Suide county, Shaanxi province, the strip-formed landscape on loess plateau termed "ridges" measuring several tens of kilometers in length and scores or even hundreds of meters wide at some localities.





延安市周围的梁峁状丘陵雪景。

Snowfall in ridge-and-mound rolling country around the city of Yanan

黄土丘陵沟壑区的城镇一般建在傍水的河谷里。图为延河畔的延安市。

Towns in gullied rolling loess region are mostly situated in valleys with avail of water, such as Yanan, a municipality, on the banks of Yanhe River.

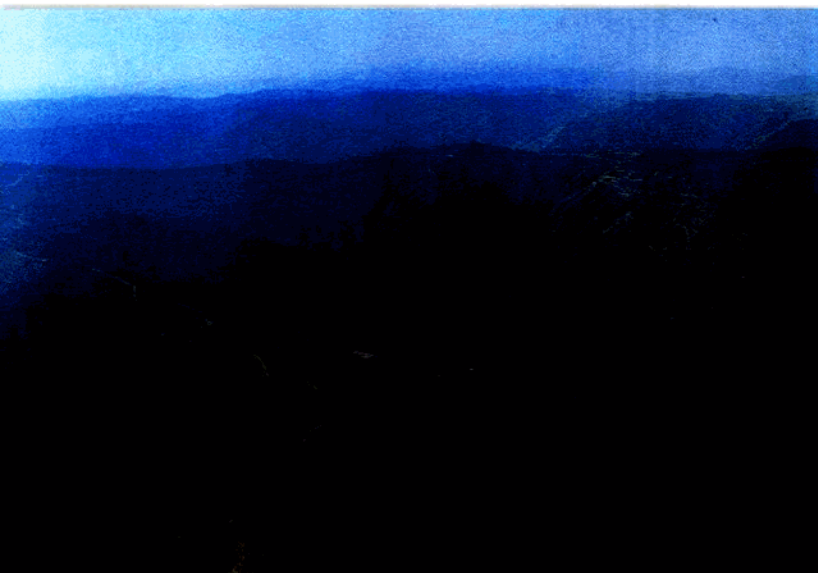




左图摄自甘肃省定西县。下图摄自甘肃省天水县。均为梁状丘陵，地形呈长梁大峁，沟深坡长，侵蚀程度中等。

The picture to the left was taken in Dingxi county, Gansu, and that at the bottom in Tianshui county of the same province, both showing ridged landform in rolling terrain; the gullies run deep along lengthy slopes moderately eroded.





甘肃省临夏梁状丘陵。沟浅而宽,植被较好。

Rather adequate vegetative cover and broad and shallow gullies on ridge-formed rolling terrain in Linxia, Gansu

甘肃省皋兰黄土丘陵。沟浅而宽,降水量少,植被差,耕垦指数低,只在沟底分布少量垆地(长条状开阔谷地)。

Rolling loess region in Gaolan county, Gansu province, with gullies wide and shallow, sparse rainfall, poor vegetative cover and low index of cultivation, farmland of limited area being spread along ravines





黄土高原沟壑区面积约 2.7 万平方公里, 水力和重力侵蚀比较强烈, 以沟蚀为主。沟壑密度 1.3~2.7 公里/平方公里, 土壤侵蚀模数 3 000~6 000 吨/平方公里·年。图为著名的甘肃省董志塬。

Covering an area of 27 000km², gullied loess plateau is typified by gully erosion in the main, water and gravitation playing predominant role, rendering gully density of 1.3-2.7km/km² and erosion modulus of 3 000-6 000 t/km²·yr. The picture shows the famous Dongzhi plateau in Gansu province.