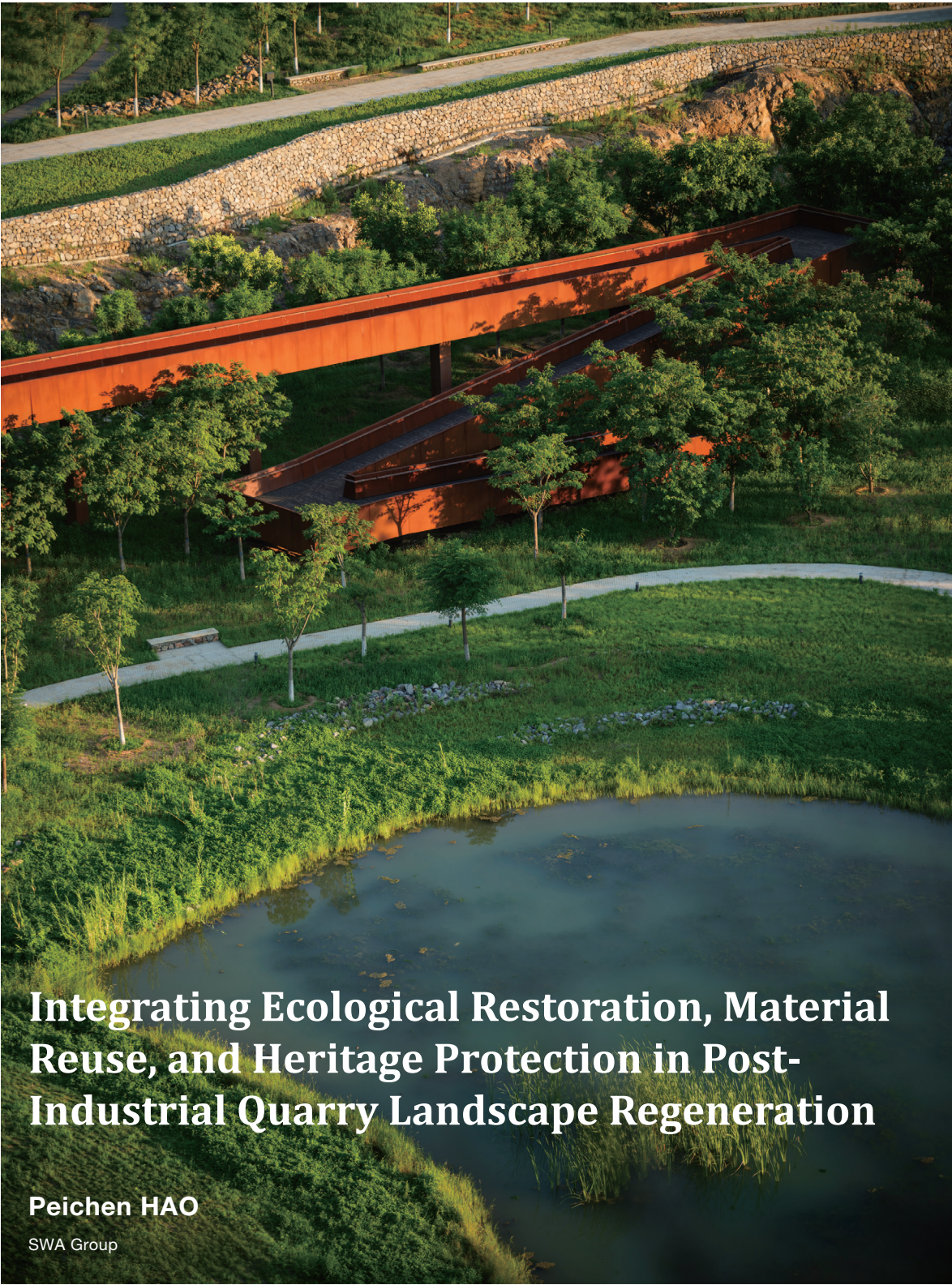




Integrating Ecological Restoration, Material Reuse, and Heritage Protection in Post-Industrial Quarry Landscape Regeneration

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1. Landscape recovery integrates with the original quarry texture.

FEATURES

Quarry Regeneration; Ecological Restoration; Surface Stabilization; Water and Soil Management; Material Recycling; Planting Strategy; Industrial Heritage; Cultural Heritage

PRACTICE REFLECTIONS

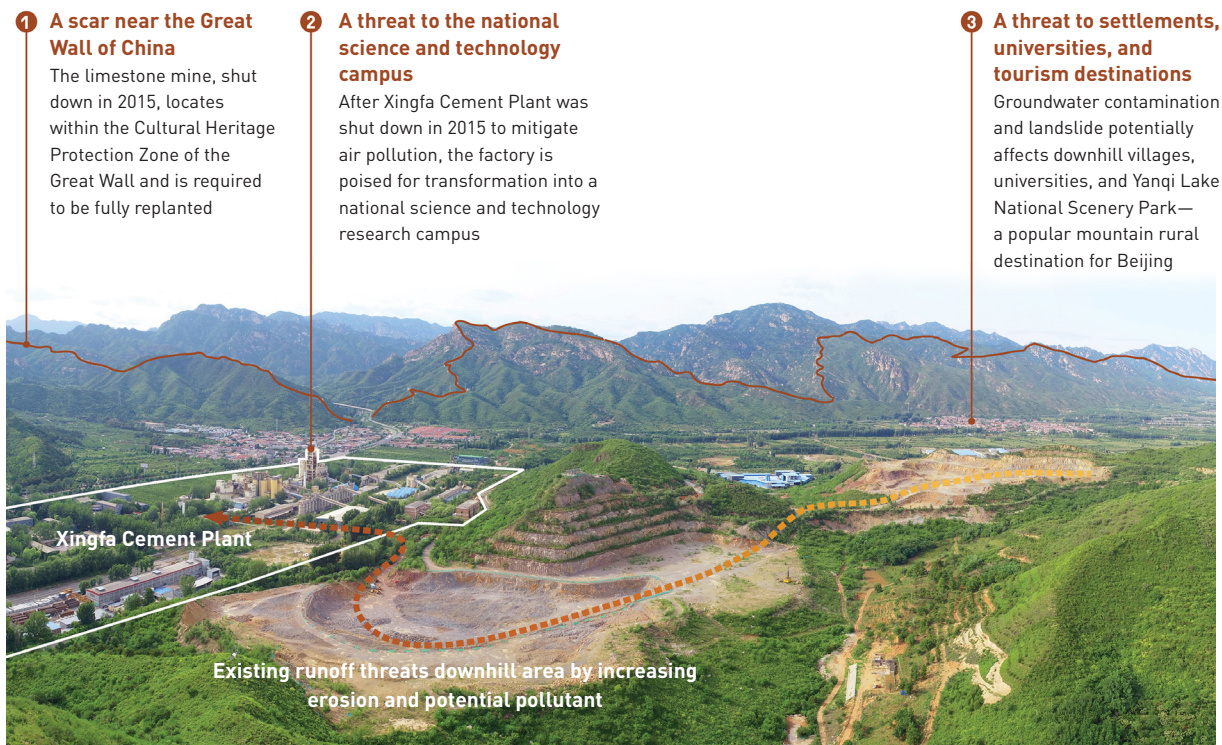
- A holistic planning approach that balances ecological, heritage, and community needs is necessary in post-industrial landscape regeneration
- It is important to adapt planting strategies to site-specific conditions, ensuring long-term ecological success despite harsh environments
- Some proposed cantilevered structures were not feasible due to the unstable slopes, requiring design adjustments for safety and practicality

EDITED BY Ying WANG

1 Introduction

Xingfa Cement Plant, which is located in Beijing's Huairou District, operated as a limestone quarry for 23 years, causing substantial ecological degradation. The site, encompassing 41.67 hm² within the cultural heritage buffer zone of the Great Wall, was left with a barren scar in the landscape. Following the shutdown of the plant in 2015 under Beijing's Clean Air Initiative, the site became adjacent to a growing cluster of national science and technology parks, universities, residential communities, and tourist destinations. In response to these shifts, the project seeks to rehabilitate the site, transforming it into a national research campus and a rural park. The restored landscape will incorporate multifunctional public spaces, including hiking trails, amphitheatres, and artistic installations, offering both ecological value and recreational opportunities.

— © ARCH-ZOOM

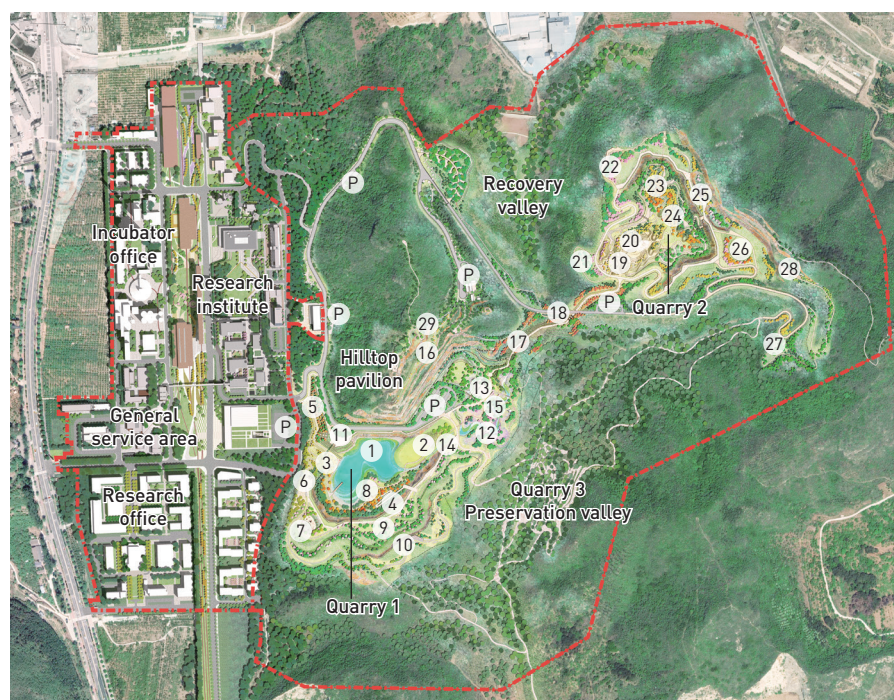


Several projects provide useful references for quarry regeneration. In China, examples like the Quarry Garden in Shanghai Chenshan Botanical Garden and Hangzhou's Liangzhu Quarry Park showcase approaches to integrating post-industrial sites into public life. Internationally, the Eden Project

in the UK and the Butchart Gardens in Canada illustrate how disused quarries can be turned into destinations for education, tourism, and horticulture.

Compared with these cases, the Xingfa site presents distinct conditions. Its limestone and shale geology requires special

water and soil management due to high porosity and instability. Covering an area of about 107 hm², with 60 hm² for the core design, it is larger than most examples and is developed alongside the plant renovation, requiring integrated planning. Being within the Great Wall's first-class protection zone,



Programs

- | | |
|------------------------------|--------------------------------|
| 1 Seasonal pond | 16 Cliff terrace trail |
| 2 Stone amphitheater | 17 Walk of gear |
| 3 Suspension bridge | 18 Flow deceleration terrace |
| 4 COR-TEN connection bridge | 19 Land art zone |
| 5 Yellow jessamine valley | 20 Pile of component debris |
| 6 Entrance service platform | 21 Recovery valley lookout |
| 7 Hillside playground | 22 The Great Wall lookout |
| 8 Metal hammer ring | 23 Spiral COR-TEN bridge |
| 9 Apricot walk | 24 Continuous walk |
| 10 Sea buckhorn overlook | 25 Planting recovery pit |
| 11 Refractory brick overlook | 26 Cliff amphitheater |
| 12 Meadow platform | 27 South valley camping ground |
| 13 Activity service platform | 28 Cliff side overlook |
| 14 Aeration cascade | 29 Central hiking trail |
| 15 Filtration creek | P Parking lot |

- A large area of exposed earth threatened nearby settlements and an emerging science and technology campus near the Great Wall.
- The planning addresses problems of erosion, pollution, and degraded ecology.
- Site plan. The park offers hiking trails, amphitheaters, and art installations alongside the new campus.



the design must respect heritage views while preserving mining textures.

2 Design Strategies

Restoration began with surface stabilization. Geological and planting conditions were assessed via 3D scanning, informing the removal of 261,314 m³ of unstable rock reused onsite to minimize soil transport. Cliff edges were stabilized under geological experts' supervision, with protective netting installed as needed.

Drainage was redesigned to manage runoff from summer storms. Flow paths were extended to promote root filtration and rapid flows were slowed to prevent soil erosion. A self-sustaining seasonal pond was created, supplemented by recycled water during dry periods.

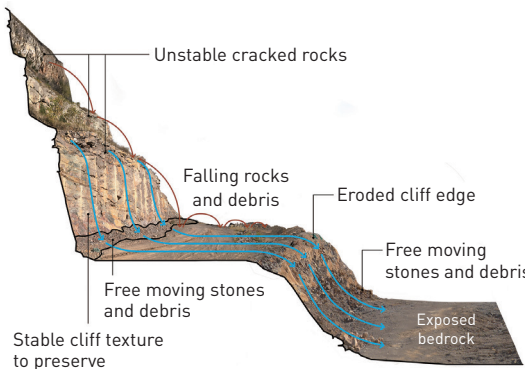
The planting strategy emphasized native and nitrogen-fixing species to improve soil quality and prevent erosion. It included hardy trees and shrubs for slope stability, soil-enriching species, and native vegetation

5. Quarry stones become land art, showcasing the site's rich industrial heritage.
6. Surface protection methods help stabilize earth volumes and redirect runoff.
7. A buildable water system manages runoff and educates visitors during recreational park use.
8. Bioswales, terraces, and ponds form a multi-layered water management system.



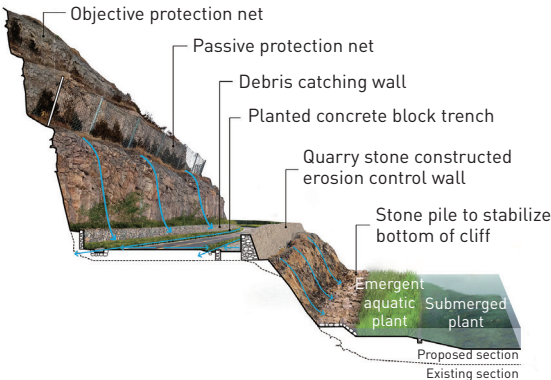
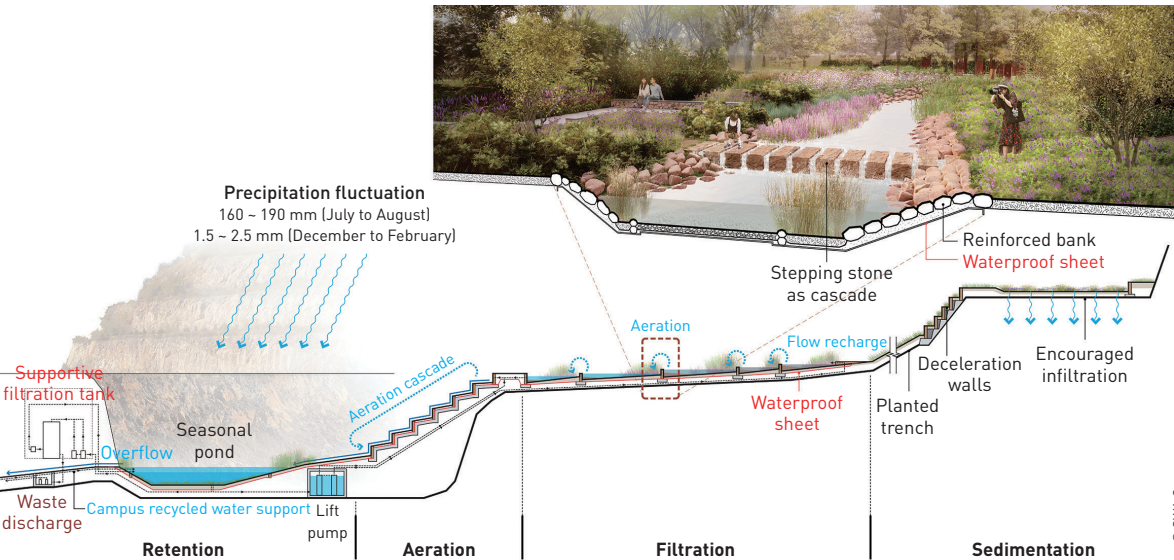
Existing

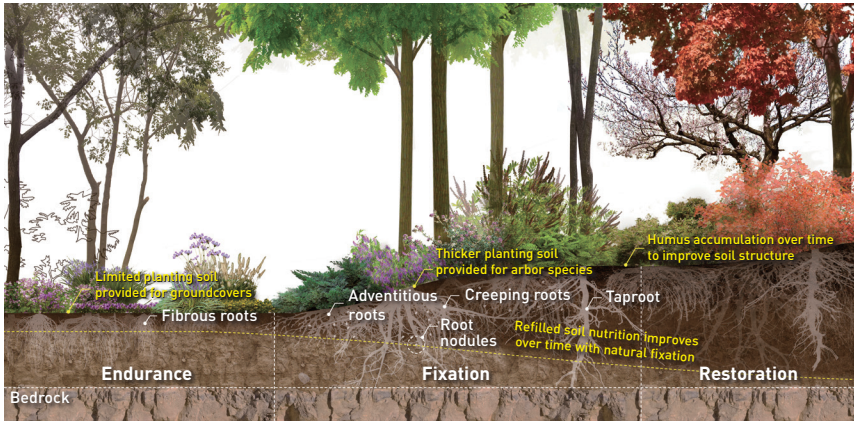
Unstable cracked rocks and free-moving stones and debris on site aggravate erosion caused by summer flood and winter wind



Proposed

Protection methods work in tandem with drainage and planting to stabilize earth and stone volumes, minimizing further surface erosion





9. Plant community design for water absorption, elevation suitability, soil stabilization, and habitat value.
10. Planting design supports water flow and highlights ecological roles with color.
11. Reused factory parts emphasize site features and preserve industrial memory.

to re-establish the regional ecosystem.

Materials from the site were reused to reduce waste and reinforce site identity. Stone and shale were repurposed for walls, seating, drainage, and paving. Machinery and spare parts from the plant were transformed into a “Trail of Memory” linking quarries. Industrial relics were incorporated as landscape features, signage, and furniture.

Distinct experiences were designed for the two quarries. One supports research functions with an amphitheater, lawns for events, and educational trails. The other creates an earth art zone with reused stone structures, a mist fountain recalling mining history, and a terraced lookout toward the Great Wall. A network of biking and hiking trails connects the site to its surroundings.

3 Challenges in Practice

Vegetation restoration was more difficult than expected. The reliance on mixed seeding methods proved highly sensitive to soil and precipitation conditions; the backfill soil had poor fertility; and the porous bedrock limited water retention. Moreover, combined with a dry climate and varied elevation, early-stage irrigation was costly and complex. Despite the selection of drought-tolerant species, initial germination rates were low. After

several rounds of reseedling, species like *Iris lactea*, *Hylotelephium spectabile*, *Juniperus horizontalis*, *Medicago sativa*, *Pennisetum alopecuroides* ‘Little Bunny’, *Orychophragmus violaceus*, and *Viola philippica* proved best suited.

Several design elements were scaled back due to site constraints. The area of land art zone was reduced to match available materials; cantilevered structures and certain architectural features were deemed unfeasible due to unstable slopes; and the integration of industrial relics was adjusted in line with construction sequencing.

Being located within a science and technology park, the site currently serves as a semi-private recreational space. The client is exploring various operational models, including corporate events and outdoor activities. In the long term, the site may develop into a comprehensive camping and

experiential zone. The challenge remains to integrate the park into its broader context while preserving its landscape and historical features.

Project Name: Beijing Xingfa Cement Plant Quarry Park

Location: Huairou District, Beijing

Size (area): 107.49 hm²

Client: Beijing Jinyu Xingfa Science and Technology Ltd.

Landscape Architecture: SWA Group

Principal: Zhaojie Wu

Design Team: Peichen Hao, Ya You, Hui Lin, Wenxin Deng, Yiwen Gao, Weixi Liu, Xinjun Gu, Shuyue Li, Bosheng Wang, Ruijie Liu, Yu Guo

Design Time: 2017 ~ 2019

Completion Time: 2024

Award: 2024 Best Practices of Urban Renewal in Beijing

Competing interests | The author declares that he has no competing interests.

