



Green Distillation: Maotai's Pioneering Eco-Metaverse Project in Zunyi, China

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1. This visionary project is not just an undertaking of environmental compliance but a stride towards setting a new benchmark in industrial ecological integration.

FEATURES

Green Distillation; Maotai; Water Recycling; Circular Economy; Design Ecology; Constructed Wetland; Industrial Ecology; Thermal Energy Recovery

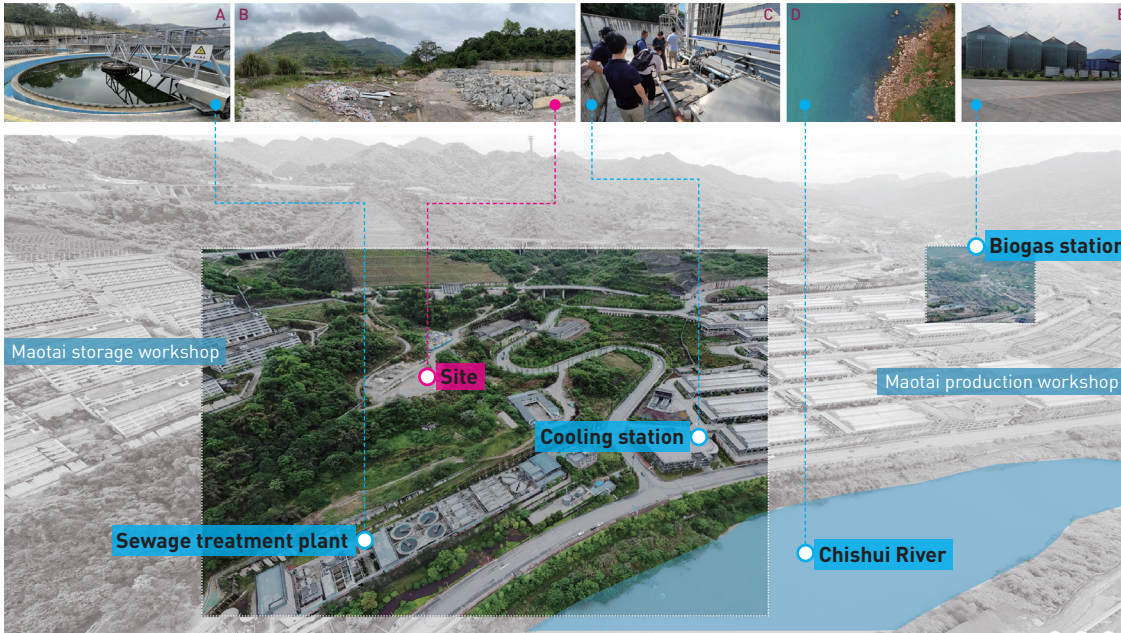
PRACTICE REFLECTIONS

- Research in advanced water recycling technologies, nutrient recovery systems, and carbon capture methods can further enhance such projects, and studies on eco-metaverse applications and energy-efficient designs could provide insights into optimizing industrial ecological initiatives
- This project demonstrates innovative solutions for environmental challenges, equipping designers with strategies to align ecological goals with industrial and economic objectives and inspiring innovative and sustainable practices

EDITED BY Tina TIAN

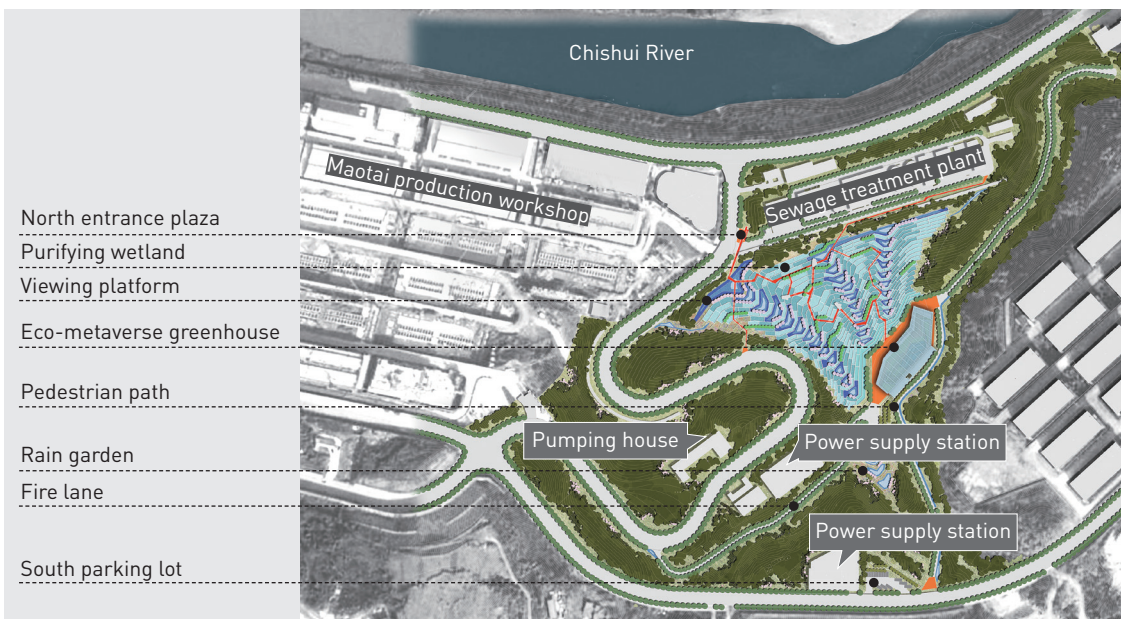
1 Site and Challenges

Maotai is arguably the most recognized brand of liquor (Bai-Jiu) in China. Situated in the heart of Maotai Town, Guizhou Province and spanning 8 hm², this environmental protection and ecological improvement project confronts the significant challenge of managing daily outputs of 7,000 tons of sewage and industrial wastewater. This volume of effluent poses a substantial obstacle to meeting the Class II and III water quality standards of the Chishui River, highlighting the project's critical importance. Furthermore, the additional thermal pollution and energy demands stemming from the new distilleries exacerbate the site's environmental pressures. Concurrently, as a central component of the endeavor, an abandoned hilly landscape filled with urban debris and solid waste was selected for an ecological experiment. Consequently, this on-going initiative represents a pivotal step towards the sustainability of Maotai's water-centric operations. It ensures that the distillery's



- A** The sewage treatment plant handles 200 ~ 2,000 tons of wastewater daily, failing to meet the water quality standard for direct discharge into the Chishui River
- B** The existing site was a brownfield filled with waste, disrupting both the mountain runoff corridor and local microclimates
- C** The cooling station was built to cool the distilled water in the production workshop, but it failed to utilize redundant thermal energy and resulted in significant energy waste
- D** The Chishui River is known as the only unpolluted river in China, utilizing the water of which contributes to the unique character of Maotai liquor
- E** The biogas station collects distiller's grains and other biomass waste to produce biogas and organic fertilizer: the biogas is utilized for power generation and the organic fertilizer is incorporated into the liquor production process

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2. Site analysis. The site area is situated adjacent to the Chishui River and surrounded by the degraded mountain slope.
3. Site plan showcasing layout and zoning details.
4. Rendering of the aerial view.

legacy aligns with modern environmental stewardship principles while responsibly utilizing water and nutrients to transform the abandoned wasteland into a green paradise.

2 Design Strategies

Transforming the industry's environmental management by creating an ecosystem that fully integrates water, nutrient, carbon, and energy recycling, landscape architects' comprehensive response to these challenges is detailed in strategic implementations, each with measurable objectives.

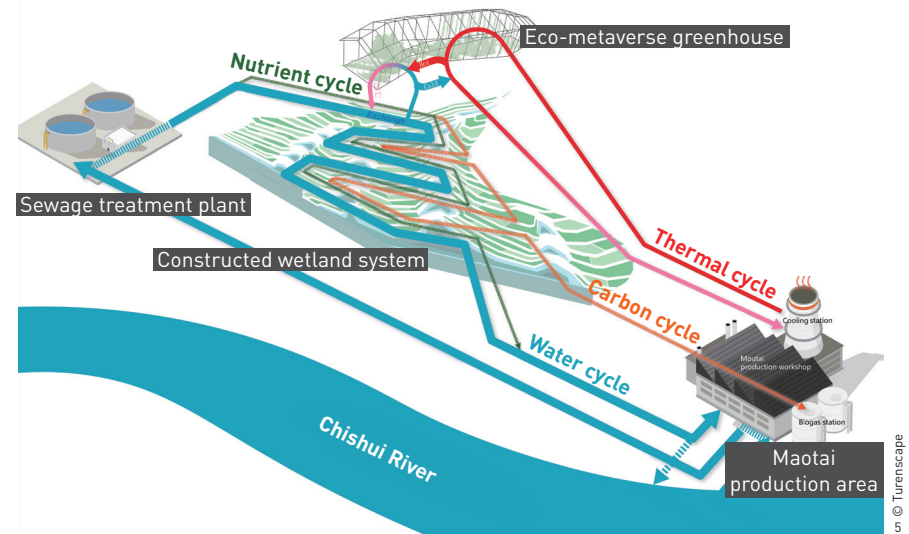
1) Water recycling: The water recycling system is engineered to treat and repurpose the distillery's wastewater, showcasing a processing capacity of 2,000 ~ 3,000 m³/d, supported by a lift pump capable of 140 m³/h. This infrastructure demonstrates an advanced commitment to managing and repurposing enormous wastewater volumes.



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2) Nutrient recovery: The purification wetland, divided into tailored zones for varied treatment processes—horizontal surface flow (15.7%), upward vertical surface flow (0.5%), upward (30.6%) and downward (22.7%) vertical subsurface flows, bio-swale (23.5%), and oxidation pond (7%), epitomizes the project’s holistic approach to water purification and nutrient recycling.

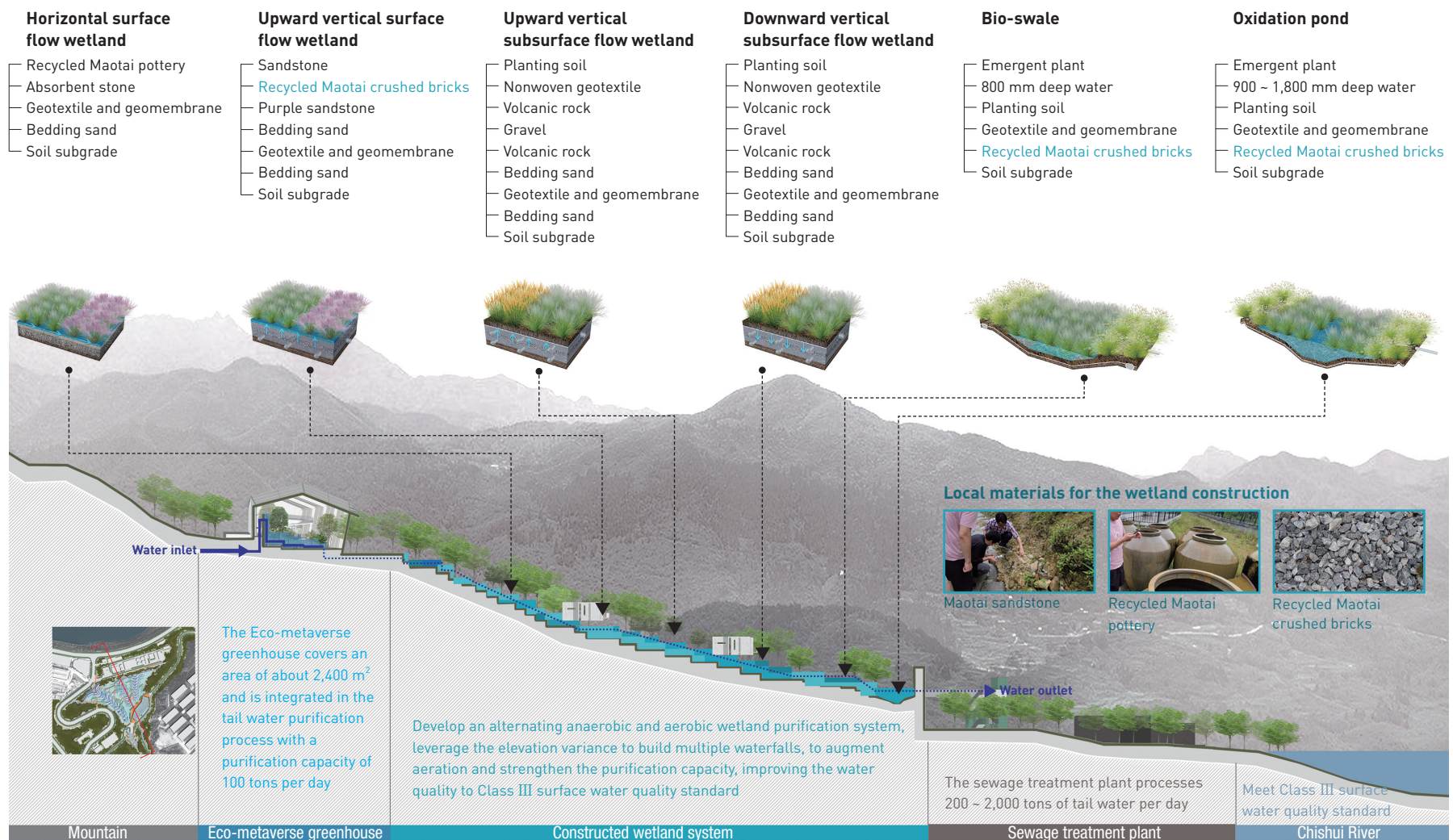
3) Carbon absorption and heat recovery: A 2,400 m² Eco-metaverse greenhouse, functioning both as a visitor center and a key component of the designed ecosystem, utilizes the wastewater’s high-temperature (50 °C) waste heat. This element underscores the dual objectives of carbon sequestration and thermal energy recovery, further augmented by the integration of biogas technology.



3 Conclusions

This “Green Distillation” project becomes a research and development paradigm of how traditional industries can embrace

5. Diagram demonstrating the site’s water, nutrient, carbon, and thermal cycles.
6. Section view of the constructed wetland system.
7. The rendering of the green house and the terraced wetland.
8. Rendering of the constructed wetlands.
9. Rendering of the heat-harvesting greenhouse.





treatment, energy efficiency, and ecological restoration [...] This project demonstrates how economic growth can harmonize with ecological preservation. We view it as an excellent reference point, serving as both a benchmark and a scalable model that can be applied across various industries. The Maotai project reinforces GROHE's commitment to creating a positive impact on society and the environment."

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

Project Name: Maotai's Pioneering Eco-Metaverse
Location: Moutai Town, Guizhou Province, China
Size (area): 8 hm²
Client/Owner: Guizhou Moutai Wine Co., Ltd.
Landscape Architecture: Turenscape
Principal: Kongjian Yu
Design Team: Jinyi Huang, Wenyu Yu, Ang Lu, Jia Song, Hao Li
Design Time: June 2022
Award: GROHE Water Prize, WAF Award 2024



sustainable practices. It not only addresses the immediate environmental impacts of distillery operations but also serves as a beacon for sustainable industrial practices globally. The 2024 GROHE Water Prize

Jury honored the project because it "truly stands out among all the candidates due to its holistic and forward-thinking approach to sustainability. It implements a multifaceted strategy that addresses water

<https://doi.org/10.15302/J-LAF-1-040035>

收稿日期 | 2024-10-22 录用日期 | 2024-12-12

中图分类号 | TU986 文献标识码 | B

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