



China' s abandoned mine land

Reclamation

Plan and Best Practice

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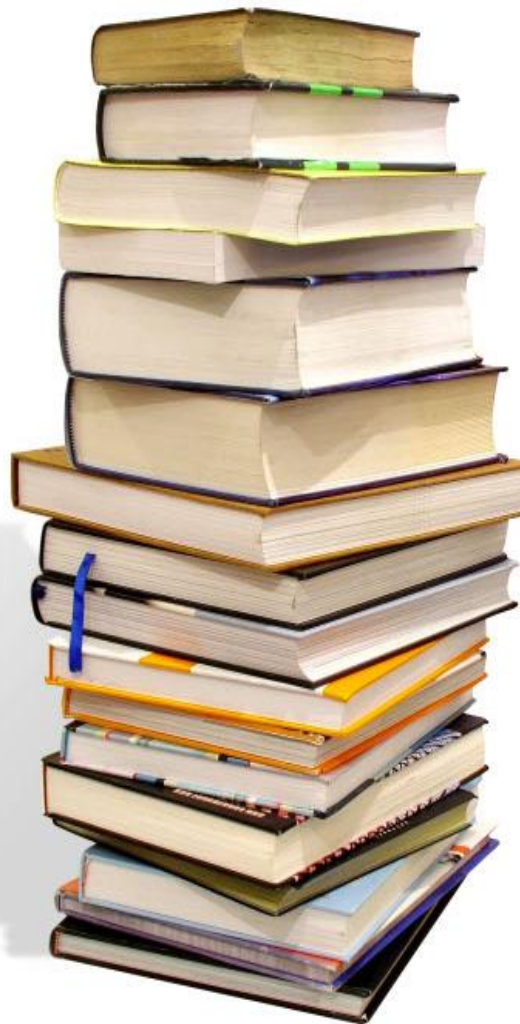
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概况 Overview



DATA OF MINE LAND IN CHINA

By the end of 2014, there are 1.775 million hectares mine land in China.

45% of them which are nearly 798.8 thousand hectares are abandoned orphaned land.

Only 4.8% of them which are nearly 85.2 thousand hectares have been relaimted.

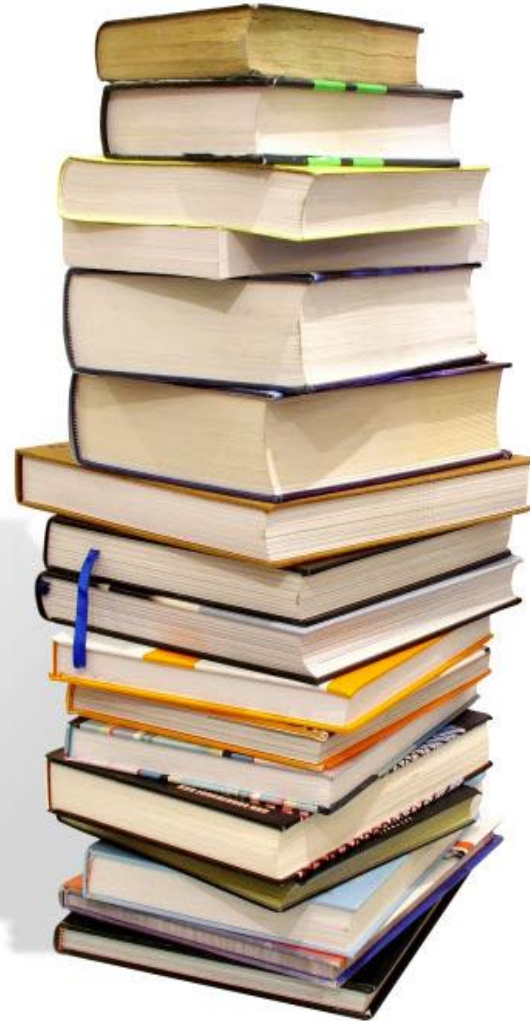
- 全国矿山占地总面积**177.50**万公顷；
- 其中，废弃矿山占地约为**79.88**万公顷，占**45%**；
- 已恢复治理矿山面积约为**8.52**万公顷，占**4.8%**。

Reasons for the Emergence of Abandoned Mining Land

- 1. The profits of many state-owned mines go to the State. No initiative.
 - 2. Illegal exploitation by individuals in the past when the legislation were not sound enough.
 - 3. Land disturbed before the issuance of reclamation regulation;
 - 4. Large proportion of small mines. Take the mineral mines for example, China has about 10 thousand mineral mines, in which 93% are small mines. The backward of technology, shortage of fund, and without the ability to reclaim after closure lead to many abandoned mining land.
 - 5. Frequent illegal uses of mining land. About 40% of mining land haven't gone through legitimate procedures .
-
- 1、大量国有矿山，利润上缴国家。
 - 2、矿业用地违法现象普遍，约40%采矿用地没有合法手续（2012年，国土部法律中心），形成大量历史遗留废弃地。
 - 3、相关法律出台前损毁的已矿地；
 - 4、小矿山比例高。如金属矿山中93%以上是小矿山，小矿山采矿技术落后、资金不足造成大量历史遗留废弃地。
 - 5、监管不严

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法律
Laws and Regulations



Year	Department	Law or regulation	Content related to abandoned mine land
2005	State Council	<p>Notification on Overall Reorganize and Standardize Development Mechanism of Mining Resources</p> <p>关于全面整顿和规范矿产资源开发秩序的通知</p>	<p>establishing mining land ecological environment recovery and compensation system</p>
2006	<p>Ministry of Finance, Ministry of Land and Resources , Ministry of Environment Protection</p>	<p>Guidance on Gradually Establish Accountability Mechanism of Mining Land Environment Consolidation and Ecological Recovery</p> <p>关于逐步建立矿山环境治理和生态恢复责任机制的指导意见</p>	<p>building of mines environmental recovery and consolidation margin system.</p>
2009	<p>Ministry of Land and Resources</p>	<p>Regulation on Geological Environment Protection of Mines</p> <p>矿山地质环境保护规定</p>	<p>"The state encourages enterprises, social organizations and individuals to invest in restoration and control of geological environment of abandoned or closed mines“and "Investors benefit".</p>

Year	Department	Law or regulation	Content related to abandoned mine land
2011	State Council	Regulation on Land Reclamation 土地复垦条例	"Any units and individuals that have made outstanding contribution to land reclamation shall be commended by the people's government above the county level". "the government above the county level should inject funds in reclamation or draw social investment based on the principle of 'investors benefit'. Land with clear ownership is subject to supportive and favorable policy set to encourage involvement of land owners in reclamation".
2012	Ministry of Land and Resources	Notification on peg of abandoned land reclamation with the newly-added construction land index 关于开展工矿废弃地复垦利用试点工作的通知	Whereas the local government reclaims abandoned orphan land into land for agricultural use, commensurate construction land index can be obtained in return upon acceptance.
2014	Ministry of Land and Resources	regulation on intensive and economical utilization of lands 节约集约利用土地的规定	

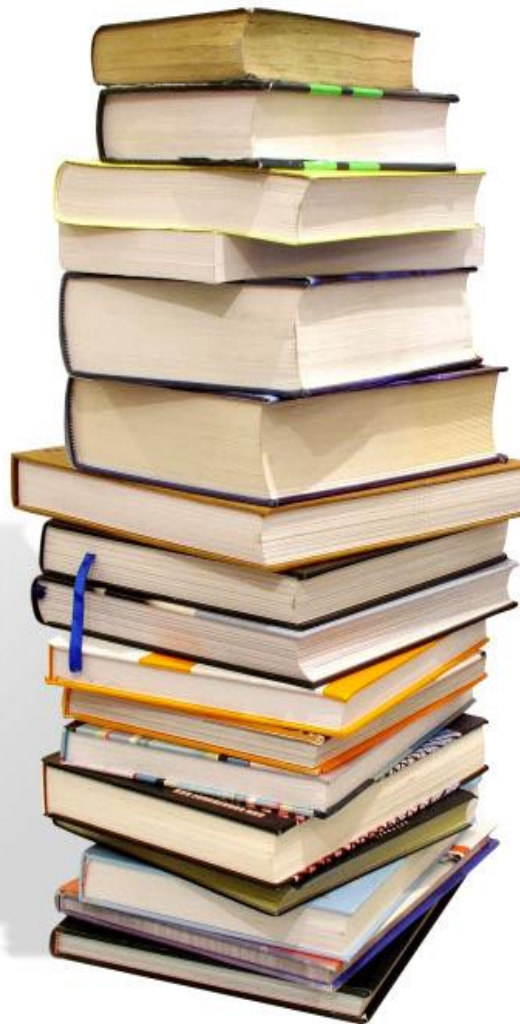
Tools (主要工具)

Those laws or regulations provides a lot of tools for encouraging land reclamation.

1. Specialized fund: be disbursed from revenue from mining rights and land transfer, including mining rights fee, mining resources compensation fee, new construction land use fee, land transferring fee and so forth, conducting a variety of mine environment recovery, consolidation and land reclamation projects, and building.
2. Construction land quota: Whereas the local government reclaims abandoned orphan land into land for agricultural use, commensurate construction land quota can be obtained in return upon acceptance.
. This is a highly effective tool with Chinese characteristics.
4. Long-term land use right and usufruct(benefit right) after reclamation

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规划
Planning



县级政府编制县域历史遗留废弃地矿地复垦专项规划，省级政府审查、批准并组织对项目验收。

Plan of abandoned land reclamation **compiled** by county-level government.

规划要点

1. 历史遗留废弃地现状调查
2. 土地复垦适宜性评价
3. 复垦质量要求（完成标准）
4. 复垦项目布局和时间安排

Key points of planning

1. Status quo investigation of abandoned mining land
2. Land reclamation suitability evaluation
3. Land reclamation quality and environment safety
4. Overall layout of after-reclamation uses for abandoned mining land

Planning key point 1: Status quo investigation of abandoned mining land

1. Original uses of abandoned mining land and land types (provide information for reclamation) . 废弃地原用途和地类（为后期复垦工程提供信息）

2. Confirmation of “abandoned” 历史遗留认定

- (1) Land disturbed by production and construction activities and the reclamation obligator cannot be identified; 土地复垦义务人灭失
- (2) Land disturbed by production and construction activities before the issuance of *Land reclamation regulation (1988)*.) 《土地复垦规定》实施以前
- (3) Land disturbed by industrial and mining enterprises shut down by governments on relevant policies. 因政策原因，被政府关停的工矿企业。

3. Legitimacy of land use 用地合法性

4. Owner ship 权属

Planning key point 2 : Land reclamation suitability evaluation

Based on related and overall planning of land use, adjust measures to local conditions, take into full consideration location and conditions of land and water resources, and settle the path in discarded land reclamation and utilization in the context of feasible economy and practical technology, referring to both land damage conditions and public opinions.

Identify reclamation purposes 确定复垦用途

Control pollution risks, avoid geological disaster risk

Protect history, culture and landscape

Planning key point 3: Land reclamation quality

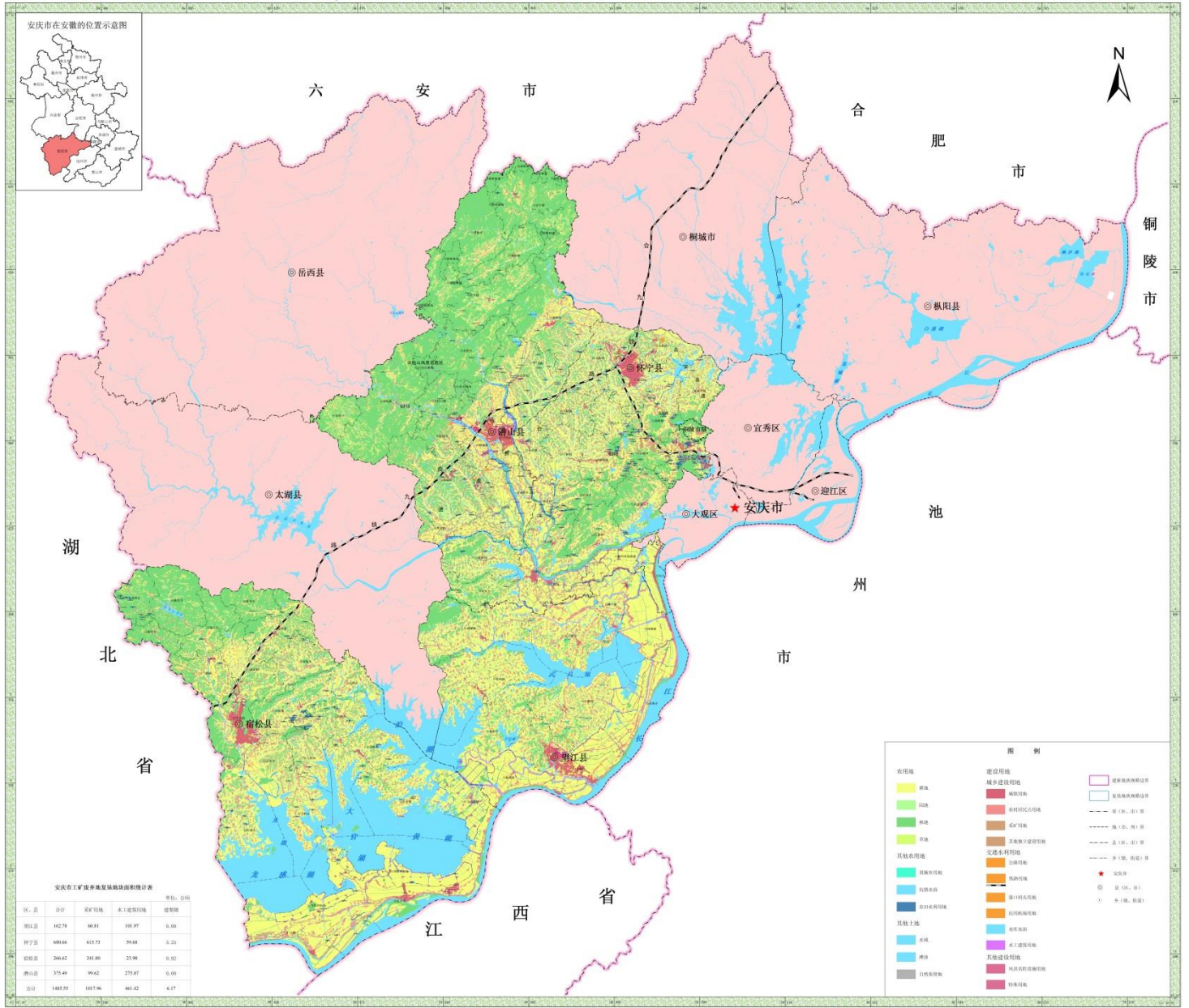
- Reclaim into cultivated land, do consider stripping and reuse of the plough layer of the cultivated land occupied by construction in the given area. (表土剥离)
- Conduct soil environmental quality evaluation and quality rating of cultivated lands after reclamation. (土壤环境质量评价与耕地质量等级评定)
- Keep tracking and monitoring of diverse quality indicators of reclaimed lands within 5 years after acceptance and take action to protect them (验收合格后的五年内对复垦土地的各项质量指标进行跟踪监测, 采取管护措施。)

Planning key point 4: Overall layout of after-reclamation uses for
abandoned mining land

- Deployment of land reclamation projects. 部署土地复垦项目
- Determine annual reclamation objectives, tasks, space and location, scale and reclamation purposes.
- 确定分年度的复垦目标、任务、空间位置、规模、复垦方向等。

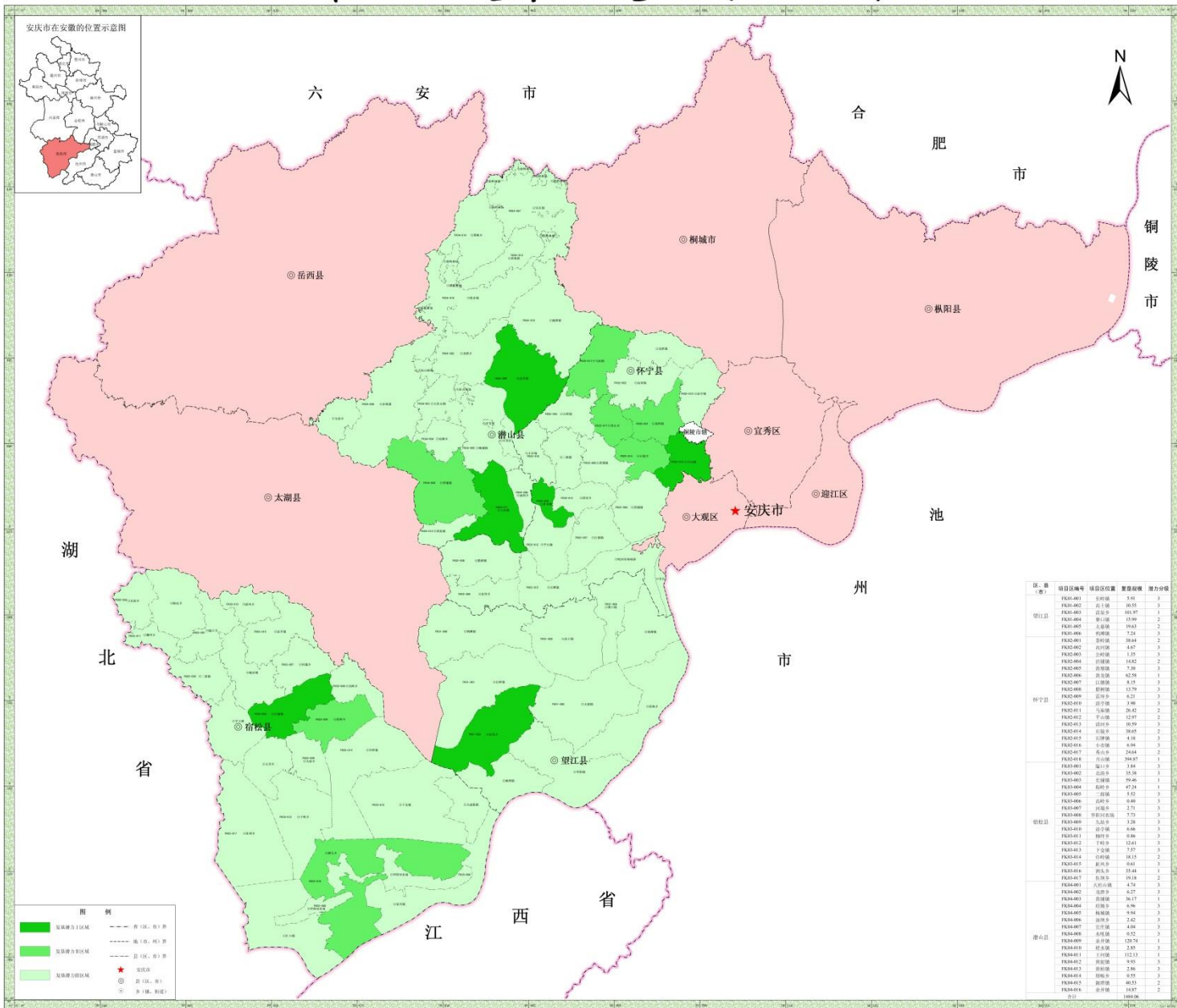
安庆市工矿废弃地复垦利用现状图

Status quo



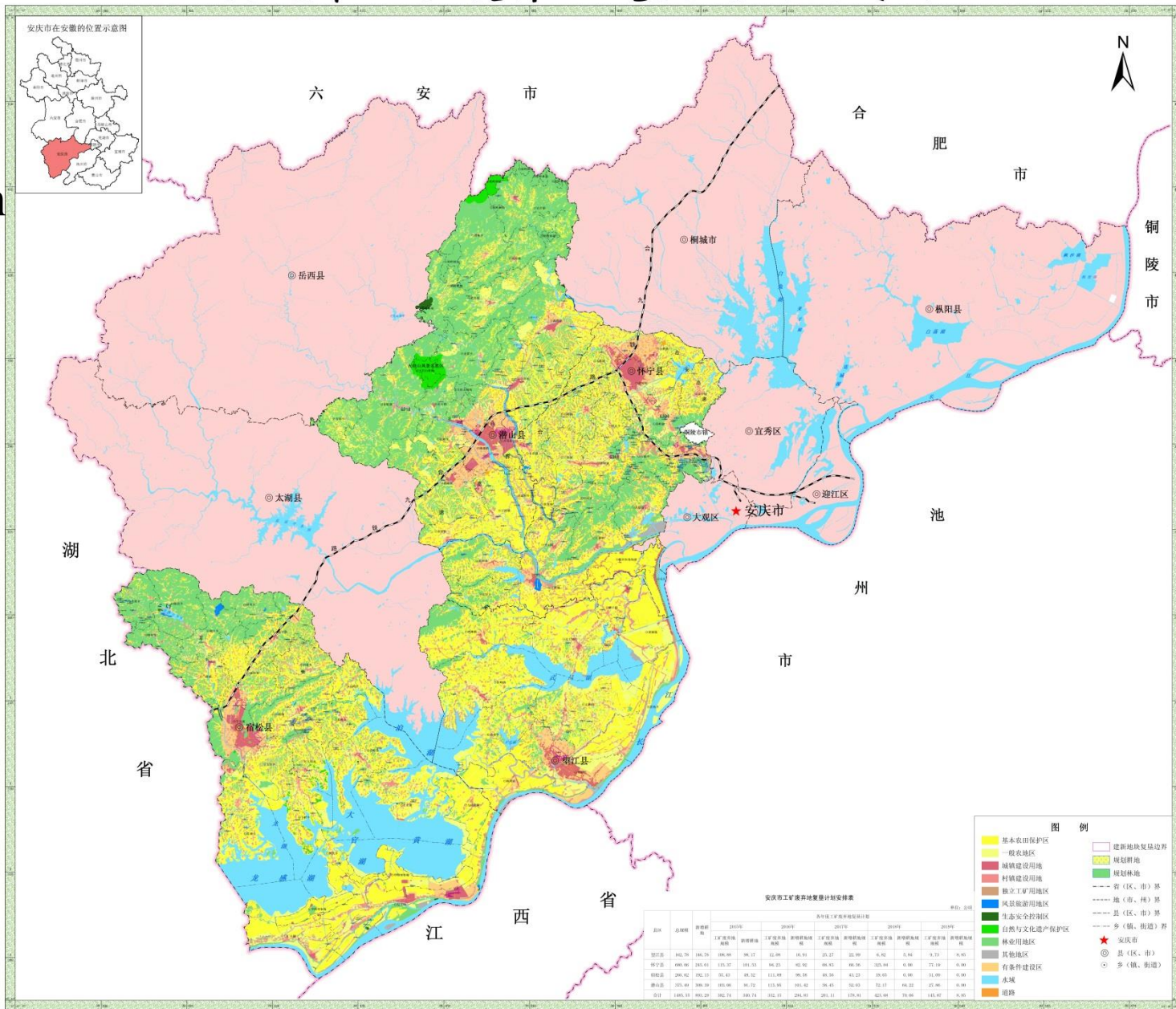
安庆市工矿废弃地复垦潜力分析图

Potential analysis



安庆市工矿废弃地复垦利用规划图

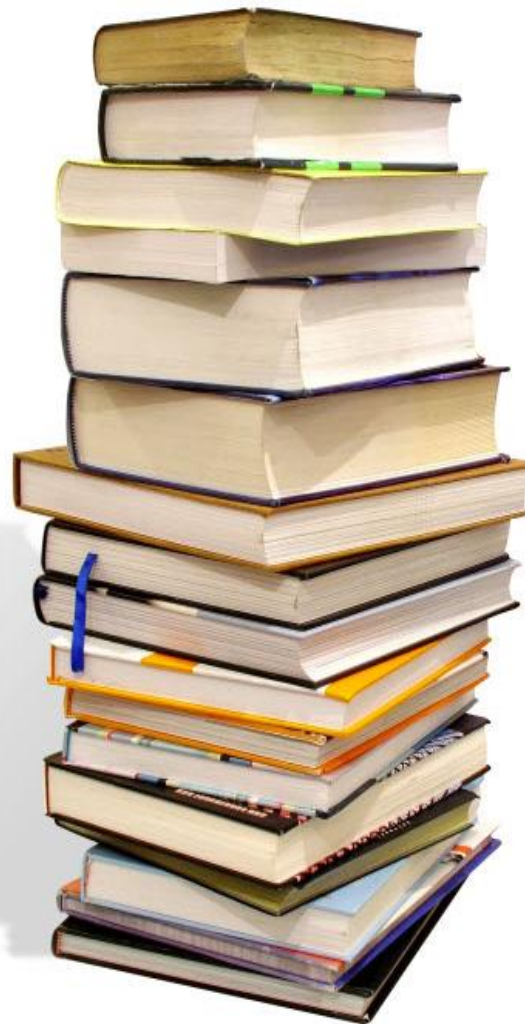
Reclamation
planning



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历史遗留废弃地复垦 典型案例

Best Practice of
Abandoned Mining Land
Reclamation



国土资源部土地整治中心
Land Consolidation and Rehabilitation Center, MLR

1. Abandoned iron pyrite mine reclaimed into cultivated land, Luzhou, Sichuan province

叙永县原大树硫铁矿四工区，占地3398.07亩。采矿历时半个世纪，排放大量废气导致酸雨周围大面积土壤酸化。大树硫铁矿关闭15年以来，所污染的土地植被基本不能够自然恢复生长，仅有耐酸性强的芦花能零星生长。Sigong Area of the original Dashu Pyrite in Xuyong County covered an area of some 227 hectares. The half-century mining activities emitted large quantities of waste gas that caused acid rains, acidizing extensive soil in areas nearby. 15 years after the shutdown of Dashu Pyrite, the vegetation on the contaminated land still couldn't naturally restore, and only acid-resistant reed catkins grew discretely.



Reclamation Measures

1. Dig high slag piles and fill low ones to lower the slope to less than 5° 将矿渣堆压占地进行挖高填低，坡度降低到5度以下；
2. Build drainage ditches in surrounding areas to drain the waste water; 场地周围修建排水沟，引流出污染水；
3. Use Luobu coal gangue to pave 50CM isolation layer to prevent pyrite slag from contaminating topsoil; 煤矸石铺设50CM隔离层，防止硫铁矿废渣污染表层土壤
4. Pave 50CM topsoil plow layer (topsoil stripping of urban construction land); 再铺上50CM表土耕作层（城市建设用地表土剥离）
5. According to test results of the agriculture sector, spray quicklime and apply farmyard manure to improve the soil; 施洒生石灰、施用农家肥改良土壤
6. Grow legume to improve the soil. 种植豆科作物改良土壤



The farmland quality of reclaimed land is subject to an annual dynamic monitoring so as to ensure safety of crops to be planted. The harnessed land shall undergo sampling monitoring by agencies such as Soil and Fertilizer Institute under Sichuan Academy of Agricultural Sciences to ensure sustainable development of the reclaimed areas.



治理后的土壤再经**四川省农业科学院土壤肥料研究所**等机构抽样检测，确保复垦土地质量与环保安全。复垦后的耕地质量，进行一年一次的动态监测。



2、江苏徐州—城市废弃地—景观与生态—采煤塌陷区复垦生态湿地公园案例
Xuzhou city, Jiangsu Province—Urban Abandoned Land—Landscape and
Ecology—Mining Subsidence Area Reclaimed into Ecological Wetland Park

- (1) 贾汪潘安湿地, Jiawang Pan'an wetland
- (2) 沛县安国湿地, Pei county AnGuo wetland
- (3) 地质公园, Geological park



Pan'an Lake (潘安湖) : the first coal mining subsidence area reclaimed into ecological remediation wetland park in China

Situated in Dawu Town of Jiawang District, Pan'anhu, which falls within the underground coal mining subsidence area of Quantai Coal Mine and **measures 1160 hectares in area**, represents the largest **coal mining subsidence area**.

Pan'anhu wetland park features the “four in one” construction model of “capital farmland consolidation, coal mining subsidence area reclamation, ecological environment restoration, and wetland landscape development”.

With an investment of RMB 1.4 billion, Phase I of the wetland park covers an area of 11 km² (including 9.21 km² water area), where 160,000 trees, one million m² flowers, and 0.98 million m² aquatic plants from over 300 kinds are planted in 19 wetland islands.

The wetland park is one of the four characteristic tourism destinations of Xuzhou City, Pan'anhu Wetland Park is projected to create an annual tourism revenue of **RMB 200 million** and raise the land prices of its surrounding areas over 30 times.



Comparison before and after Reclamation, Pan' an Lake 潘安湖



Before



After



Before



After

(2) Xuzhou City, Jiangsu Province—AnGuo Wetland, Pei County

Anguo Wetland Project was approved as a provincial level wetland by Jiangsu Provincial Forestry Department in May, 2012. By taking advantage of unique resources in coal mining subsidence land, the wetland project represents the largest ecological people-benefit project of the county, with a planned construction area of 10 km² and a total investment of RMB 500 million.

Anguo wetland Construction: by means of slope design, precipitate incoming water from Longgu Development Zone and Pei County Development Zone through the water inlet, and then make the water flow into Level I and Level II surface flow wetlands, forming standard-attaining drainage of wetland.



采石宕口复垦为矿山公园——江苏徐州

Quarry reclaimed into mine park—XuZhou, Jiangsu province

观止位置



Before



After

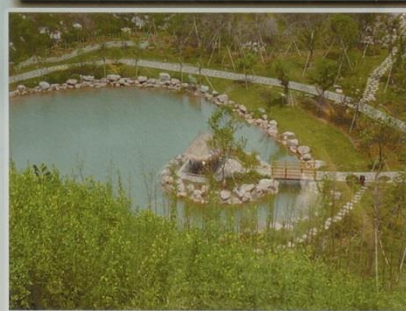


After

日潭位置



Before



After



After

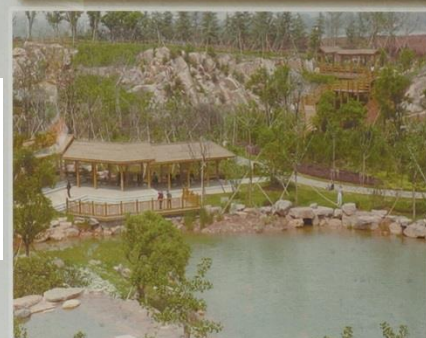
月潭、瀑布位置



Before



After



After

项目完成后，直接带动周边区域的地价升值，周边房价翻倍。

The completion of the project promoted the increase of surrounding land price by times.



国家财政补资金投入200万，地方政府配套资金1000多万，完成矿山公园复垦项目。

The minningl park project, input of financial fund 2 million, from local government 10 million.



采石宕口治理为矿山公园
江苏徐州
Quarry reclaimed into mine
park—XuZhou, Jiangsu province

There were over 600 mining enterprises surrounding Naoshan. During the 1950s, to develop collective economy, the local people's commune led enterprises to develop mountain-based economy by massively exploiting limestone. After reform and opening-up, towns surrounding Naoshan brought “mountain-based economy” to an even greater scale.

The mining regulation initiative in 2005 witnessed the shutdown of 472 mining enterprises in the city of Qingzhou, with a reduction rate of up to 80%. However, the stormy and immediate shutdown under administrative orders would, despite some seemingly fruitful effect, pose a huge hazard by leaving a number of abandoned mines, pits, and rock ballast, degrading local environment and severely wasting resources and land.



首页 > 浏览图片 > 青州邵庄采石场



狍山周边在内的原有采矿企业有600家之多。自上世纪50年代，当地人民公社为发展集体经济，大规模开采石灰石。改革开放后，狍山周边的乡镇更是掀起了“啃山”热潮。

2005年矿山整治，青州就关停采矿企业472家，压减率达到80%。整治后遗留的大量废弃山场、石渣，留下废弃矿坑23处，面积2万余亩，既破坏了生态环境，又形成了崩塌、滑坡等地质灾害隐患，也造成了资源和土地的严重浪费。

The quarry land is planned into industrial and cultural parks, called Naoshan Economic Development Zone—with 60,000 workers and an industrial chain featuring car production and its supporting industries has taken shape. 将采石场规划为工业、文化产业园区，统称狍山经济发展区。两个项目区总规模2.3万亩，规划建设用地规模1.8万亩。以汽车生产及配套的产业链条基本形成，可安排6万人就业。





By the end of June, 2007, Phase I Leveling Project had basically ended. According to relevant statistics, every day over the past six months, over 300 various machines were used and more than 400 construction and instructors were present. The total explosives consumed registered more than 700 tons, detonators 1.07 million, soil and stone over 8 million m², and leveled land some 233 hectares.

We offer preferential policies on land use to those incoming enterprises. For instance, the price of leveled land stands at RMB 200,000 per 0.07 hectare, whereas the leveling is done by an enterprise itself, the price will be brought down to RMB 150,000 per 0.07 hectare, and the enterprise also enjoys extra taxation benefit.

As planned, there will be 110 enterprises entering the park.

At present, the industrial park has taken in 65 projects with a total investment of more than RMB 20 billion, falling into multiple industries and fields such as chemical engineering, machining, smelting, and building materials

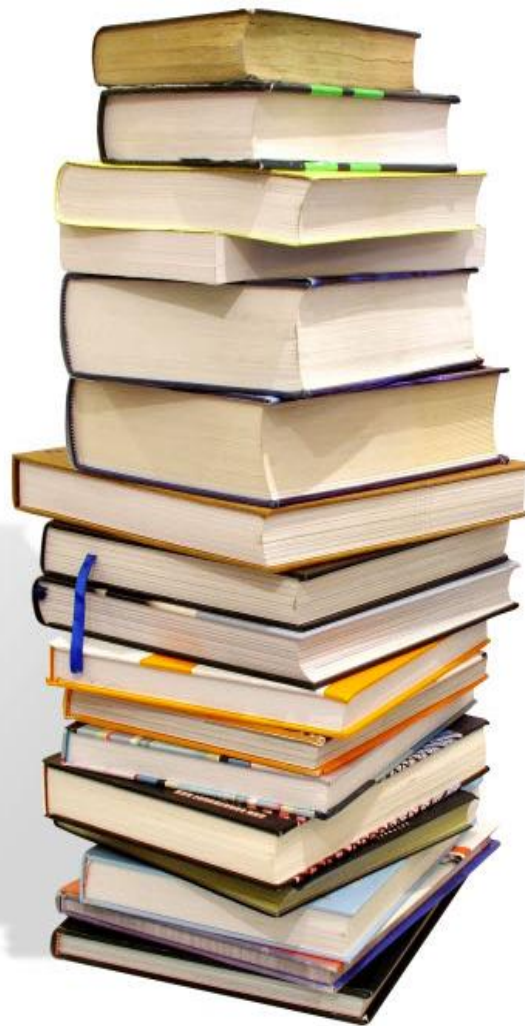
4. Coal mining subsidence area reclaimed into floating photovoltaic power generation -- Jining city, Shandong province (山东济宁)

- The photovoltaic power generation project in the solar energy ecological park is a new energy industrial project by taking advantage of coal mining subsidence land. With a total investment of RMB 600 million, the project is on a 39MWP scale, with the 9 MWP in Phase I already generating power that totals more than 13 million KW.h in annual output. Phase II of the project is under examination procedures for approval. The project, when fully completed, is projected to produce more than 50 million KW.h of power annually.
- As solar panels are able to stand on the pontoon and go round the sun, compared with land-based photovoltaic power generation, **water-based photovoltaic power generation produces 30% more power.** A depth of more than 1 meter is a prerequisite for water-based photovoltaic power generation. This provides a new idea in coal mining subsidence land reutilization.
- 由于太阳能面板矗立在浮桥上，能够围绕太阳运转，与较陆地光伏发电相比，**水上光伏发电量多30%**。



5

挑战
challenges



国土资源部土地整治中心
Land Consolidation and Rehabilitation Center, MLR

国土资源·土地整理

- 1. Implementation of planning requires combination of different measures 规划实施需要多工具结合
- 2. planning on the scale of watershed 流域尺度的规划设计
- 3. Insufficient awareness of risk control 风险控制意识不足
- 4. Contradiction between cultivated land protection and ecological priority 耕地保护与生态优先的矛盾