BOUNDARY ECOLOGY

Testing Nature-Based Solution Guidelines Against the Urban-Rural Planning Collision in Hong Kong

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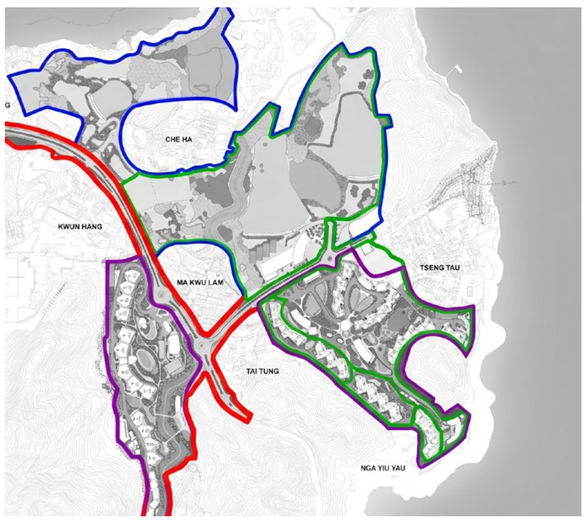
NATURE CONSERVATION IN FLUX:
RESTORING BIODIVERSITY IN WATERSHEDS

Boundary Ecology: Econtone Transition Zones

Hong Kong's Sai Sha presents a legible case of unresolved planning juxtaposition. Its traditional rural landscape, including villages, farmlands, and wetlands, persists through land use policies, yet its ecological and social substance is progressively eroded by urban-driven amalgamation. The imposition of Go Park creates irreconcilable adjacencies, defined by three exclusionary boundary typologies: Solid Blockades (opaque noise barriers), Linear Flows (regulated paved paths), and Empty Plot Edges (balustrades dissecting marshland). These materialise a governance gap between urban policy and rural stewardship, severing ecological connectivity and deepening socio-spatial segregation.

This research asks: can Hong Kong's Nature-based Solutions Design Guidelines (HKNbSDG), applied to these boundaries, mediate this contradiction? Using a Research-through-Design methodology, the study test-fits HKNbSDG provisions onto each typology via the Design Scientist 2026 citizen co-design workshops. Here, design operates as a diagnostic instrument for assessing policy applicability directly at the urban-rural interface.

Findings reveal HKNbSDG's generative potential. Where guidelines align with Sai Sha's ecology, interventions transform exclusionary boundaries into sponge territories and community-centric natural spaces. A maintenance-as-construction model empowers residents as ecological stewards through bottom-up management. Where planning falls short, nature-based solutions demonstrate the potential to fill the governance void at the rural-urban fringe.



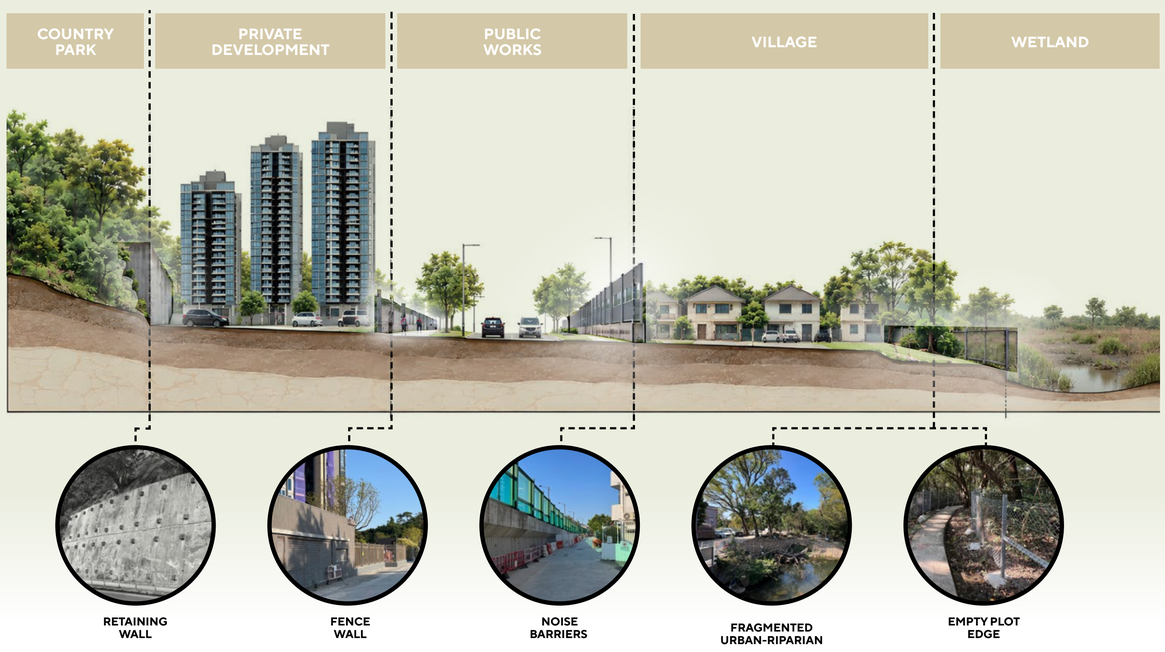


Geographically cradled by Ma On Shan and the Kei Ling Ha Hoi (Three Fathoms Cove), Sai Sha was historically defined by an ecological gradient.

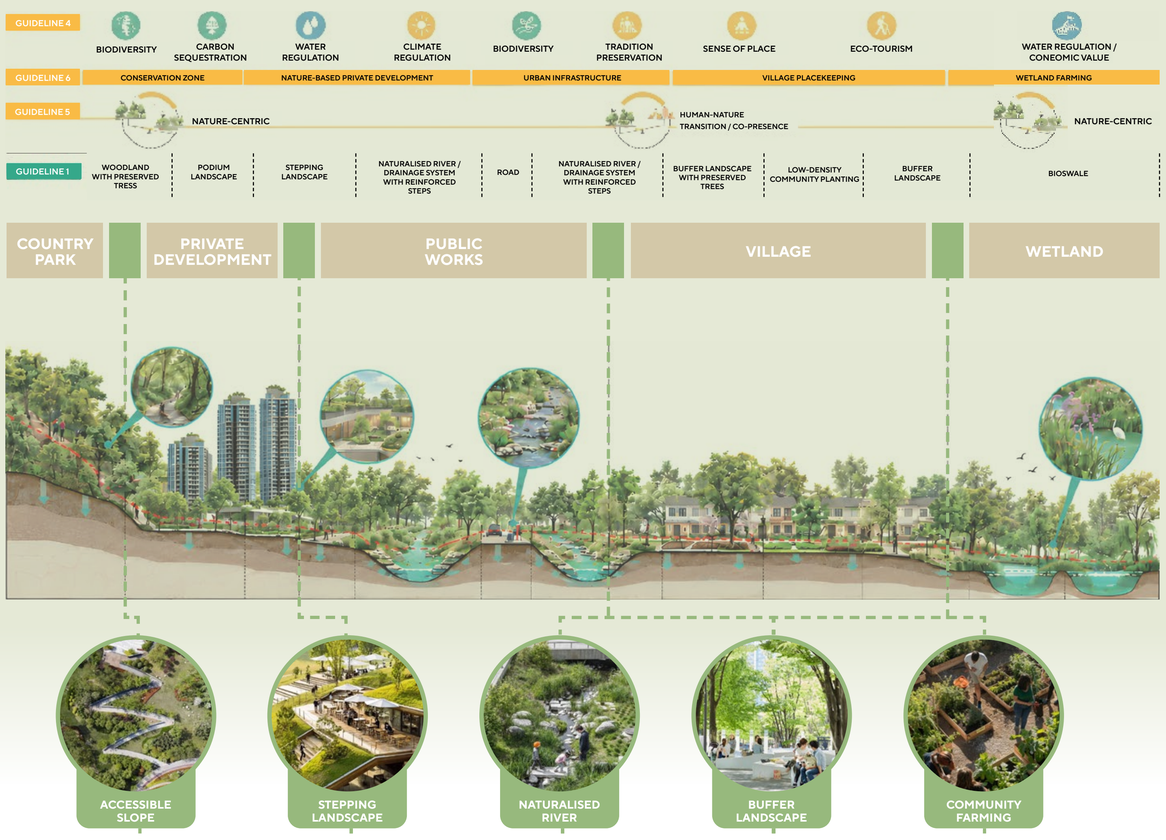
Urban sprawl has superimposed a rigid layer of modern infrastructure over this landscape, exemplified by the Go Park commercial complex and its adjacent high-density towers. This contemporary intervention establishes implicit hierarchy, inducing physical friction

Boundary Ecology reimagines Sai Sha's rigid barriers not as limits, but as the primary sites as natural driven public spaces that encourage community interaction, mitigate urban warming and manage precipitation through natural evapotranspiration.

EXISTING ENVIRONMENTAL CONTEXT

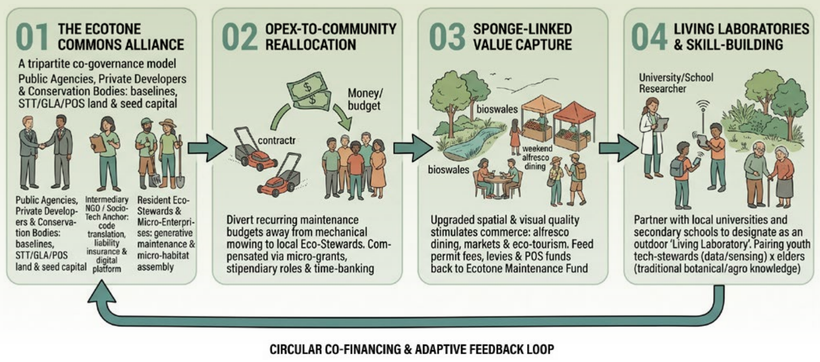


HUMAN CENTRIC NBS OVERLAY



ECONTONE TRANSITION ZONES

Governance & Value Capture Strategy

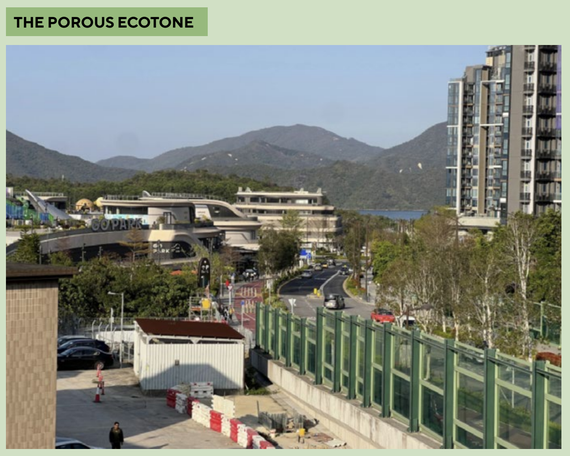


HKNbSDG Performance Verification

NATURAL CAPITAL
- ▲ Habitat Value
- ▲ Species Richness
- ▲ Sponge & Water Regulation
- ▲ Green Area
- ▲ Canopy Coverage

SOCIO-ECONOMIC
- ▲ Public Accessibility
- ▲ Social Interaction & Joy
- ▲ Visual & Aesthetic Quality
- ▲ Maintenance & Adaptive Care
- ▲ Capital Value & Utility

THE POROUS ECOTONE

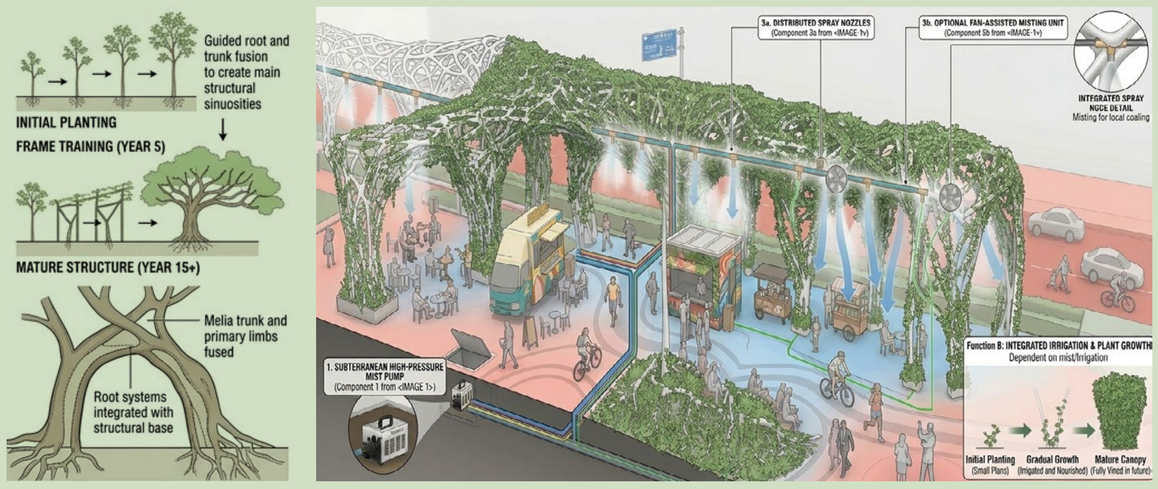




Boundary Ecology transforms these hard edges into ecotones—dynamic, living transitional zones. We allow the wetland to reclaim these boundaries, transforming them into sponge territories.



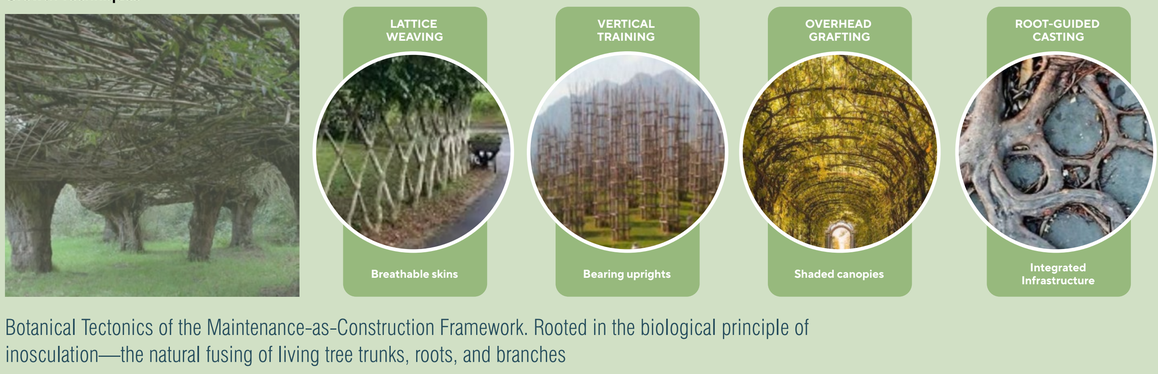
Phased Evolution of the Hydro-Lattice: From robotic 3D-printed biodegradable formwork to a self-supporting, inosculated public canopy.



Natural driven public spaces that encourage community interaction, mitigate urban warming and manage extreme precipitation through natural evapotranspiration.

MAINTENANCE-AS-CONSTRUCTION

Inosculation Growth Techniques



Botanical Tectonics of the Maintenance-as-Construction Framework. Rooted in the biological principle of inosculation—the natural fusing of living tree trunks, roots, and branches

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