

Protection of Rare Geoheritages for Sustainable Development

保护珍稀地质遗迹 促进可持续发展



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二、地质遗迹保护情况

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Brief Introduction to Wudalianchi

五大连池介绍





Brief Introduction to Wudalianchi

五大连池介绍



Wudalianchi is located in northeast China — Heihe City, Heilongjiang Province, at the transformation area of Xing'an Mountains and the Songnen Plain. It is an active monogenetic volcanic field located within a continental lithospheric plate, far from any plate boundary.

五大连池地处中国东北部黑龙江省黑河市，位于大兴安岭向松嫩平缓的转换地带。它是远离板块边界的陆内单成因活火山地区。



Brief Introduction to Wudalianchi

五大连池 介绍

Lava flows of the youngest volcanic activities dammed a river so that the river was broken into five connected parts, for which Wudalianchi got her name which means “five connecting volcanic barrier lakes”. 境内古老的湖泊被火山熔岩流阻塞成五个溪水相连的湖泊，五大连池因此得名。





Brief Introduction to Wudalianchi

五大连池介绍

There are rich natural resources, including volcanic landscapes, natural mineral water, good health care environment and unique volcanic ecosystem. It is like a beautiful volcanic geological painting and is taken as a “Natural Volcano Museum” and a “Living Textbook on Volcanoes”.

五大连池资源丰富，拥有新老期火山地质地貌、天然冷矿泉水、神奇的康疗环境和独特的火山生态系统。五大连池这幅美丽的火山地质画卷，被誉为“天然的火山博物馆”、“打开的地质教科书”。



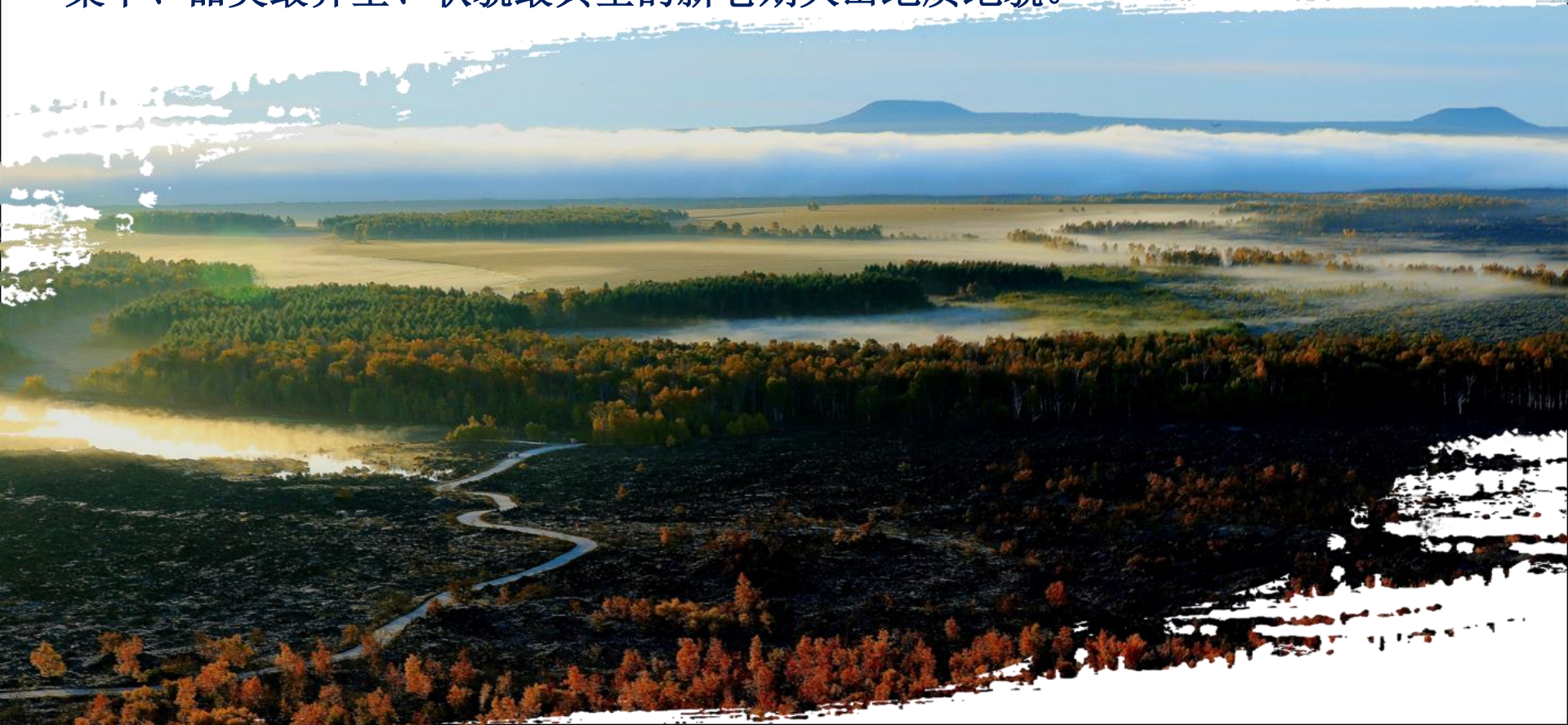


Brief Introduction to Wudalianchi

五大连池 介绍

During the past 2.1 million years, it has experienced seven volcanic eruption cycles and formed special volcanic geological landscapes of new and old periods which are very typical, diverse, well preserved and concentratedly.

五大连池210万年来经历了7次火山喷发旋回，形成了世界上保存最完整、分布最集中、品类最齐全、状貌最典型的新老期火山地质地貌。



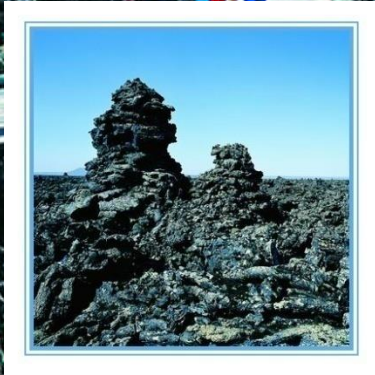
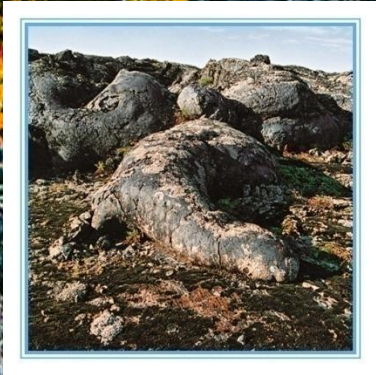
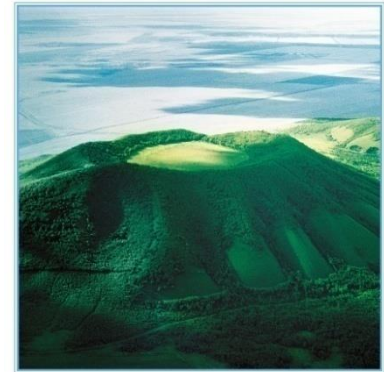


Brief Introduction to Wudalianchi

五大连池 介绍

It includes 14 volcanoes, lava plateau of 800 square kilometers, 1537 driblet cones and dishes (hornito), lava tunnels and other geoheritages.

包括14座火山锥、800平方公里熔岩台地、1537座喷气锥碟、熔岩洞穴等地质遗迹。

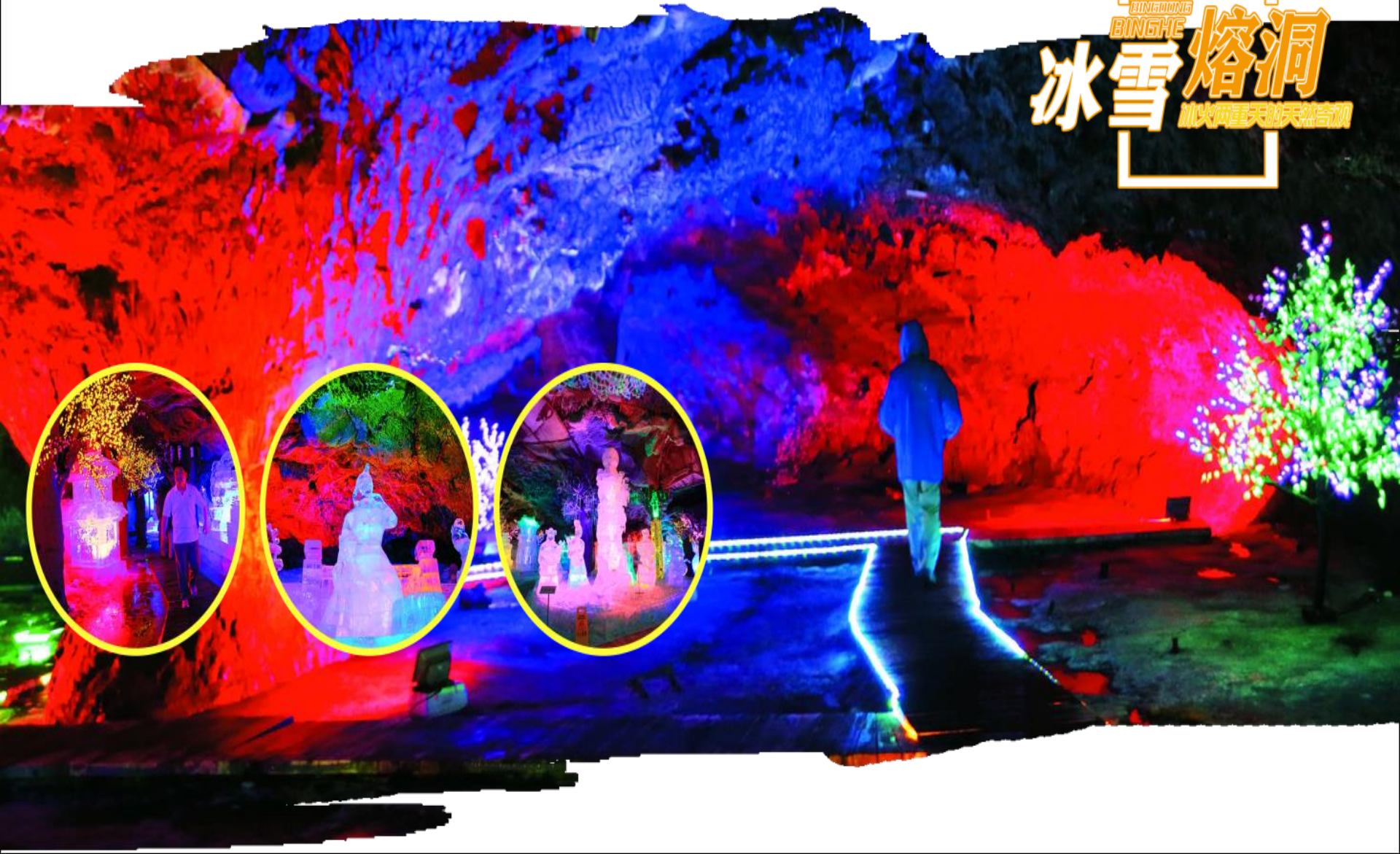




Brief Introduction to Wudalianchi

五大连池 介绍

BINGDONG
BINGHE
冰雪熔洞
冰火两重天的天然奇观





Brief Introduction to Wudalianchi

五大连池介绍

这里有396种脊椎动物，1044种低等到高等植物并存，生物多样性在我国北方乃至北温带纬度地区极为罕见，更珍贵、更有价值的是它再现了地球生命由低等到高等交替、特别是火山熔岩上生命占领和演变的全部过程。

There are 89 families 396 species of animals, 1044 families 428 genus 143 species of plants.





Brief Introduction to Wudalianchi

五大连池 介绍

经中科院等34部门鉴定，火山喷发形成的天然冷矿泉水中富含铁、锰、钴、钼、铬、铜、硒几十种微量和宏量元素，可饮可浴，康体健身，对人体多种疾病具有显著的疗效。



According to the Chinese Academy of Sciences and other institutions, the mineral water contains many kinds of microelements such as potassium, sodium and calcium which are beneficial to human body by drinking or bathing so that it can be used for health care and treatment of some kinds of diseases.





Brief Introduction to Wudalianchi

五大连池 介绍

The water is rare resource for drinking and treatment and then got the name of “Magical Spring” and “Holy Water”.

五大连池矿泉水是珍稀的饮用和医用矿泉资源，享有“神泉”、“圣水”的美誉。



Conservation of Geoheritage

地质遗迹保护情况



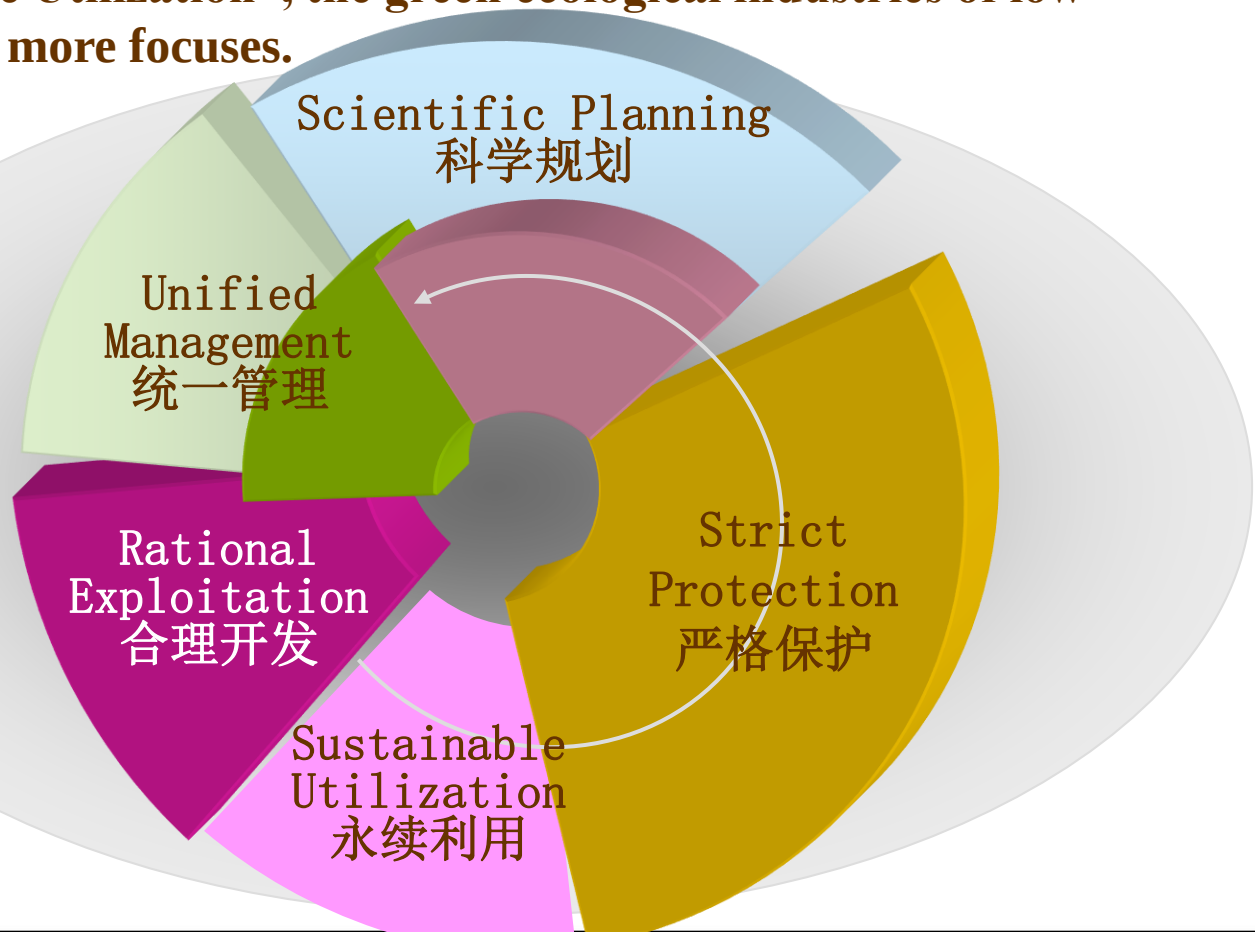


Conservation of Geoheritage

地质遗迹保护情况

Administrative Committee, Heihe City, Heilongjiang Province and even China pay much attention to the protection and management of Wudalianchi. On the principle of “Strict Protection, Scientific Planning, Unified Management, Rational Exploitation, Sustainable Utilization”, the green ecological industries of low energy consumption got more focuses.

国家、省市高度重视五大连池保护管理工作，管委会本着“严格保护、科学规划、统一管理、合理开发、永续利用”的原则，重点打造原生态、低能耗绿色产业。





Conservation of Geoheritage

地质遗迹保护情况

The relative laws regulations were enforced, such as *Regulations on Wudalianchi National Park and Nature Reserve*, *Regulations on Wudalianchi Global Geopark*. A resource management team was organized to do daily patrol on natural resources.

严格执行《五大连池风景名胜保护区保护条例》、《五大连池世界地质公园保护条例》等法律法规。成立了资源管护队伍，常态化巡视巡查。





Conservation of Geoheritage

地质遗迹保护情况

Space information technology now has become forward eyes and ears. This technology is widely used at many areas of Wudalianchi such as planning, monitoring, protection, management, service. Especially the work of protection and management has been more scientific by cooperation with the scientific research institutes such as Institute of Remote Sensing and Digital Earth (RADI), Tsinghua University and Tongji University.

空间信息技术是直观感受地球变化的“千里眼”，已广泛应用于五大连池的规划、监测、保护、管理、服务等方面。通过与中国科学院遥感所、清华大学、同济大学等科研单位合作，实现了保护管理的科学化。



Conservation of Geoheritage

地质遗迹保护情况



In May 2015, HIST established Wudalianchi as a base of research and capacity building.
2015年5月，HIST在五大连池建立了科研与培训基地。

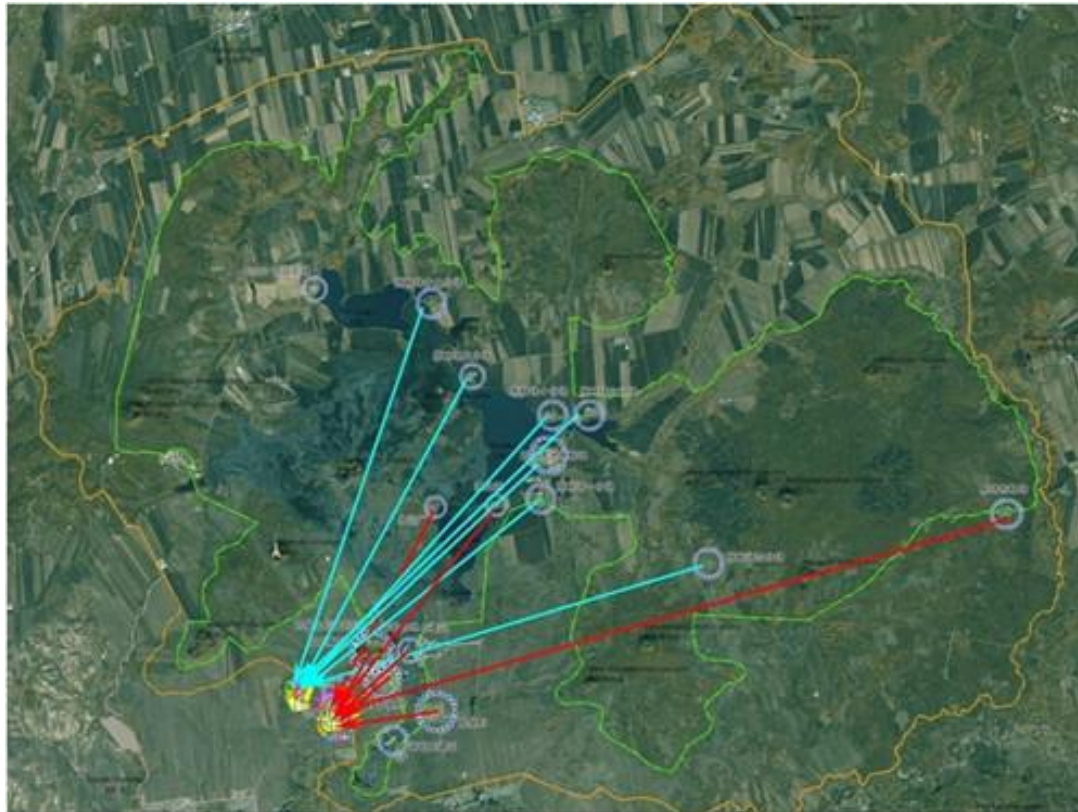


Conservation of Geoheritage

地质遗迹保护情况

By using satellite images, eco-migration project was planned to restore natural ecological environment so as to make homonius development of man and nature (Please see case study).

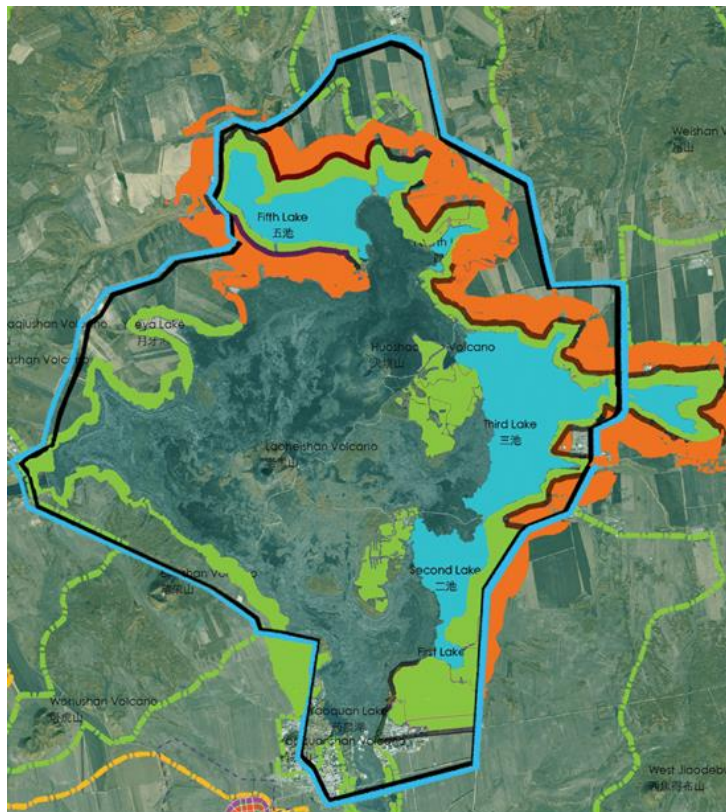
通过卫星图片进行遥感监测，提出生态搬迁的整体规划，恢复自然生态，实现人与自然和谐发展（见案例分析详述）。



Conservation of Geoheritage

地质遗迹保护情况

沿湖200米范围内已经退出耕地1.28万亩，沿湖200米外种植业结构调整。
A large area of farmland about 12,800 mu (853 ha) where it is within 200 meters along the lava dammed lakes was returned to forestland, grassland or wetland. The planting structure in other areas was adjusted and improved.





Conservation of Geoheritage

地质遗迹保护情况

生态环境保护工程已经启动建设，预计五年内竣工。建设格球山、卧虎山、喷气锥碟、火山堰塞湖、药泉湖、石龙河等19个保护治理项目。重要地质遗迹和生态环境得到有效保护。

Ecological Environment Protection Project has been initiated and planned to be finished in five years. 19 protection projects were finished to make important geoheritages and ecological environment be protected effectively.

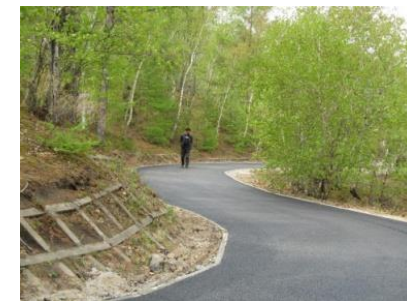




Conservation of Geoheritage

地质遗迹保护情况

相继建成山体护坡1万平方米，保护通道58公里，保护栈道20公里，保护围栏12公里。
10,000 square meters mountain slope protection, 58 kilometers protection road, 20 kilometers plank road, 12 kilometers protection fence were built.



Conservation of Geoheritage

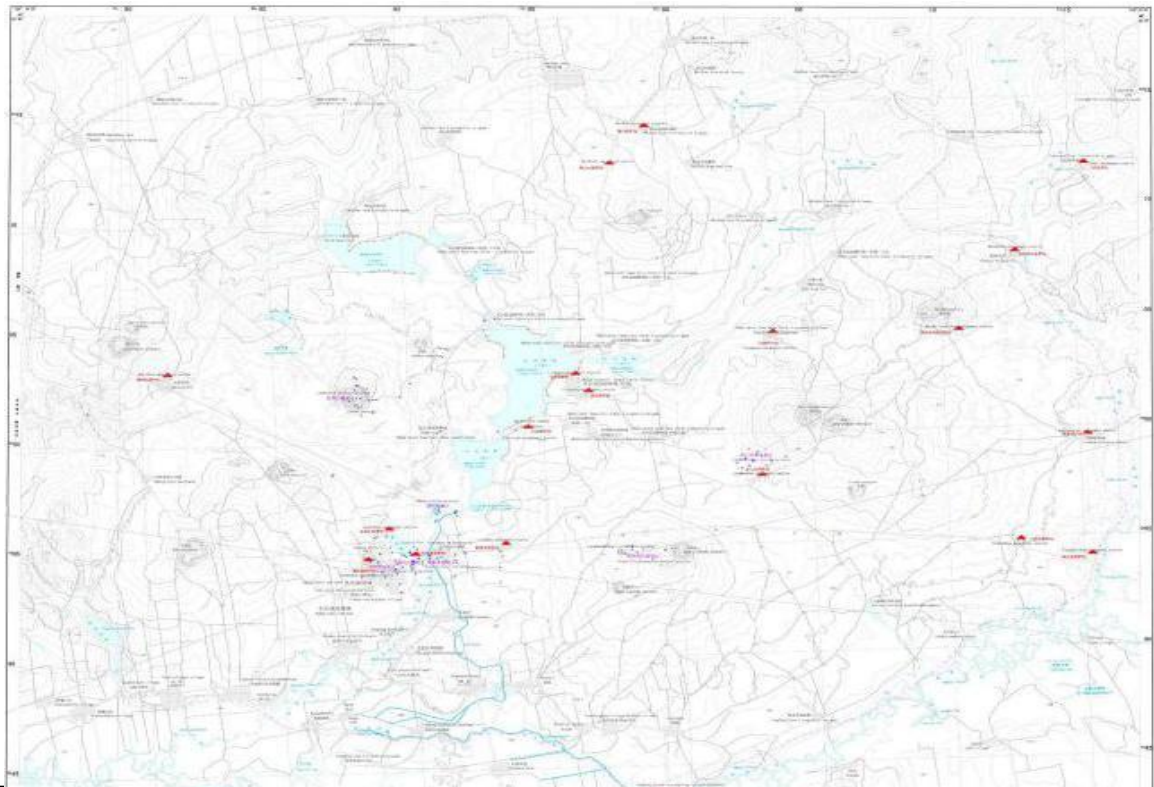
地质遗迹保护情况

建成数字化景区监控系统，设立一个主控中心、六个分控中心，133个摄像头分布于区内，对火山地质遗迹、野生动植物进行定点监控。对珍稀独特、具有世界意义的1537个喷气锥（喷气碟），全部通过GPS定位保护。

The digital monitoring system was established, including one control center and six sub control center. 133 cameras are spreading to monitor the wild plants and animals, as well as the volcanic geoheritage. 1537 hornitoes are all under GPS positioning protection.

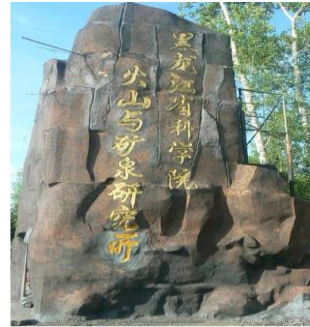


监控设施现状分布图
Distribution map of
monitoring equipments



Conservation of Geoheritage

地质遗迹保护情况

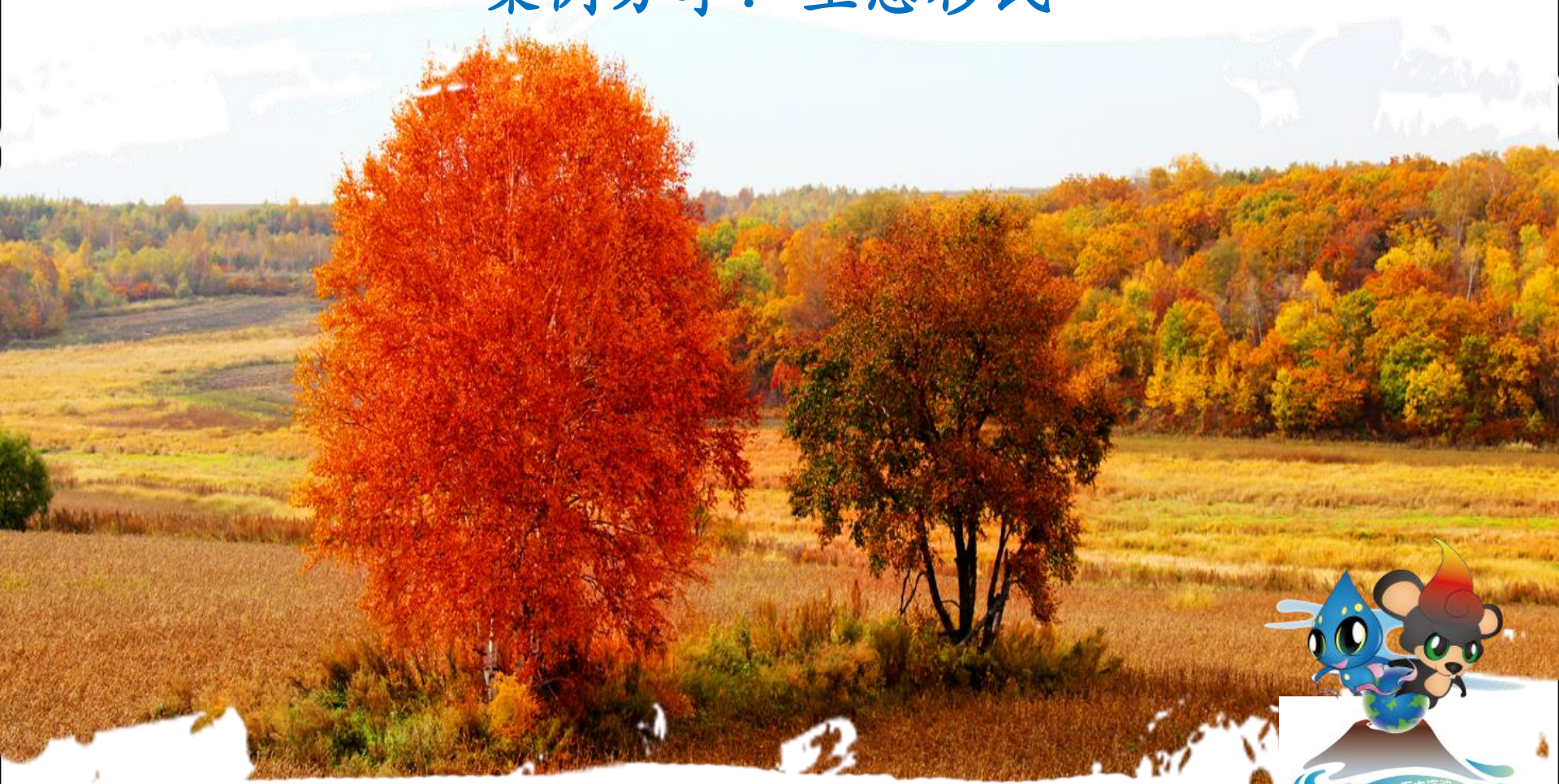


区内有省级环境监测站、火山与矿泉研究所、火山地震监测站三家科研监测机构和18个环境资源保护站，常年开展地质遗迹、负氧离子、水体、大气、动植物等多项监测，为环境变化提供了有效数据。

There are three scientific research and monitoring institutions and 18 environmental resources protection stations to monitor geoheritage, negative oxygen ion, water, air, plant, animal and so on, which provides data for environmental change. The institutions are Provincial Environmental Monitoring Station, Volcano and Mineral Water Research Institute, Volcano and Seismic Monitoring Station.

Case Study: Eco-migration

案例分享：生态移民





Case Study: Eco-migration 案例分享：生态移民促节能减排

生态移民项目的目标是保护生态环境、改善居民生活。此案例基于中国特殊国情和五大连池特定情况而开展的，赢得了2016年米歇尔奖。

The aim of eco-migration project is protecting the environment and improving people's livelihoods. It is based on the particular conditions in China and specific conditions in Wudalianchi. This case study won the Michel Battisse Award in 2016.





Case Study: Eco-migration

案例分享：生态移民促节能减排

Houses before eco-migration



在保护管理过程中，发现有些定居点对湖泊及周边环境造成了不利影响。这些定居点的居民房屋破旧，道路不畅，就医就学难，完全依赖当地的自然资源生活，收入很少。另外，他们砍伐林木作为取暖燃料，破坏熔岩台地和大气。生活垃圾、污水、化肥、农药随地表径流排入湖中，造成污染。

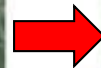
In daily management, detrimental effects on the lakes and surrounding environment from settlements was gradually observed. Residents of these settlements lived in small and shabby houses on narrow and muddy roads, far from hospitals and schools. Their income was very low as they relied entirely on local natural resources for living. Furthermore, the residents cut trees for fuelwood, resulting in damage to air and lava plateau. Surface runoff carrying household garbage, sewage, fertilizer and pesticides polluted the lakes.



Case Study: Eco-migration 案例分享：生态移民促节能减排

为解决这些环境与社会问题，管委会自2010年开始进行生态移民，有力地促进当地的资源保护、生态环境恢复、经济社会可持续发展。

To address the environmental and social problems observed, Wudalianchi Administrative Committee has initiated eco-migration project since 2010, to improve resource protection, restoration of ecological environment, economic and social sustainable development.



五大连池沿岸居民搬后



Case Study: Eco-migration 案例分享：生态移民促节能减排

为安置居民，管委会建成了一个4平方千米的生态移民新区，包括35万平方米居民回迁楼，15万平方米设施一流的学校、医院、公园、商服，以及道路、净水厂、供电系统、集中供热系统、污水处理厂、垃圾处理厂等基础设施。

Then a new eco-migration town was built, covering a area of 4 km²; including 350,000 m² of relocation buildings, 150,000 m² of schools, hospital, parks and stores; the area also includes well-equipped supporting infrastructures such as roads, water purification plant, power supply system, central heating system, wastewater treatment plant, and refuse processing plant.

Effect drawing of the new town





Case Study: Eco-migration

案例分享：生态移民促节能减排

搬迁到移民新区后，住房宽敞明亮，配套设施齐全，既消除了人类活动对脆弱的生态环境构成的威胁，同时提高了居民生活条件。

After relocation, the residents now live in their own spacious and beautiful buildings with a complete range of supporting facilities, earning a higher income. The eco-migration initiative eliminated the threat of human activities to the fragile ecological environment and improved people's living conditions.

新建医院
New hospital



社区居委会办公大楼
New building for Community Committees



新建中学
New middle school



新幼儿园
New kindergarten



Case Study: Eco-migration 案例分享：生态移民促节能减排

2010-2014年，火山熔岩与火山堰塞湖周边的常驻居民5470人、环境敏感地带上2328人进行了生态移民搬迁，拆除影响环境建筑面积约40万平方米。
From 2010 to 2014, 5,470 residents who lived near lava plateau and lava dammed lakes and 2,328 residents who lived at environmentally sensitive places moved into the new town. Buildings approximately 400,000 m² with a negative influence on the environment were demolished.



居民新居 New houses for relocation people

Case Study: Eco-migration 案例分享：生态移民促节能减排

老房子

Poor houses



居民搬迁后，生态环境发生了巨大变化。
After eco-migration,
the ecological
environment changed
a lot.



草地

Grassland



Case Study: Eco-migration 案例分享：生态移民促节能减排



温室气体排放引起全球气候变暖，加强节能减排工作是应对全球气候变化的迫切需要，尤其是北方的冬季供暖问题，传统的取暖方式是燃烧秸秆或煤炭，而独家取暖经济成本较高，环境成本更高。
Greenhouse gas emissions cause global warming, so energy-saving and emission-reduction is urgent to deal with global climate change . Especially in northern areas, winter heating is very important. Burning straw or wood or coal in traditional way results in not only high economic cost but also high environmental cost.

Case Study: Eco-migration 案例分享：生态移民促节能减排

搬到移民新镇后，所有居民使用统一的集体供热系统，供暖效果好，污染物排放量小，生活垃圾减少，高效的除尘设备能有效降低空气污染，真正做到节能减排。

In the new town, all the residents use the unified collective heating system so that the pollutant discharge and household garbage is reduced effectively. The technically advanced dedusting equipment can effectively reduce air pollution for energy-saving and emission-reduction.





Case Study: Eco-migration 案例分享：生态移民促节能减排

根据世界卫生组织的规定，清新空气的负氧离子标准浓度不低于1000—1500个/每立方厘米，而五大连池空气的负氧离子含量达到世界标准的9—24倍，被称之为“天然氧吧”。

According to World Health Organization, the content of negative oxygen ion in fresh air must up to 1000—1500 per cubic centimeter. But this standard in Wudalianchi is 9-24 times. So it is taken as “Natural Oxygen Bar”.





Case Study: Eco-migration 案例分享：生态移民促节能减排

今年春季的空气监测结果显示：负氧离子浓度最低点为药泉山景区9000个/每立方厘米，最高点为龙门石寨景区24000个/每立方厘米，五个监测点的平均值为13600个/每立方厘米。

The air monitoring results in this spring indicate that: the lowest negative oxygen ion point is at Yaoquanshan Scenic Area --- 9000 per cubic centimeter. The highest point is at Longmen Stone Village Scenic Area --- 24000 per cubic centimeter. The average number of five monitoring points is 13600 per cubic centimeter.





Case Study: Eco-migration 案例分享：生态移民促节能减排

水质得到明显改善，空气质量常年保持在中国国家一级标准以上。保护区内新发现植物36种，表征环境变好的指示性植物石蕊、百里香、山茄子、五福花等数量大幅增长。我们能看见在保护区极少出现的国家一级保护动物金雕、东方白鹳、黑鹳，也能看见成群结队的野鸭、鸳鸯、灰鹤等鸟类。

Air quality remained above the Chinese National Primary Standard. 36 species of plants were newly discovered, First-grade State Protection animals that were seldom seen before are now observed in the Biosphere Reserve again.





Case Study: Eco-migration 案例分享：生态移民促节能减排

全球变暖已经形成难以扭转的趋势,我们所能做到的就是寻求可持续发展之路,在不影响环境的前提下实现发展。在生态移民过程中,我们采取了很多办法,也克服了诸多困难,最后实现了居民自愿搬迁,既有效地保护了生态环境,又提高了居民幸福指数。

The trend of global warming can't reverse easily, what we can do is just to seek the way of sustainable development on the basis of environmental protection. During the eco-migration project, we took many measures and overcame many difficulties finally made the residents move out voluntarily. So it is not only good for ecological environmental protection, but also good for improvement of people's happiness.





Case Study: Eco-migration 案例分享：生态移民促节能减排

管委会特别努力发展当地污染小的产业，比如生态旅游业、康疗业和矿泉饮食品加工业，以此帮助搬迁社区居民由收入较少的农业和捕鱼业向收入较高的新行业转型。通过工作培训、免息贷款、政府优惠政策等措施，鼓励搬迁社区自主创业，增加收入。

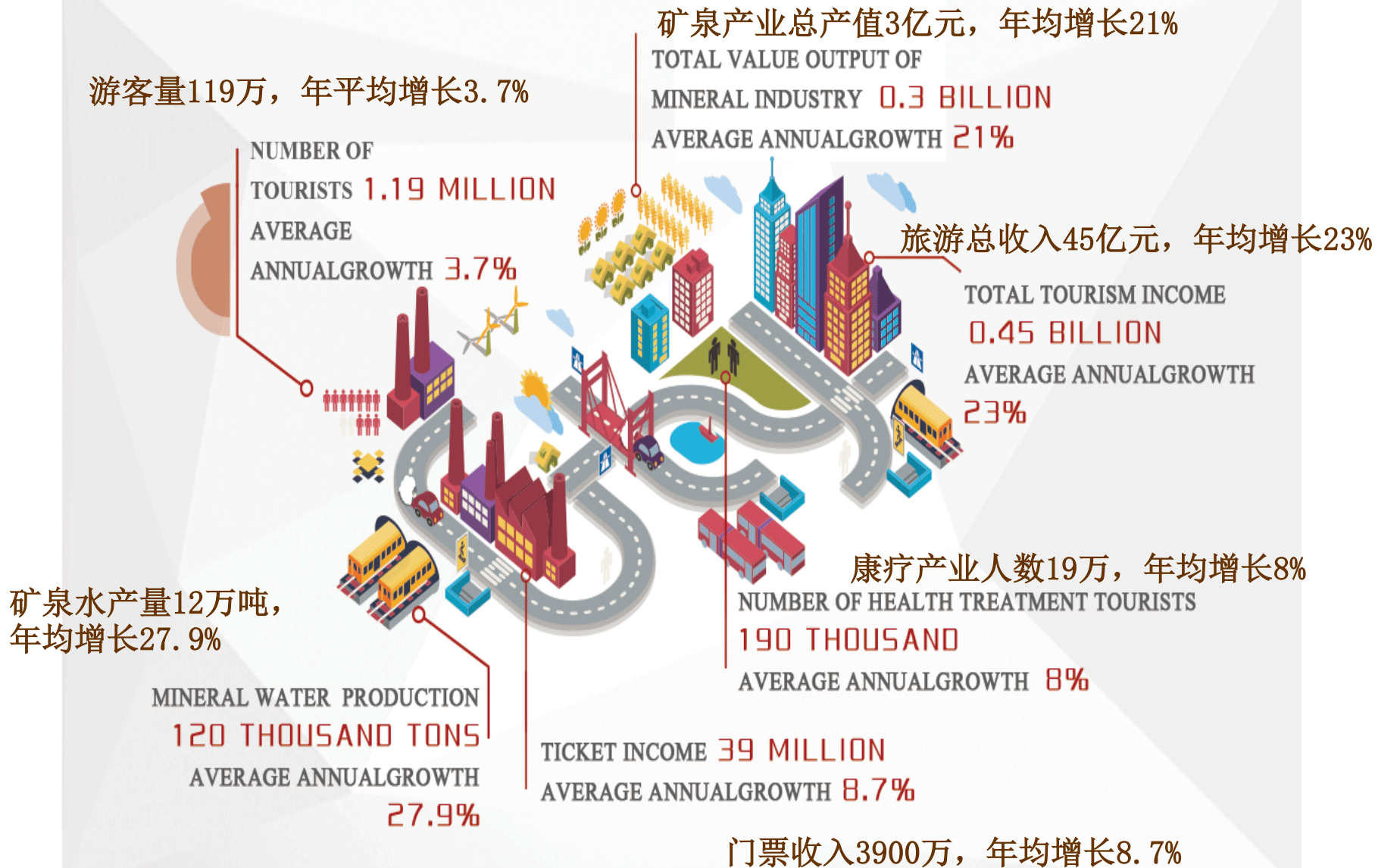
Particular efforts were made to stimulate local low-pollution industries such as eco-tourism, health care as well as mineral food and drinks processing so as to facilitate the transfer of relocated communities from low-income agriculture and fisheries to new higher-income eco-jobs. Job training, interest-free loans, preferential government policies and other measures encouraged relocated communities to start companies and other activities to build careers and enhance earnings.





Case Study: Eco-migration

案例分享：生态移民促节能减排





Case Study: Eco-migration 案例分享：生态移民促节能减排

2015年，五大连池重新启动生态搬迁项目，对位于矿泉水带、药泉山周边和邻泉村部分房屋进行拆迁。目前已经有481户居民喜迁新镇，另外328户将于9月末全部迁入新镇。在五大连池，生态搬迁将持续下去.....

In 2015, the eco-migration project was restarted. The target is the houses located at the mineral spring zones, at the foot of Yaoquan Volcano and Linquan Village. Now 481 families have moved into the new town and another 328 families will be move in the end of this September. At Wudalianchi, eco-migration will continue.

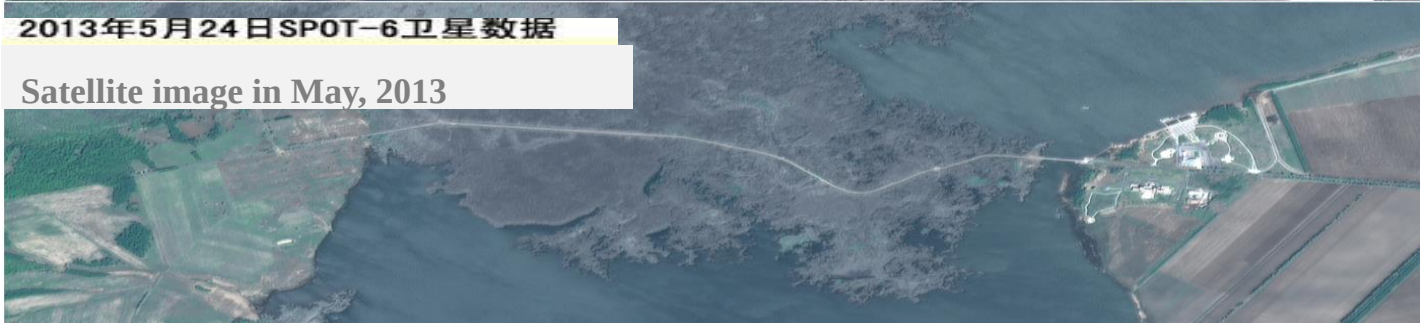
2010年6月19日 (Quickbird卫星数据)

Satellite image in June, 2010



2013年5月24日 SPOT-6卫星数据

Satellite image in May, 2013





Case Study: Eco-migration

案例分享：生态移民促节能减排

PRIME TARGET

到2020年主要目标

TO 2020

五大连池总产值9亿元

TOTAL OUTPUT VALUE OF WUDALIANCHI 0.9 BILLION

AVERAGE ANNUAL GROWTH 7.7% 年均增长7.7%

游客量200万

NUMBER OF TOURISTS 2 MILLION

AVERAGE ANNUAL GROWTH 10.9% 年均增长10.9%

康疗人次50万

NUMBER OF HEALTH TREATMENT TOURISTS 500 THOUSAND

AVERAGE ANNUAL GROWTH 21.4% 年均增长21.4%

门票收入8000万元 TICKET INCOME 80 MILLION YUAN

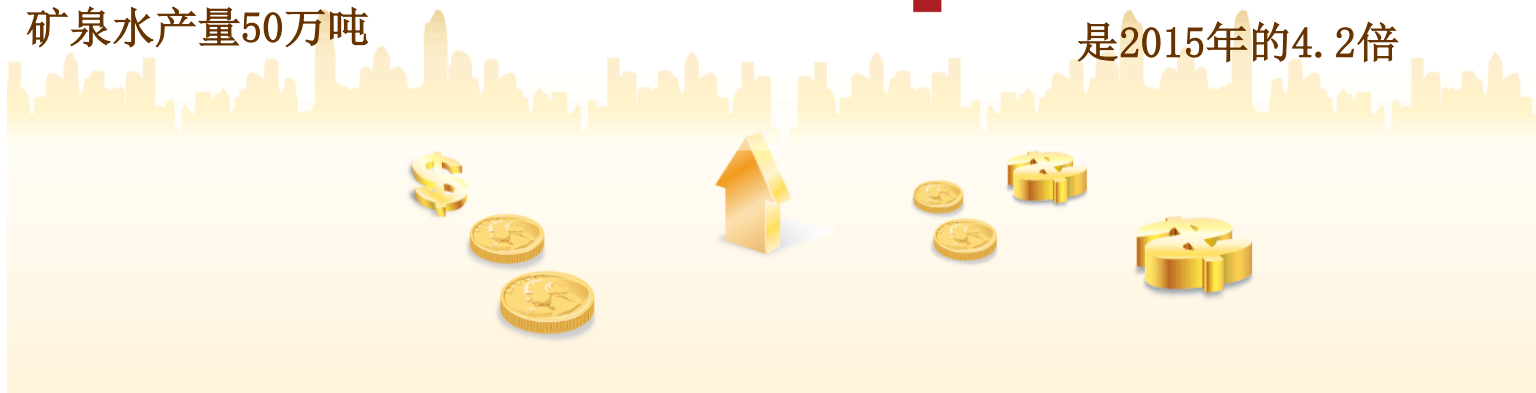
AVERAGE ANNUAL GROWTH 15.2% 年均增长15.2%

MINERAL WATER PRODUCTION 500 THOUSAND TONS

4.2 TIMES OF THE YEAR 2015

矿泉水产量50万吨

是2015年的4.2倍





Case Study: Eco-migration 案例分享：生态移民促节能减排

五大连池集旅游观光、康疗度假和矿泉产品产业于一身，发展综合经济的潜力巨大。不久的将来，五大连池将释放出更大的魅力，展露给世人。

Ecotourism industry, health care industry and mineral product industry are all developing well in Wudalianchi, with large potential of developing integrated economy. In the near future, Wudalianchi will exert all efforts to achieve the goals of all-round development.



Thanks for your attention!



谢谢

