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Speculative inconstancy: Exploring the architectural potential of porosity

Fig. 1 Qixuan Hu (2023). Symbiosis with the flood. [Digital render]

The growing severity of climate-related issues challenges the traditional binary perception of land as liveable or uninhabitable. Consequently, more areas now find themselves in an ambiguous zone of questionable liveability. Coastal, ravine, and riverine regions are especially at risk, with rising sea levels and frequent flooding placing them in an uncertain position between habitable and uninhabitable.

This phenomenon necessitates a re-evaluation of prevailing architectural practices that often view the appearance of architecture right after construction as its definitive and desired state. Such a perspective gives rise to a widening gap between the intended design and the actual material behaviour.[1] Overlooking the potential impact of external factors can render buildings vulnerable to shifting environmental conditions, which are growing more unpredictable and intense.

In response to these turbulent landscapes, this research-driven design delves into the potential of an adaptable architectural language that coordinates with environmental fluctuations—located within a seasonally submerged ravine in San Miguelito, Panama City. The initiative introduces a community centre to the

neighbouring San Miguelito favela that adapts to seasonal shifts, offering versatile spatial configurations. By envisioning a dialogical border between habitation and nature, the project invites residents to engage cooperatively with (non)substances such as rain, wind, and flooding (Fig. 1).

The concept of "porosity" is a methodological approach within architectural realms to address fluctuating environmental conditions. This notion, seminally narrated by Walter Benjamin and Asja Lacis in 1925, portrayed Naples as a porous city, stating, "As porous as this stone is the architecture. Building and action interpenetrate in the courtyards, arcades, and stairways."[2] Such permeability between the internal and external gives rise to complex interplays of material and space, concurrently invigorating urban spaces with life. These intricate intersections and integrations—hallmarks of porosity—guide exploration into how a loose-fitting and porous architectural language might mediate between human and non-human entities in ever-evolving terrains.[3] This endeavour challenges the conventional anthropocentric perspective that often perceives inconstancy as a detriment. It discusses the potentialities of unpredictability and the feasibility of coexisting with regions impacted by climatic fluctuations.

Reconceiving: Río Abajo's seasonal contradictions

People who observe Río Abajo will be puzzled by an unusual contradiction. From satellite imagery, it resembles a vibrant green belt crossing Panama City, yet upon onsite inspection, it reveals itself as a neglected space nestled within the urban fabric, gradually succumbing to chaos.[4] The discrepancy brought about by this observation piqued interest in this research project in the post-pandemic era.

This phenomenon is primarily driven by seasonal submergence.[5] In Panama City, the tropical dry-rainy season demonstrates distinctive climatic shifts. Especially during the rainy season, the ravine can rapidly expand and appear inundated. The deep terrain of the ravine, coupled with heavy rainfall, can lead to the accumulation of water and sediment, creating temporary or prolonged flooding conditions.

As the project's preliminary phase, the proposed masterplan aims to restore the tensions between the human and non-human agencies, turning Río Abajo into a location that adaptively coordinates with varying seasonal conditions (Fig. 2). Porous installations are introduced along the river to augment public programmes that are often missing in neighbouring high-density communities. Such porosity, viewed as a feature of permeation, facilitates the positioning of constructs along or above the river without disrupting the inherent terrain features. The plan underscores the potential of adaptive architectural designs and material strategies, advocating for a symbiotic relationship with changeable landscapes rather than withdrawing from these regions.

Crossing the ravine

The architectural approach delves into the San Miguelito favela upstream of Río Abajo. Recognised as one of the most expansive informal settlements in Panama City, this community is marked by its distinctive topography, where homes and structures nestle on the ravine's slopes and boundaries. The unique terrain

Fig. 2 Qixuan Hu (2022). Río Abajo masterplan. [Digital drawing]

fosters a densely populated environment where structures are closely knit (Fig. 3). Additionally, this layout heightens the inherent risks of landslides and flooding, especially during rainy periods. Such conditions often lead to the disruption of the settlement's essential communication and accessibility.[6]

A staggered gabion system is designed to reshape the surrounding landscape, creating a buffer zone that effectively interacts with floodwater—their layout aids in the controlled deceleration of water flow, averting blockages and potential damage. The porous aggregate within the gabion permits water passage while capturing solids. As the floodwaters recede, the sediment that settles on the gabion plinth will be cleaned and collected.[7] This rejuvenating process enables the ground area to convert into a shadowed public square, offering everyone a secure and welcoming space. When appropriately processed, this sediment can be used in various building applications within the favela community. This strategy reduces waste and champions sustainability by repurposing a natural by-product of the environment. By incorporating these elements, the project not only tackles the challenges of flooding but also capitalises on the adaptive potential of the substances brought by the flood.

Flood-response configuration

The configuration of the detached gabion modules, tailored to the unique terrain features, resembles the intimacy of a street or lane scale. It boasts meandering pathways and hidden pocket spaces that beckon exploration and social interaction. The curated scale ensures that most ground areas benefit from the shade cast by the lifted pavilions. It helps to mitigate the effects of the intense sun and contributes to a comfortable public environment for residents. Adapting to the existing terrain characteristics, this layout supplements the limited public space resources in the community and enhances a sense of community and connectivity among residents.

The final layout emerges as a staggered linear system along the ravine, shaped by topographic characteristics and environmental forces (Fig. 4). Each raised pavilion is tailored to offset specific communal programme deficiencies in the favela community. Addressing the water supply shortfall, adjustable openings are designed for controlled water ingress, guiding rainwater into embedded tanks.
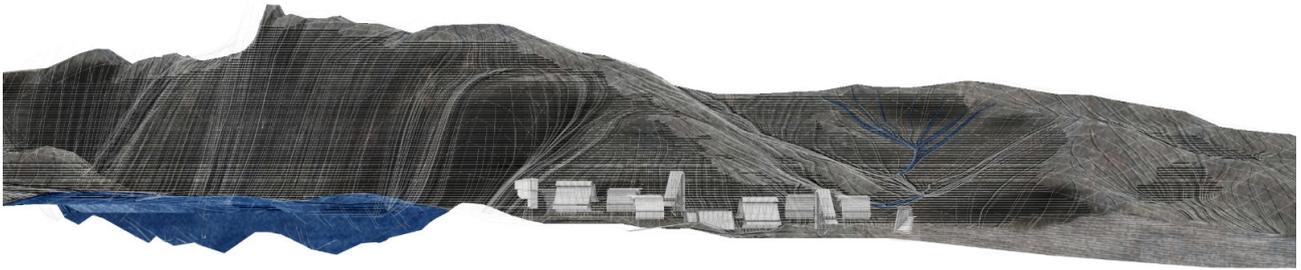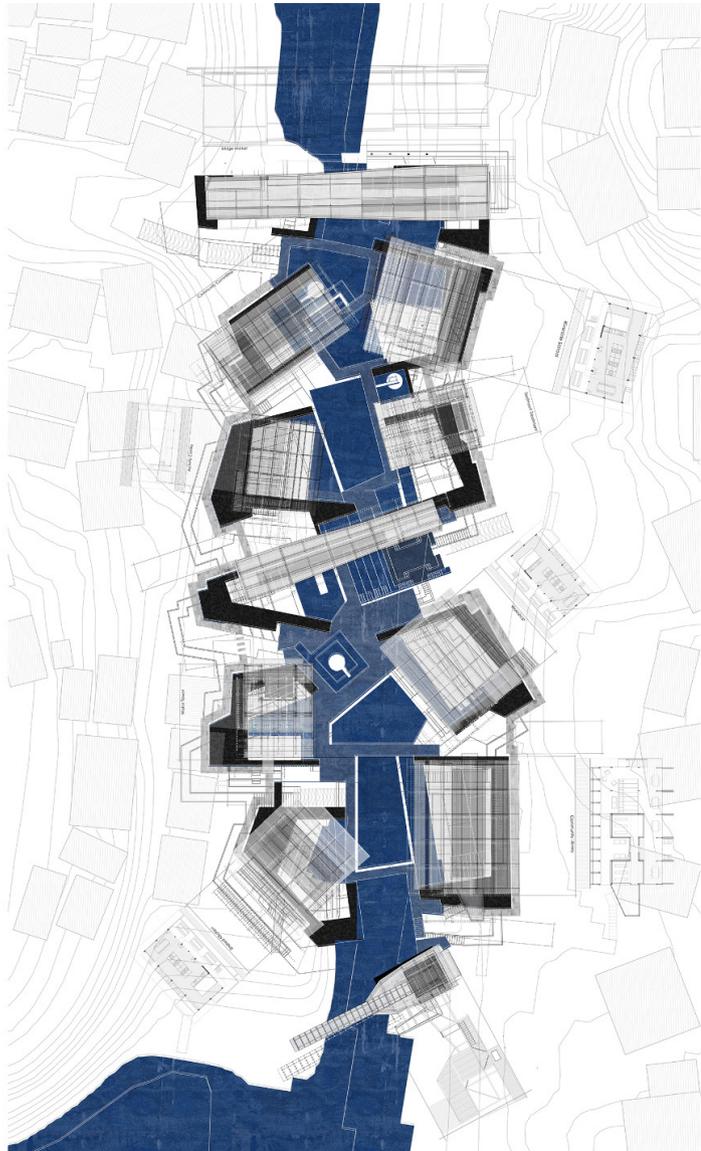
Fig. 3 Qixuan Hu (2023). Long
section: Crossing the ravine. [Digital
drawing]

Fig. 4 Qixuan Hu (2023). Flooding site
plan. [Digital drawing]

The uniquely geometric corrugated panels facilitate efficient heat transfer between the sun's rays and rainwater in the pipes. Their wavy profile expands the surface area exposed to sunlight to promote heat conversion.[8] This sustainable strategy maximises natural resource use and enhances the favela's water management system's energy efficiency and self-reliance (Fig. 5).
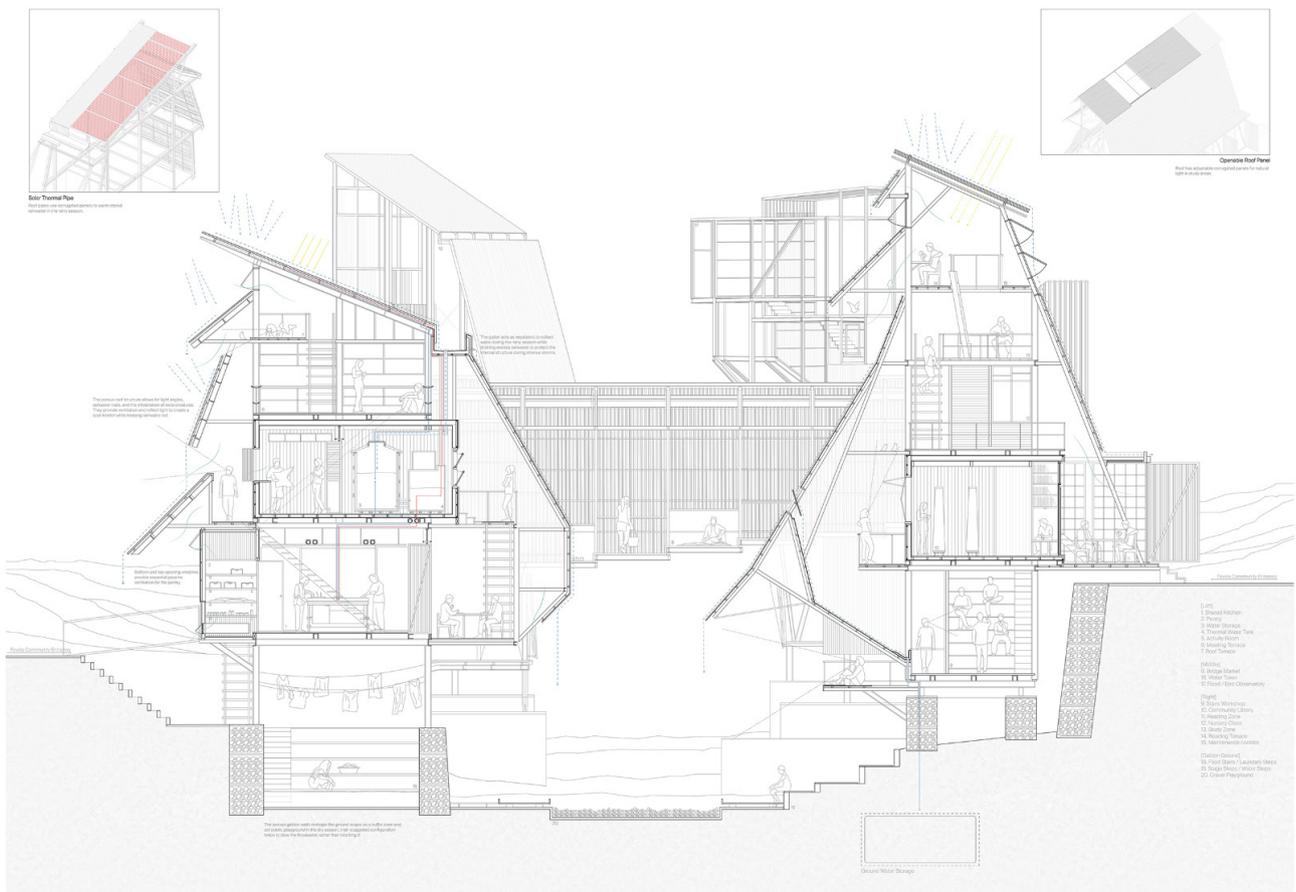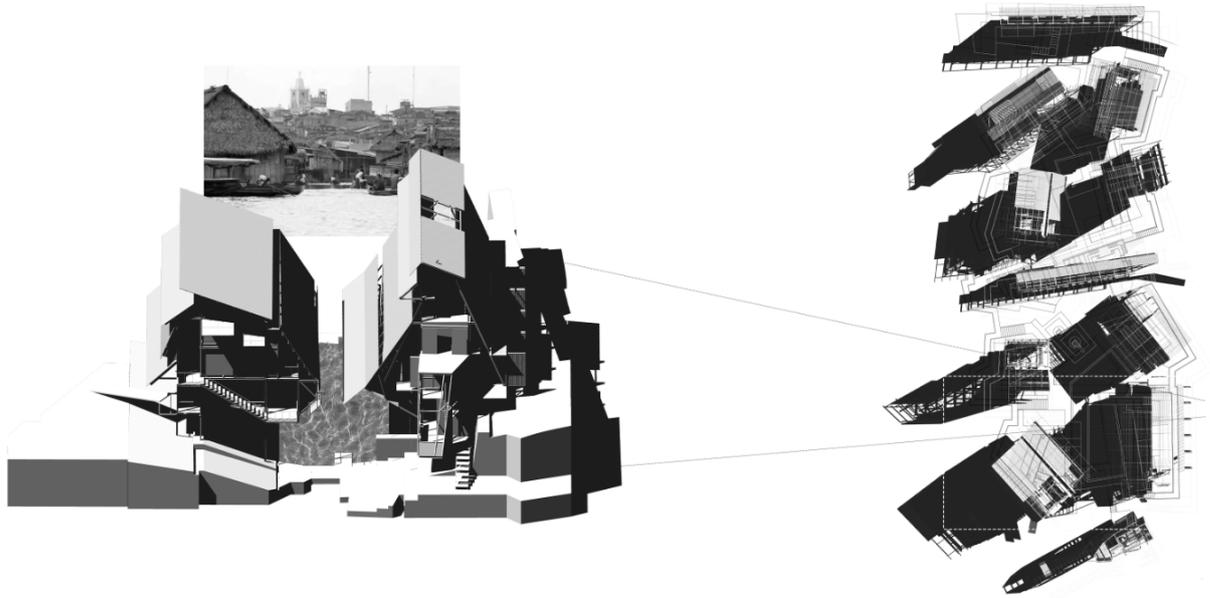
Fig. 5 Qixuan Hu (2023). Flooding site plan. [Digital drawing]

Fig. 6 Qixuan Hu (2023). Section of the Food Centre (left) and Education Centre (right). [Digital line drawing]

Fig. 7 Qixuan Hu (2023). Steam, heat, moisture, and shuttle, the cafeteria interior. [Digital rendering]

"It takes a village"

Situated at the heart of the community and bordering the central passage through the ravine, the Food Centre is a pivotal hub for community interaction, addressing the often-lacking culinary facilities in favela communities (Fig. 7). The stepped gabion on the ground level functions as the dining space, providing seating in the dry season and skilfully blending the architectural extension with the ground landscape. The event space above is versatile and adaptive, suitable for hosting various events and gatherings. Crowning this enclosed room, a spacious open terrace beckons, providing a subtle transition between the interior and exterior, welcoming and including all.

Directly across from the Food Centre, the Education Centre emerges as a beacon for community-based knowledge sharing, filling the gap in cultural and educational infrastructures in the local community. It is primarily intended as a library that subtly transitions into varied study spaces, catering to various communication and reading needs. On the top floor, an attic space is designed to serve as the primary area for reading and study. Its open design encourages free-flowing communication and interaction across all levels.

This spatial penetration incorporates staggered facades, lintels, and rafters strategically arranged to facilitate the dynamic steam, wind, and moisture trails between the loosely assembled structures, ultimately permeating the exterior environment (Fig. 8). The outer skin resists intense sunlight while faintly reflecting brightness through the voids, creating an atmosphere of subtle illumination that permeates the interior with a soft and ambient glow. The interstitial space within the structure is intentionally conceived as habitable places for mountain creatures, providing a space where birds and small mammals can find refuge and create nests, forging an instinctive penetration between the built environment and the surrounding natural habitat.

An object-oriented collaboration

This looseness between objects draws on the investigation of Object-Oriented Ontology. This theoretical framework conceives a coexistent relationship between human and non-human (involving artificial and natural matters) objects. Proposed by Graham Harman, it denies the anthropocentric idea and treats the
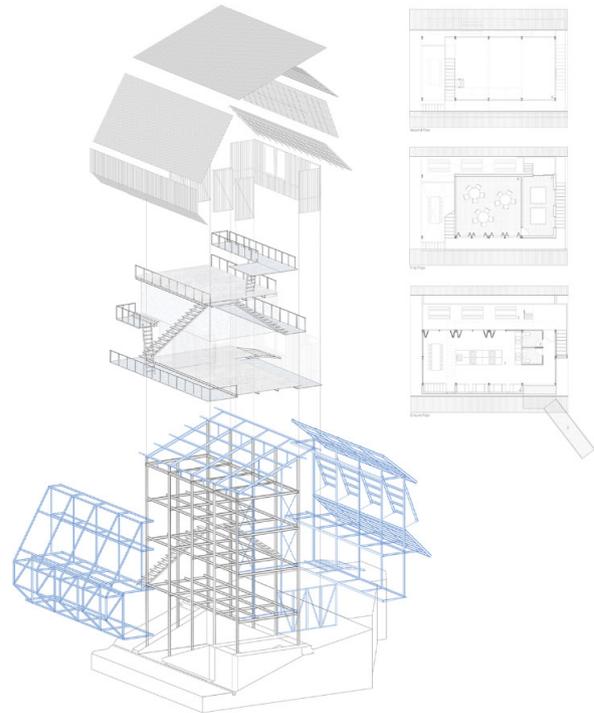
Fig. 8 Qixuan Hu (2023). The penetrative structure. [Digital render and line drawing]

interaction of objects as a heterogeneous network of non-dominant relations.[9] In this paper, the idea of "object-oriented" argues against the preconceived impression of the uncertainty of nature. It demonstrates that non-dominant relations are an essential prerequisite for constructing an environment where humans and non-humans coexist.

In the context of this project, an object-oriented approach is adopted as a methodology for coexisting with inconstancy. This involves recognising the autonomy of seasonal floods, sediment accumulation, and ground vulnerability as neutral objects. Though these objects may partake in various interactions, they cannot be depleted, processed, or replaced. This intertwined inclusiveness contrasts with conventional barriers like dams, which rigidly block water and irreversibly alter hydrological characteristics. Rather than attempting to evacuate or dominate nature, as observed in prevailing anthropocentric strategies, this project reinterprets inconstancy, a term often associated with negative connotations, as a speculative field that accommodates human and non-human agencies.[10]

Reductive curation

This philosophical focus on the nuanced interplay between independent entities enriches the restoration and simulation of interactions between material and the immaterial in the design of the physical model. The emergent texture becomes a sensory trigger by rubbing oak veneers with graphite powder, aiming to evoke phenomenological associations within the audience. This deliberate tactile treatment beckons viewers to reminisce about the sound of raindrops on corrugated rooftops, the marks from torrential downpours, and the gentle fading of surfaces exposed to moisture.
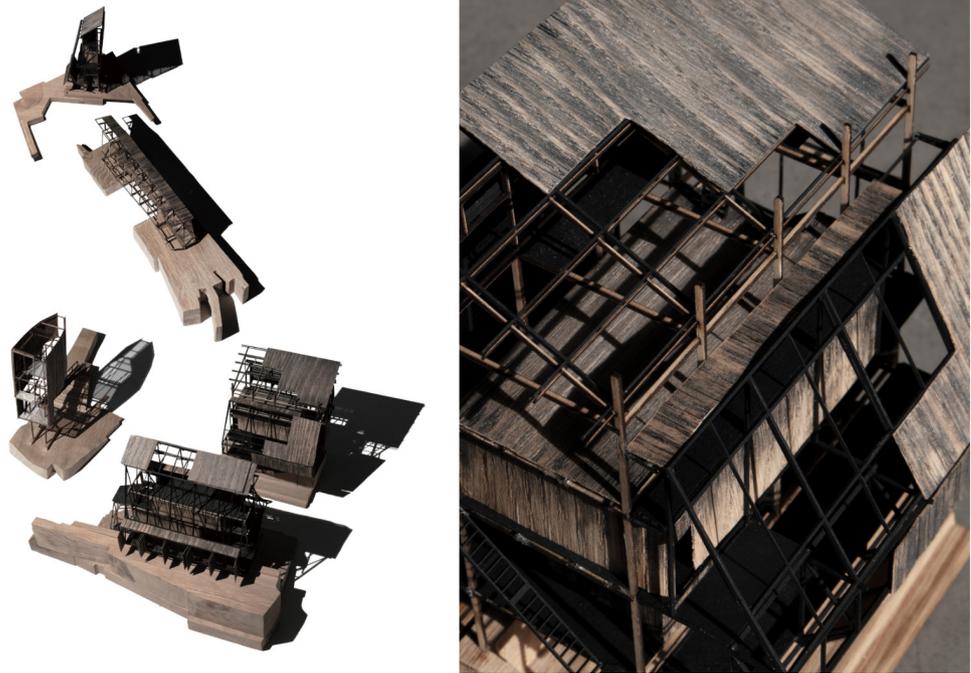
Fig. 9 Qixuan Hu (2023). Model: Curated looseness. [Photograph]

Two primary model materials, plywood and black mountboard, distinguished by their contrasting colours, have been chosen to depict the hierarchy inherent in the architectural language (Fig. 9). The careful selection of joining techniques and varying structural densities is designed to mimic the feel of actual steel. A conscious decision was made to remove portions of the facades, revealing the hidden complex structural design. This approach not only unveils the internal construction but also imparts a sense of incompletion, reminiscent of the ongoing construction process carried out by residents.

Epilogue

The fascination with the concept of porosity in this project culminates in developing an object-oriented architectural language. This suggests that the design gestures are tailored to resonate with the inherent characteristics of (non)substances, acting as a permeable intermediary between human and non-human entities.[11] The objects are invited to create space, each showcasing their distinctive curtain calls. This vibrant interplay of interactions and displays emerges in a cyclical dance, harmonising the acts of consumption and rejuvenation. The meaning of this status of continuous construction could be aptly encapsulated by a quote from *Invisible Cities*[11]—"So that its destruction cannot begin."

As a research-led design, this project endeavour seeks a distinctive perspective on re-evaluating the value of terrains that are susceptible to climate shocks. It highlights the value of an adaptable architectural language that can effectively respond to and harmonise with the ever-changing landscape. Consequently, porosity emerges as a subtle mediator between environmental changes, biodiversity, and habitation, demonstrating its potential as an architectural design method in the face of inconstancy, thus provoking discussions of more inclusive approaches by non-human agencies to architectural design and research methods.

Fig. 10 Qixuan Hu (2023). Exhibition physical model. [Photograph]

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NOTES

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